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ADVANCEMENT OF ELECTRICAL, INFORMATION AND COMMUNICATION TECHNOLOGIES FOR LIFE APPLICATION

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SOCIETY
FOR SCIENCE AND NATURE
SCIENCE FOR LIFE

EDITORIAL COMMUNICATION

The special issue of Bioscience Biotechnology Research Communications Vol 13 No (4) 2020 on **"Advancement of Electrical, Information and Communication Technologies for Life Application"** aims to provide an original research articles from scholars, researchers, academia and industry on the emerging technological problems in areas of Electrical, Information and Communication.

This special Issue contains 60 articles on topics of Recent Advancement in Electrical, Information and Communication Technologies. Some of the important research discussions are Neural Network, IOT, Antenna, Electrical vehicle, Battery monitoring, Image Processing and Wireless Sensor Networks.

All submissions are well supported by proof with a direct and simulated comparison to the technical solutions, designs and implementations. The article available in this issue will be helpful for the researchers working in these new emerging areas.

Best wishes and thank you for your contribution to this special issue - Advancement of Electrical, Information and Communication Technologies for Life Application!

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Happy Reading!

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Random Forest based Solar Radiation Prediction

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ABSTRACT

Precise forecasting of sun radiation is primary essential to utilize the solar power effectively. The primary objective of this article is to make forecasting model for the estimation of solar radiation using machine learning algorithm. For forecasting the sun radiation a regression model of random forest technique is introduced in this paper. In this paper, Five variables are used to build the source regression model and actual solar radiation is used as target attribute. The solar radiation is predicted with the help of Source regression model by majority voting of class. In order to validate the regression model, Root mean square value is used. The error value obtained from the existing decision tree regression model is 0.42.In this paper the calculated RMS value of proposed random forest method is 0.34 which is comparatively less than existing model. The simulation results show that accuracy of proposed method is improved with reduced error value. The proposed method with improved accuracy is more useful to predict solar radiation in order to consume the solar radiation in effective manner

KEY WORDS: RANDOM FOREST, SOLAR RADIATION PREDICTION, DECISION TREE, REGRESSION,RMS VALUE.

INTRODUCTION

In recent years, Machine learning techniques are plays vital role to make conclusion in both classification and regression model type of questions. (SelvamNallathambi et al,.2018, MonanapriyaMuthukumar et al,. 2017) The rudiments of supervised machine learning algorithms are made clear in order to predict and utilize the solar energy effectively.(Baskaran et al,.2019) establishes different techniques such as Support vector regression ,artificial neural network and decision tree to estimate the solar irradiance. The results of ensemble models are examined with RMSE.(J Liu et al,.2019) introduced feature extraction based random forest to predict the solar radiation. (R saranya et al,. N Selvam et al,.2019) explained about the computation of solar radiation based on Decision tree algorithm. In existing paper only five parameters are used to forecast the global solar radiation .In this proposed method, Multiple of decision trees i.e. random forest algorithm is implemented with five input parameters in order to reduce the different error values with improved accuracy.

MATERIAL AND METHOD

Random Forest Method: Random forest is an ensemble learning based classification and regression techniques. It is one of the commonly used predictive modeling and machine learning techniques. A random forest is making a bunch of decision tree and consulting all of them at once to make your decision. Profoundly authentic classifier and running effectively on large data samples are the

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typical characteristics of random Forest. The benefits of random forest method are pruning of tree is not required and over-fitting is not major issue in proposed method. Figure 1 describes the working of proposed method. Firstly the predicting model is created based on the five input parameters and target variable. Then unknown data samples are fed into the created model to estimate the solar radiation. The operational procedure of random forest is presented in figure 2.Since the used method is random forest so multiple numbers of trees is developed and consulted with all the trees by majority voting of class to make highly authentic decision.

Figure 1: Block diagram of Proposed Method
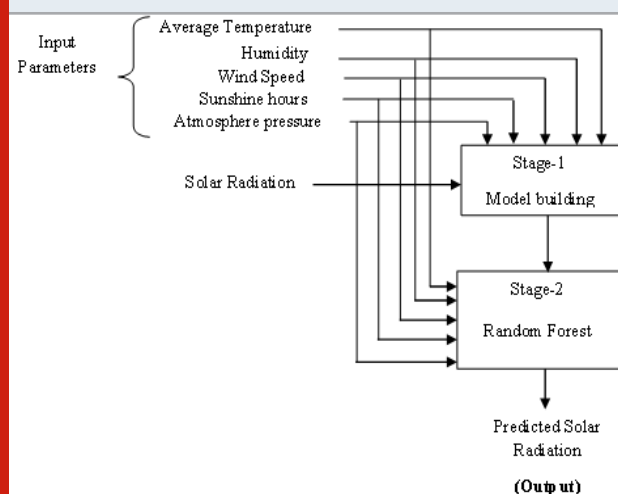
There are two stages in random forest, random forest creation is the first stage and the second stage is to make a prediction from the random classifier created in first stage.

The first stage working is as follows, step one is from the total M features randomly select K features while the value of K must be less than M. In Step 2, with the randomly selected K features find the node d using the best split point. In Step 3, the node d formed is further split into decision or daughter nodes. In Step 4, the step from 1 to 3 is repeated until the single node is obtained. Like this the tree is created by repeating the steps from 1 to 4 for n number of times.

Figure 2: Design and Working of Random Forest Algorithm
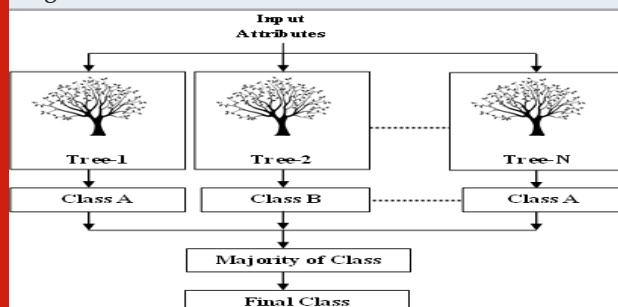
The second stage in random forest work as follows, the total number of M features is divided into two features. The one is training feature and the other is testing feature. The training feature is for creating the model and the testing feature is used to make the prediction. In Step 1, the test feature is taken and the decision tree rule is implemented for the randomly selected input feature to predict the outcome and the predicted outcome (Global Solar Radiation target) is stored. In Step 2, the votes of each predicted target is calculated. Finally in Step 3, the majority voting of the predicted outcome is considered as the final prediction from the random forest algorithm.

Solar Radiation Prediction: Solar radiation is predicted by using the random forest algorithm. For the prediction of solar radiation the input attribute chosen are average temperature, atmospheric pressure, humidity, sunshine hours, wind speed and month. These input attributes along with the solar radiation is given as input to the random forest algorithm. The ratio of training and testing data set is 50:50 which implies that 50% of data is given for training the model and the remaining 50% of data is used for testing the model.

The random forest algorithm working is similar to the decision tree algorithm since multiple decision tree forms random forest. For the regression type of dataset, the standard deviation of target is calculated by using the Equation mentioned in [8]. Using the Equations the standard deviation must be calculated for all other input attributes. Now for the entire input attribute the standard deviation reduction have to be estimated by using the formulas. The standard deviation reduction of entire input attributes the standard deviation reduction has to be calculated. The root node of the tree depends on the input attribute, which has the highest standard deviation reduction. In this model, the sunshine hour has the highest SDR value it forms root node and it further split up into decision node or daughter nodes until the predicted value is obtained.

RESULTS AND DISCUSSION

The multiple decision trees are created for the dataset with 365 samples. The dataset is collected from the website open government of India. The dataset of year 2017 is chosen. Partial data samples are fed into the well builded random forest model to forecast the solar radiation. Majority of voting class is investigated from the Multiple of decision trees then the optimal value is considered.

The predictive model created by random forest technique based on the Input parameters. After building the model, the unknown data is rolled down one by one to predict the target. Likewise the unknown target is predicted values are tabulated in table 4. It shows the Predicted Value of Global Solar Radiation by Random Forest Technique. It predicted the Global Solar Radiation more accurately than other Techniques.

Table 1. Predicted Result of Random Forest Algorithm		
S.No	Instances	Predicted Solar Radiation
1	10	472.5
2	20	472.2
3	30	473.1
4	40	471.9
5	50	472.4
6	60	473.3
7	70	471.2
8	80	472.3
9	90	472.8
10	100	473.5
11	110	471.6
12	120	473.2
13	130	473.8
14	140	471.7
15	150	471.0
16	160	472.5
17	170	473.4
18	180	481.6

Model Validation: The dataset with 365 samples are not predicted as actual, there are some error occur between the actual and predicted. In these four types of error is calculated for the given dataset using Equations mentioned below. Where y_i is actual target value, y_i is Predicted target value using Random forest and d is Total Number of Instances

$$MSE = \frac{\sum_{i=1}^{d}(y_i - y_i')^2}{d} \qquad (1)$$

$$RMSE = \sqrt{\frac{\sum_{i=1}^{d}(y_i - y_i')^2}{d}} \qquad (2)$$

$$RBE = \frac{\sum_{i=1}^{d}|y_i - y_i'|}{\sum_{i=1}^{d}|y_i - \overline{y}|} \qquad (3)$$

$$RRSE = \sqrt{\frac{\sum_{i=1}^{d}(y_i - y_i')^2}{\sum_{i=1}^{d}(y_i - \overline{y})^2}} \qquad (4)$$

After Predicting the target value of unknown data, different types of errors were estimated In order to find the accuracy level of predictive model. These error values are calculated mainly based on difference between actual target value and predicted target values using the equations (1) to (4). The obtained error values are represented and compared with Existing method [8] in the table2 (a) and 2 (b).Among the different types of error

values, the Mean square error reaches minimum error value i.e.)0.13 comparatively with existing scheme . The random forest provides minimum error as it shows that the dataset is predicted in accurate manner.

Table 2. (a) Error Results of two kind of models			
S.No	Error	Decision Tree [8]	Proposed Method [RF]
1	MSE	0.18	0.13
2	RMSE	0.42	0.34
3	RSE	0.45	0.24
4	RRSE	0.65	0.22

Table 2. (b)Comparison of Proposed and Existing method			
S.No	Paper	Algorithm	Root Mean Square
1	[8]	Decision Tree	0.42
2	Proposed Method	Random Forest	0.34

CONCLUSION

Random Forest algorithm is one of the supervised machine learning Technique for solving the regression type of dataset. In this work, the prediction of solar radiation is executed by random forest algorithm. The predicted outcome is more accurate since the error value is minimum. The random forest provides efficient prediction of solar radiation so that the production of electricity can be properly designed. Random forest provide good design feature and it is easy and fast in creating the model compared to other machine learning algorithms. The prediction of solar radiation by random forest is designed by using the MATLAB tool of version R2017a. The various type of error is estimated for the given dataset.

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Frame work for Improving Spectral Efficiency in Cognitive Radio Network Using Markov Decision Algorithm

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ABSTRACT

CR is a growing technology for future generation of networks. It gets more attention in recent times due to most promising solution for the efficient utilization of spectrum. The main importance of CR is to increase efficiency of communication networks. Spectrum efficiency is the important characteristic. In order to improve the Spectrum Efficiency, MDP framework is used to find the best method of spectrum sensing interval where Secondary user senses the Primary User channel once in consecutive slots. Markov Decision Process (MDP) maintains the tradeoff between throughputs of the (SU) and reduces the interference caused to the (PU).

KEY WORDS: SPECTRUM SENSING INTERVAL, MDP, INTERFERENCE, THROUGHPUT.

INTRODUCTION

Thus, spectral efficiency plays major important factors in cognitive radio networks. Simply, it is a next generation technology in order to efficiently use the spectrum resources. There are three basic tasks. They are Spectrum Sensing, analysis and decision.

Spectrum Sensing: It deals with radio channel specifications, availability, transmit power, interference and noise.

Spectrum Analysis: It is based on external and internal radio waves. It is able to find the channel estimation.

Spectrum Decision: Spectrum decision deals with reconfiguration for the channel and protocol of transmission values. The main aim of cognitive radio network is to improve the spectral efficiency by protecting primary user PU from interference in the same time to increase the throughput of secondary user.

The paper consists of following modules: In Section 2 the work related to spectrum specifications in CRN and problems in that is discussed. In section 3, architecture model of the network., Calculation of optimum sensing interval is defined in the section 4. In section 5, Simulation and results of the proposed work. Finally the conclusion in Section 6.

MATERIAL AND METHOD

Related Work: The tradeoff between primary user interference and secondary user throughput is formulated as a MDP problem and it was analyzed in (Hoang et al,. 2009)In (Mercier et al,. 2008), the authors have discussed about the cognitive radio network spectrum utilization

and its performance in spectrum sensing with the help of two probabilities of interest namely, PFA and PM.. With the help of this two-performance parameter (Wang et al,. 2009; wang et al,. 2010) probabilities result the impacts the secondary user's maximum reachable throughput to the PU. .In (Petrio et al,. 2008), mainly focused on the maximum achievable throughput (Joshi et al,. 2013) without considering the interference caused by the primary user. They have proposed a spectrum sensing model at the receiver end in order to get the efficiency i.e maximum throughput. In Chen et al,. 2009) the researchers have discussed how Markov decision process framework is related to cognitive radio network with its own properties.

Proposed System Model: The time slotted cognitive radio network with traditional spectrum sensing scenario is shown in Figure 1. The periodic spectrum sensing should consider following design issues:

Figure 1: Traditional spectrum sensing in Time slotted cognitive network

Markov channel model
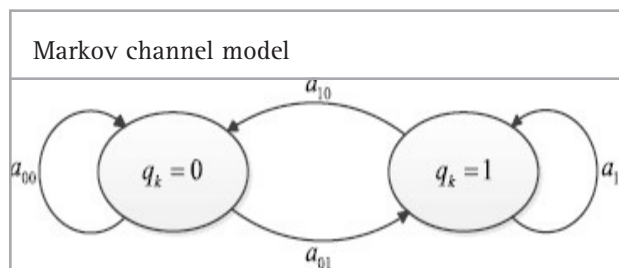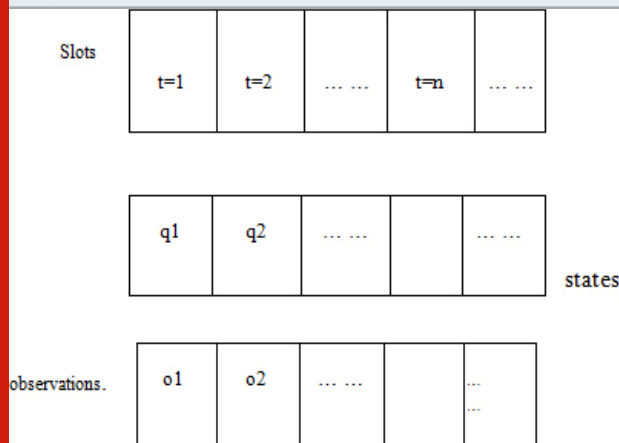
$$a_{ij} = P(q_{t+1} = j | q_t = i\,) > 0,\ i, j \in X\ (1)$$

Calculation of Optimum Sensing Interval:
Principle of Optimality: The policy function and value function are the two important parameters of Bellman equation.

Policy Function It defines the behaviour of the agent, MDP policies depends only on the current state and not on the previous state. They are stationary.

Value Function: There are two methods in Markov Decision Process to calculate value function iterative function and value deterministic function. In spectrum sensing value iterative method is used for the calculation of optimum spectrum sensing interval. On each iteration, new probability transition matrix is updated and optimal sensing interval is calculated. Bellman equations relates the value function to itself via the problem dynamics. It is defined in the bellman equation.

RESULTS AND DISCUSSION

Simulation and Results: Markov decision framework of cognitive radio network is implemented using MATLAB is shown in this section.. It consists of slot length T, The channel coefficients are denoted by huv, hud, hsv, hsd. The input parameters for the calculation of optimum sensing interval is given below.

Table 1. Input Parameters

Parameters	Values
Bandwidth W	10KHZ
Noise Variance N0	-87dBm
Transmission power	10mW
Transmission time for each slot	0.057s
Throughput Threshold	3Kbps
Interference Threshold	4dBm

Table 2 shows the implementation of reward function for both idle and busy channel of cognitive radio network under different channel coefficients

Coefficients Channel	Idle	Busy Channel
[0.1,0.9]	0.6423	1.3415
[0.2,0.8]	0.6845	1.1905
[0.3,0.7]	0.6999	1.0932
[0.4,0.6]	0.7028	1.0352
[0.6,0.4]	0.7296	1.0018
[0.7,0.3]	0.7876	1.0002
[0.8,0.2]	0.8012	0.9994
[0.9,0.1]	0.8516	0.8933

The values in the table shows the implementation of reward function of Markov decision Process which includes the parameters number of states, number of actions, Probability Transition Matrix with respect to idle and busy channel for the coeffients. It gives the trade off between interference of PU and SU. Figure 2 shows the interference Vs probability of detection .Interference decreases monotonically with the increase of Probability of detection has shown in the figure.

In Traditional spectrum sensing, time slot for each slot is about 0.05s. By using Markov decision process, Optimum sensing interval is calculated and gives the time interval of 0.1723s. Its shows the efficient usage of spectrum by 25%.

Figure 2: Interference vs probability of detection
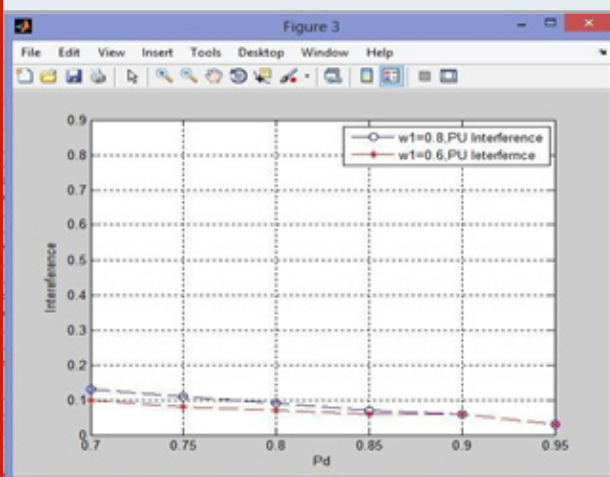
Figure3: Throughput vs Probability detection
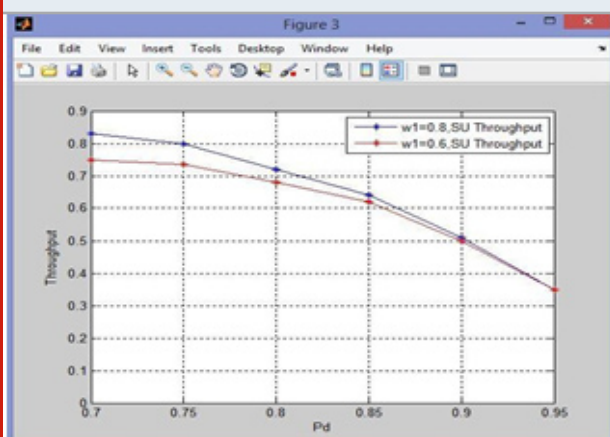
CONCLUSION

Markov Decision Process is finally decided for the spectrum sensing. Results shows that spectrum sensing using Markov decision process has high accuracy when compared to other methods. In traditional spectrum sensing interval for each transmission slot is about 0.05s whereas the spectrum sensing interval using Markov decision process is about 0.1752s which shows the

Figure 4 shows the implementation of Reward function of MDP (Mdecision Process) shows the plot between interference and throughput versus probability of detection
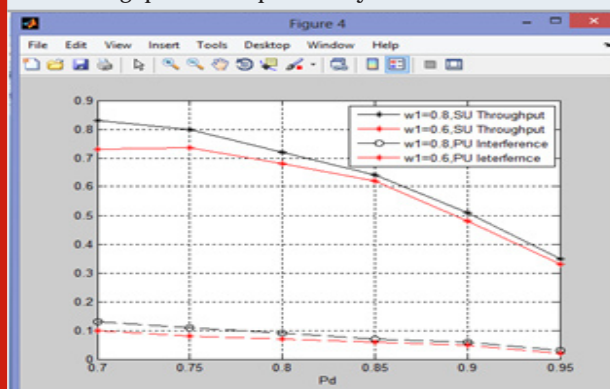
increase in the efficiency of 25%. With this optimum sensing interval maintains the tradeoff between primary user interference and throughput of the secondary user. With this, use of perfect scheduling gives further more efficient spectrum.

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Hop-By-Hop Data Transmitting using EPID to Reduce Iteration Process

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ABSTRACT

Text authentication is one of the most powerful ways to prevent the transmission of unauthorized and compromised traffic into wireless sensor networks (WSNs).Recently a polynomial-based scheme was implemented to provide that service. Nevertheless, this scheme and its extensions all have the drawback of an integrated threshold determined by the degree of the polynomial: if the number of transmitted messages is greater than this threshold, the opponent will fully recover the polynomial. A scalable authentication scheme based on elliptic curve cryptography (ECC) is proposed in this paper. While enabling intermediate node authentication, our proposed scheme allows any node to transmit an unlimited number of messages without suffering the threshold problem. To reduce the number of iterations Enhanced Privacy ID (EPID) is a proposed cryptographic scheme that allows a hardware device to be remotely authenticated while maintaining the device's privacy.EPID can be seen as a direct anonymous credential scheme with increased ability to revoke. Through EPID, if the private key embedded in the hardware device has been stolen and widely published, a computer can be revoked so that the manager can identify the compromised private key.

INTRODUCTION

A backhaul is an idea for managing the flow of data over a network. When transmitting in parts, data fragments are transmitted from node to node, and stored in the forward direction. Since the transport passage after the transition includes not only the source and destination nodes, but also some or all of the intermediate nodes, it allows data to be transmitted even if the path between the source and destination is not constantly connected during communication. Nevertheless, if the implementation of end-to-end transportation does not lead to an increase in efficiency, then an end-to-end traffic control system should be implemented, the end-to-end concept says. In addition, transit traffic requires status information for each flow in the intermediate connection. Nodes, which limits its scalability. Today, this is one of the reasons why end-to-end transport protocols, such as TCP, dominate almost all communications.

Ongoing fragmented mobile network research is considering cross-segment traffic for application scenarios in which end-to-end connectivity is only occasionally available, as cross-segment traffic can achieve significant performance improvements. Transfer the data to a secret code. Encryption is the most effective way to protect data. You must have Allows you to decrypt access to the secret key or password to read the encrypted file. Unencrypted data is called plain text; Encrypted data is called ciphertext.

The EPID continuously integrates frames when the IMRT field is emitted. In this data collection process, we identified several possible errors: missing data between the start of the radiation and the image and the last (incomplete) frame that we showed to the IMRT fields; The time elapsed during the exposure from data transmission, we have successfully adjusted for clinical MU (> 100). We compared the estimated relative profiles and dosage of 25 prostate fields on the central axis. Using our correction methods, we obtained very good agreement between the estimated and expected profiles with an average sigma of 1.9% and standard deviation. 0.5%; The size of the central axis is more than 2.0%. We concluded that the aS500 is an effective tool in the context of MU clinical settings (> 100) for testing IM beam delivery. Although the supplier plans to upgrade to solve such problems, our results show that the current configuration will give satisfactory results using simple repair schemes.

MATERIAL AND METHOD

Modules:
- Initialization
- Node Registration
- File Request
- View File Request
- Encrypt File
- Send File (EPID)
- Decrypt File

Initialization: In this module user have to login, after successful login then it redirect the page to home page. If user didn't have user account they have to register their details.

Node Registration (TCP): In this module, every new network has to register their details. After registration only networks get user account. By using this user account networks can access their account. This Network Formation is created by using TCP (Transfer Control Protocol). After creating a network group, users can send file request or data transmission.

Send File Request: In this module, user has sent the request to destination from data owner. And the requests are accepted to destination. Nevertheless, the hopping rate of the jammer is constrained by the time it has to remain on a given band (dwell time) to corrupt a sufficient number of bits from the targeted packet.

View File Request: The file request can be found in this Modulesource ID. After that, source Id is able to verify the environment of nodes that it is either trustable or untrustable.

Encrypt Data & Send Data (3DES Algorithm): In this module, admin have to view the request from the data owner. And using security sharing data from encrypted files from nodes to destination. Data transferred from source node to destination node Because we operate in the mobile network, mobility of nodes is set, i.e., nodes switch from one location to another. For Data security sharing we implement 3DES Algorithm for encrypt the data.

File Transferring (EPID Algorithm): A Wireless Network is built in this module. All nodes are placed randomly within the area of the network. Our network is a mobile network, nodes with mobility are allocated (movement). Description of source and destination nodes. Transferring data from source node to destination node. Since we work in a mobile network, mobility of nodes is set, i.e., node moves from one position to another. We apply the EPPID algorithm for data sharing. This algorithm is used to plan the path of networking (i.e.) to evaluate the path of data transfer, and then to send data.

Download & Decrypt data: In this module user can search the file from database and then download the file after download completion user have to decrypt the data by using 3DES algorithm. Then only the document converted into human readable format.

Existing System:
- The packet loss is very high in the network
- The variable delay in the transfer of data packet in the bilateral communication
- Transmission delay in the transfer of packets from source to destination
- High transmission bit error
- Network reliability is not maintained in the existing system.
- Data Security, Integrity and Privacy are less in the existing system.
- Proposed System:
- Processing delay is less than 45.32 µs.
- The data encryption provides data security from attackers
- Network Reliability is achieved if there is a failure in the node it takes alternate path to reach the destination
- Low packet loss, low jitter, low total delay and low bit error
- Service Oriented Router is a new generation backbone router which can inspect the data contents in a packet up to OSI layer.

Algorithm:
PID: Privacy enhancement technologies (PET) is a general term for a collection of computer tools, applications and frameworks that-when incorporated into online services or applications or when used in combination with such services or applications-enable online users to protect the privacy of their Personally Identifiable Information (PII) provided to and controlled by such services or applications.

Privacy enhancing technologies can also be defined as: Privacy-Enhancing Technologies is an ICT measures system that protects information privacy by removing or reducing personal data, thus preventing excessive or

unauthorized processing of personal data without the loss of information system functionality.

EPID: Enhanced Privacy ID (EPID) is a cryptographic scheme that allows authentication of a remote device while maintaining data privacy. EPID can be viewed as a direct, anonymous credential system with enhanced revocation. To override a device, a device can be overridden in EPID if the private key within the hardware device is extracted and published widely.

RESULTS AND DISCUSSION

System Design: Layout is the process of translating specifications that are identified during the study into several Voter requirement layout activities. In this step the designer chooses the specifications needed to implement the system; the database is also designed. Limitations are opportunities to improve the output method once the problem has been identified. A detailed design of the proposed system is completed. In database design several objectives are considered such as,

- Controlled Redundancy
- Data Independence
- More Information at low cost
- Accuracy and Integrity
- Recovery and Failure
- Security
- Performance

1.Input Design: Input design is a way to translate voter input into a computer format. System input quality System quality determines the quality of the output signal. The data format and evaluation criteria used to deliver data to the system determine the input scheme. Input design is part of the overall design of the device, which requires a lot of attention. If the data entering the system is incorrect, these errors increase during processing and performance. Computerized and interactive feedback can be classified as internal, external, and operational. The learning process will take into account the impact of input on the entire system, including other processes.

Key tasks to consider when designing input data are input processing efficiency, consistency and integrity of evaluation guidelines, as well as managing expectations in input documents and design mapping to ensure the accuracy and reliability of input data. Communication with input data. Careful input design often requires error management, testing, packaging, and evaluation procedures. The nature of the input that occurs here reduces the error to its limit. The client input is checked at the end of the client and transferred to the database. Any irregularities found in the input are verified and processed efficiently. Features of the input circuit can provide system reliability, obtain results based on accurate data, or give incorrect information. Input screen features include: well-defined notifications and reminders, simple menu items and field labels, custom mess screens.

2. Output Design: System output usually refers to the system output and information. The main reason for developing a program for many end users and the performance criteria they will determine the usability of the application. Most final voters control the information system or provide data through the workstation, but the system uses the output. When designing output, the device analyst will do the following: Determine which information to display, where to display it, print the information and select the output medium.

3. **Database Design:** The structure of the database controls the structure and configuration of the table. The purpose of the database is to access voter information in Oracle. This process determines which tables to create, which columns to include, and how to link them. The voter database is an automated array of related data. The limited frequency and the numerous voters / applications are served quickly and efficiently. The database system is basically a computerized accounting system, i.e. a computerized system, whose overall goal is to maintain information and access it as needed. A DBMS is a set of programs that allow you to collect or related data, and many voters can run Oracle. Its main goal is to provide voters with an abstract view of data, that is, the system hides some details of how data is stored and maintained.

Data flow diagram:
User:
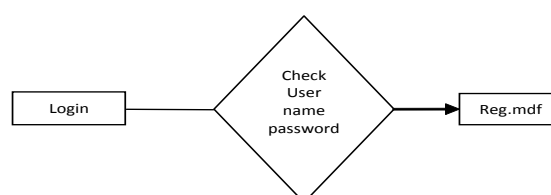
Initialization
Node registration (ftp):
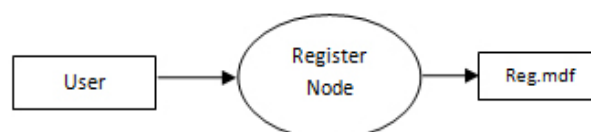
File request:

View file request:
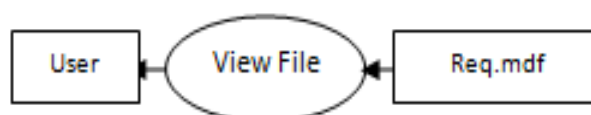
Encrypt file & send file (epid):
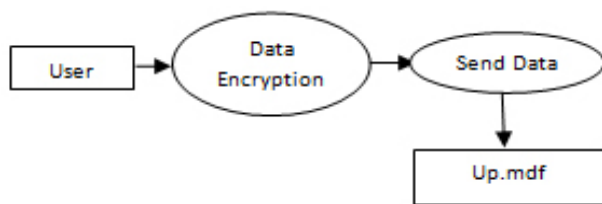
Decrypt file:

Admin module:
Initialization:
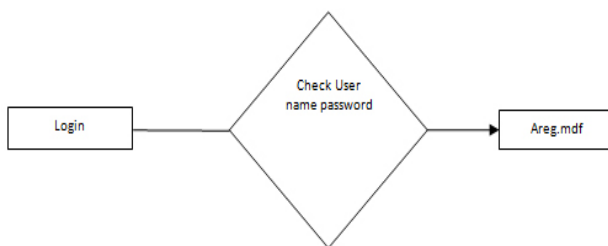
View user details:
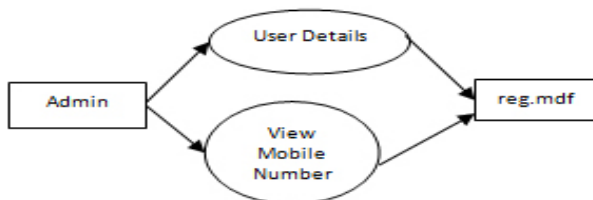
Table Design:

User Registration

Table 1.		
User Name	nvarchar(50)	Unchecked
Password	nvarchar(50)	Unchecked
Ip Address	nvarchar(50)	Unchecked
Protocol	nvarchar(50)	Unchecked

Table 2. Data Request		
Sender Id	nvarchar(50)	Unchecked
Destination Id	nvarchar(50)	Unchecked
Details	nvarchar(MAX)	Unchecked

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CONCLUSION

We were proposed by BFS Algorithm in Wireless Mesh Networks to route multipath protocol. In this protocol, the source discovers multiple paths to the destination using parallel path-based approach. The method organizes the nodes for each and every iteration into multiple paths. To find partial paths it performs the first search method to length. The partial paths obtained are stored in the set component direction. Repeat this process until it reaches destination. By bringing all partial paths together, the source gets multiple paths towards the destination. Using primary path selection method, the primary route is chosen from multiple paths. The source uses the primary route to transfer the packets of data to the destination. To choose the primary direction, the approach uses the Expected Forwarding Counter (EFW) metric.

Future Enhancement: Its methodology should be applied to mobile nodes in a wireless sensor network, since mobility is not considered in this study. The effects of very high density nodes must be investigated. Multi-hop routing was adopted in this work. The ability to use clustering and data aggregation technology must be tested in one wireless sensor network. The energy problem in the transport layer was not discussed in this study.

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ParijathamVKalpanaVDhivyaRRajavarman RVidya An Efficient Cloud Security System Using Verifiable Decryption Process

Shi-Xiong Zhang Yifan Gong Dong Yu -Encrypted Speech Recognition Using Deep Polynomial Networks

Sowjanya Mou Dasgupta Sangram Ray Mohammad S Obaidat-An Efficient Elliptic Curve Cryptography-Based Without Pairing KPABE for Internet of Things

Sivakumar U Srinivasulu Reddy Aspect Based Sentiment Analysis of Students Opinion using Machine Learning Techniques

Data and User ConfidentialityPrivacy Preservation in Distributed Servers

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ABSTRACT

Distributed data and its processing to cloud storage server deliver an efficient way to organize large scale file storage and its related operation. Under privacy and security issues on user data that are sensitive need to stored and protected from the distributed cloud server and intruders. The proposal is to distribute encoded information to the cloud server to perform necessary processing on the information that has been encrypted. It is a tedious process to organize and support queries in the circulated server that has been put away and encrypted. which has been stored efficiently and securely in the most prominent way that the cloud server doesn't gain or attain any knowledge that has been put away in the server. In our proposal, we investigate the issue of secure horizon inquiries over encoded data. The skyline query is efficient for securing data in the server, i.e.: skyline controls the entire data with encrypted data and database. We utilize a complete secure skyline query on scrambled information utilizing semantically-secure encryption. We implement a secure dominant protocol that secures the data with its dominance, from which unauthorized access can be blocked. The outsourced data in the distributed database server are quite insecure when compared with the current techniques and security measures. So we propose a strategy dependent on horizon inquiries, alongside that we incorporate the client information asfigment information and the information and the database are in an encoded position with the goal that the disseminated server does not know the information that has been spared by the client to the information proprietor. The data has been stored within an image using the morse code analysis procedure. It stores the user information into an image and retrieves the user data using specific private key generation. The data owner is the authorized person who transmits the information that has been spared by the client to the information proprietor. The distributed server does not know the information that has been spared by the user. On account of intruder breach, the interloper achieves the figment information and the gatecrasher ready hint will be given to the concerned information proprietor and client. Along with that block, privacy procedure has been implemented to enhance the privacy features and secure the user data.

ARTICLE INFORMATION

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INTRODUCTION

This is a growing computing paradigm, distributed computing draws in expanding consideration from both research and industry communities. Outsourcing information and calculation to the cloud server gives a financially savvy approach to help enormous scope information stockpiling and inquiry preparing. In any case, because of security and security concerns, delicate information should be shielded from the cloud server as well as other unauthorized users. A common approach to secure the classification of re-appropriated information is to scramble the information. To shield the classification of the inquiry from the cloud server, approved customers additionally send scrambled inquiries to the cloud server. It delineates our concern situation of secure question preparing over scrambled information in the cloud.

The information proprietor redistributes scrambled information to the cloud server. The cloud server forms encoded inquiries from the customer on the scrambled information and return the inquiry result to the customer. During inquiry preparing, the cloud server ought not to increase any information about the information, information examples, question, and inquiry result. Completely homomorphic encryption plans guarantee solid security while empowering discretionary calculations on the encoded information. In any case, the calculation cost is restrictive practically speaking. Confided in equipment, for example, Intel's Software Guard Extensions which is an expanded form of SGX brings a promising option yet at the same time has impediments in its security guarantees.

Many techniques have been proposed to help explicit questions or calculations on scrambled information with differing degrees of security assurance and effectiveness (e.g., by more vulnerable encryptions). Concentrating on similitude search, secure k-closest neighbour (kNN) inquiries, which return k generally comparative (nearest) records given an inquiry record, have been widely studied.

MATERIAL AND METHOD

Related Works: B. Rogers: Advances in detecting and following innovation empower area based applications yet they additionally make big protection risks. Anonymity it may provide a huge level of protection, spare assistance clients from managing specialist co-ops' protection arrangements, and decrease the specialist co-ops' necessities for shielding private data.

However, ensuring unknown utilization of area-based administrations necessitates that the exact area data transmitted by a client can't be effectively used to re-recognize the subject. This paper presents a middleware engineering and calculations that can be utilized by an incorporated area intermediary administration. The versatile calculations change the goals of area data along spatial or transient measurements to meet indicated secrecy limitations dependent on the elements who might be utilizing area benefits inside a given region. Using a model dependent on car traffic checks and cartographic material, we gauge the practically anticipated spatial goals for various obscurity imperatives. The middle goals created by our calculations is 125 meters. Along these lines, mysterious area based solicitations for urban regions would have a similar exactness at present required for E-911 administrations; this would give adequate goals to wayfinding, computerized transport steering services, and similar location-dependent services.

Fincy Francis1: Dummies help improve the achievement rate since they can be constantly accessible, notwithstanding, utilizing fakers have two principle challenges. The first is how to produce a fake that is indistinct from a genuine client particularly on street systems which have changed development patterns. Besides, fakers can be utilized to dispatch assaults on the area based server by malevolent customers which influence the matter of the specialist co-ops. In this paper, we propose an innovative customer orientated security safeguarding plan for ceaselessly questioning street arrange administration that is additionally fit for ensuring location-based servers from attacks.

We utilized a disconnected direction grouping calculation that bunched clients' direction and utilized the inferred parameters to create financially effective reusable sensible dummies on the road network. To defeat malevolent customers utilizing fakers to dispatch assaults on the spot based servers, we built up a privacy-preserving verification protocol equipped for checking the exercises of all customers in a security saving way to control such assaults. We tried the productivity of our calculation with some characterized assessment measurements, and it gave powerful security assurance, fulfilled customers consistently inside a phenomenal handling time at a sensible sham preparing cost when ceaselessly questioning road network services.

C. Gentry: The expanding utilization of cell phones has set off the improvement of location-based services (LBS). By giving area data to LBS, portable clients can appreciate an assortment of valuable applications using area data yet may endure the difficulties of private data spillage. Area data of versatile clients should be stayed quiet while keeping up utility to accomplish wanted assistance quality. Existing area security upgrading methods dependent on secrecy and Hilbertcurve shrouding zone age demonstrated preferences in protection assurance and administration quality however inconveniences because of the age of enormous shrouding regions that makes question handling and correspondence less powerful.

In this paper we propose a novel area security protection plan that uses some differential security-based ideas and systems to distribute the ideal size shrouding territories from various turned and moved adaptations of the Hilbert curve. With trial results, we show that our plan fundamentally diminishes the normal size of shrouding territories contrasted with the past Hilbert

curve technique. We likewise tell the best way to evaluate the foe's capacity to play out a surmising assault on client area information and how to restrict the enemy's prosperity rate under a structured edge.

E. Aktas: Location-Based Service (LBS) has become an indispensable piece of our everyday life. While getting a charge out of the accommodation gave by LBS, clients may lose security since the untrusted LBS server has all the data about clients in LBS and it might follow them in different manners or discharge their information to outsiders. To address the security issue. For this, we propose a DLS which is also known as Dummy-Location Selection. We are implementing a calculation to accomplish k-secrecy for clients in LBS. Not quite the same as existing methodologies, the DLS calculation cautiously chooses dummy areas thinking that side data might be abused by foes. We initially pick these dummy areas dependent on the entropy metric, and afterwards propose an upgraded DLS calculation, to ensure that the chose dummy areas are spread quite far. The gained results show that the proposed DLS calculation can essentially improve the security level in terms of entropy. The improved DLS calculation can expand the shrouding district while keeping a comparable security level as the DLS calculation

C.Gentry: In customary versatile crowdsensing applications, coordinators need members' exact areas for ideal assignment distribution, e.g., limiting chosen labourers' movement separation to task areas. The presentation of their areas raises security concerns. Particularly for the individuals who are not, in the long run, chose for any undertaking, their area protection is relinquished futile. For this, we propose an area security saving undertaking allotment system with geo muddling to ensure clients' areas during task assignments. In particular, we cause members to muddle their announced areas under the assurance of differential security, which can give protection insurance paying little heed to foes' earlier information and without the association of any outsider element. To accomplish ideal assignment designation with such differential geo-confusion, we figure a blended number non-straight programming issue to limit the normal travel separation of the chose labourers under the limitation of differential security. Assessment results on both reproduction and true client portability follow show the viability of our proposed structure.

Especially, our structure beats Laplace muddling, a cutting edge differential geo-jumbling component, by accomplishing 45% less normal travel separation on this present reality information.

Problem And Model Description: To defeat the previously mentioned constraints, for this we propose novel area security safeguarding portable application, called MoveWithMe. It is called MoveWithMe since it consequently produces a few fakes to move with the client like genuine individuals and fill in as interruptions to the specialist co-ops.

In the MoveWithMe framework, each fake has its moving examples, most loved spots, everyday plans, social practices, and so on. Given the client's security needs, the underlying number of imitations, the baits' social and travel designs, and their customized profiles can be changed. Not at all like past sham based methodologies which just create fakers in the close-by district and a similar city where the genuine client is found, our fakes might be in a similar city as the client, or various urban communities of various nations to additionally befuddle the assailants about the areas of the genuine client. The components, for example, GPS blunder and changing of speed are likewise thought of Bounce's solicitation before it goes out to the area based help, blend Bob's solicitation in with other recreated demands from the four imitations and afterwards send five demands inside and out to Yelp.

Regardless of whether Bob persistently gets to a similar area based assistance, the specialist organization will, in any case, make some hard memories to find Bob's areas out of five directions that show distinctive moving examples, employments, social practices, and so on. To demonstrate the viability of the security assurance offered by MoveWithMe, we appear in our tests that the clients' genuine directions are all around tucked away among fakes' directions since they are not just difficult to be recognized from distractions' directions outwardly by people yet also difficult to be recognized by cutting edge information mining procedures that the assailants or specialist co-ops may utilize. In the proposed framework alongside the encoded horizon inquiries, we actualize dream information, gatecrasher penetrates and scrambled database. The client adds or transfers his information to the conveyed database alongside the horizon inquiries and the extra highlights included the procedure is the information is included the appropriated server in a dream group so we can keep the information from the break of gatecrashers and alongside that the database has been scrambled so there will hush up better security to the client information.

Alongside that interloper, a ready message will be given to the client from the information proprietor if any anomalous exercises happen in the dispersed server. Hugely builds the validation techniques of whole information that shelter been put away in the disseminated servers. The client affects his information or the data that has been redistributed to the dispersed or Te cloud server. Alongside on the proprietor side, the clients who store their information has a huge component to give ideal validation to their data that has been decentralized. Diminishes the gatecrasher break up profoundly which improves the security highlights

RESULTS AND DISCUSSION

System Implementation

Skyline: Skyline question restores the articles that can't be overwhelmed by some other items. On account of a dataset comprising of multidimensional items, an

article rules another item on the off chance that it is as acceptable on all measurements, and better, in any event, one measurement. Horizon questions got extraordinary consideration in the database network during the previous decades. The horizon calculation got essential to numerous multi-rules dynamic applications. A critical number of calculations were proposed and concentrated widely. Given a strong relationship in a dataset, a horizon question restores the articles that can't be commanded by some other items. On account of a dataset comprising of multidimensional articles, an item commands another article on the off chance that it is as acceptable on all measurements, and better in at any rate one measurement. The meaning of horizon questions in multidimensional datasets is indistinguishable with the known greatest vector issue.

Figure 1: Architecture
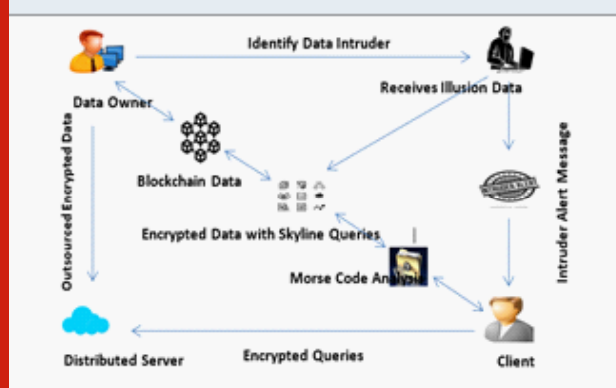
In these early works, horizon the calculation was an algorithmic issue in nature, and all information was expected to dwell in memory. Be nowadays we face large datasets that are put away in optional memory. Having the information on the disk(s), the proposed calculations for horizon question handling are isolated in two classes: file-based calculations and non-list based calculations. The horizon calculation issue was first concentrated in the computational geometry field where they concentrated on most pessimistic scenario time multifaceted nature. Proposed calculations accomplish improved security by validating client authorization for each datum that has been engaged with the framework. Since the horizon has been widely concentrated in the database field it encodes the information and just as the database by giving figment information to the interloper.

Secure Query Processing On Encrypted Data: Fully homomorphic encryption plans empower self-assertive calculations on encoded information. It is demonstrated that we assemble encryption plans to give superior security the information must be scrambled. Numerous strategies are proposed to help calculations on encoded information with security assurance and effectiveness. We know about interloper in any proper work on secure horizon questions over scrambled information with semantic security.

Significant research has been implemented to answer the issue that clients might be keen on horizon questions in the subspace of the information. In a system is proposed which utilizes horizon gatherings and unequivocal subspace to register the horizon in any necessary subspace. Upon this structure, a proficient calculation is proposed, named Skye, which applies a top-down way to deal with recursively register the horizon in subspace. Presorting methodologies and multidimensional move up and drill-down investigation decrease the arrangement of items to be looked at. A comparable methodology, the SKY CUBE, be proposed in, which is the association of the horizons of all possibles non-void subsets of a given arrangement of measurements. A few calculation sharing techniques are utilized, given viably distinguishing the calculation conditions among numerous related horizon questions. Base Up and Top-Down calculations are proposed to register the SKY CUBE effectively.

Secure Multi-party Computation (SMC): Secure multi-party calculation (otherwise called secure calculation, the multi-party calculation (MPC), or protection saving calculation) is a subfield of cryptography to make strategies for gatherings to mutually figure a capacity over their information sources while keeping those data sources private. In contrast to conventional cryptographic assignments, where cryptography guarantees security and uprightness of correspondence or capacity, and the foe is outside the arrangement of members (a meddler on the sender and recipient), the cryptography in this model shields members protection from one another. The establishment for secure multi-party calculation began in the late 1970s with the work on mental poker, cryptographic work that recreates game playing/computational errands over separations without requiring a confided in an outsider.

Note that generally, cryptography was tied in with disguising content, while this new kind of calculation and convention is tied in with hiding halfway data about information while registering with the information from numerous sources, and accurately delivering yields. Secure Multi-Party Computation (SMC) is a significant subset of cryptography. It can empower genuine information protection. SMC looks to discover ways for gatherings to mutually figure a capacity utilizing their sources of info while keeping these information sources private. SMC was proposed for multi-gathering and alludes to the issue of clients with low security for their information. In this way, we execute blockchain innovation to guarantee insurance to the client information alongside the horizon questions. The client confirms their information, and each datum has been interconnected with their hash capacities and topsy-turvy keys. The objective is to get a scrambled consequence of capacity on the contribution without unveiling the first contribution to the overseer.

An Example: To Understand better this idea, how about we utilize a basic model: a mystery number that is bigger than 1000, a hundred clients inside a framework, and a majority of 10 clients. Every client is given a one of a kind number somewhere in the range of 100 and 199. Since the base majority prerequisite is 10 clients,

whenever a gathering of at least 10 individuals meet up, their consolidated numbers, x, will uncover the mystery (x > 1,000) without uncovering any's an individual number.

Steganography Data: Steganography is the technique of hiding details in a safe spread channel. For example, any important detail can be concealed inside a document. Steganography provides favoured security over cryptography because cryptography encrypts the information but the presence of the information is not hidden. Steganography is the art of hiding data and change its presence in another form. It comes up as a better method for protecting the message compared to cryptography as it only encrypts the message but doesn't conceal the presence of it. The message is hidden in another file with the intention of making it not eye-catching. In this paper, we will inspect how pictures can be used as a mode to hide messages.

This paper examines a part of steganography devices. Steganography is useful technique that helps covert transmission of information over a different channel. Merging the mystery image with the carrier image provides us the concealed image. The clouded image is difficult to differentiate without retrieval. This paper will take a top to bottom gander at this innovation by acquainting the peruser with different ideas of Steganography, a short history of Steganography and a glance at a portion of the Steganography system. Steganography is the speciality of concealing information in a harmless spread medium. For instance – any touchy information can be covered up inside a computerized picture. Steganography gives better security than cryptography since cryptography shrouds the substance of the message however not the presence of the message.

So nobody separated from the approved sender and collector will know about the presence of the mystery information. Steganography messages are regularly first scrambled by some customary methods, and afterwards, a spread picture is adjusted somehow or another to contain the encoded message. The location of steganographically encoded bundles is called steganalysis. we implement three effective Steganography strategies that are utilized for concealing mystery messages. They are LSB based Steganography, Steganography utilizing the last two noteworthy bits and Steganography utilizing askew pixels of the picture. Symmetric and asymmetric key cryptography has been utilized to scramble the message.

The information is put away with various digit orderings, mixed in a solitary half breed information. Aside from a legitimate verification plot, the interloper gets just the illusioned structure of the information that has been put away in the circulated server.

Blockchain Privacy: A blockchain, which is initially square chain, It is a development rundown of records, called hinders, that are joined utilizing cryptography.

Each square result contains a "cryptographic hash" of the previous square.

By plan, a blockchain is impervious to alteration of the information. It is "an open, connected record that can be used to record swaps between any two collections productively and by a certain and changeless manner.".Once recorded, the information in some random square can't be adjusted retroactively without modification of every ensuing square, which requires the accord of the system greater part. Even though blockchain records are not unalterable, square chains might be viewed as secure by structure and embody a dispersed processing framework with high Byzantine adaptation to non-critical failure.

Blockchain was imagined by an individual (or gathering of individuals) utilizing the name Satoshi Minamoto in 2008 to fill in as the open exchange record of the digital currency bitcoin. The creation of the blockchain for gave rise to Bitcoin which provides advanced security. The bitcoin configuration has motivated different applications, and blockchains that are decipherable by people, in general, are broadly utilized by cryptographic forms of money. Blockchain is viewed as a sort of instalment rail.

A blockchain is decentralized, conveyed, and as a rule open, a computerized record that is utilized to record exchanges across many computers, so that,t any included record can't be adjusted retroactively, without the change of every single ensuing square. A blockchain has been depicted as a worth trade convention. Blockchain, here and there alluded to as Distributing Ledger Technology (DLT), makes the historical backdrop of any advanced resource unalterable and straightforward using decentralization and cryptographic hashing.

Example: Google Doc is a direct alternative for comprehension blockchain innovation. At the time when we create an archive and give it with a group of individuals, the record is set as opposed to duplicate or of being moved. This introduces a distributed conveyance chain that provides access to a file for many individuals simultaneously. No one is dropped out of expecting changes from a different group, while all changes to the encasing being noted constantly, making adjustments simple.

Blocks

Figure 2: Blockchain Structure

Each chain consists of different squares and each square three basic elements. The details in the square. A 32-piece complete number is called a nonce. The nonce is randomly generated when a square is formed, which at that point produces a square header hash. The hash is a 256-piece number associated to nonce. It should begin with countless zeroes.(i.e., be insignificant).

Visibility index is a calculation to evaluate whether the client's information is obvious to an after appropriate verification. Here three perceptions are performed to discover legitimate confirmation for the privacy of the information, Validation As-Filtering

Permeability Index Edge Value of the VisibilityIndex.x

Result And Expected Output: The results of the proposed schema implement the search results for the users in an efficient way. For example, if a user searches for a specific content our proposed schema provides the search results in an enhanced manner by analyzing searching content that has been put away in the disseminated database server which was obtained from the previous search contents. These previous search contents analysis the entire search data of the users involved in the system. Based on the previous user search results, our proposed schema attains better performance evaluation.

Figure 3 Conceptual Graph1
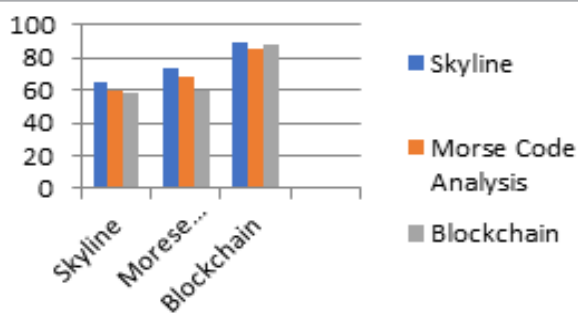
The search results are stored as a Conceptual Graph which represents the search results to the clients in a graphical format. So that the user can efficiently obtain the search results.

Figure 4: Conceptual Graph 2
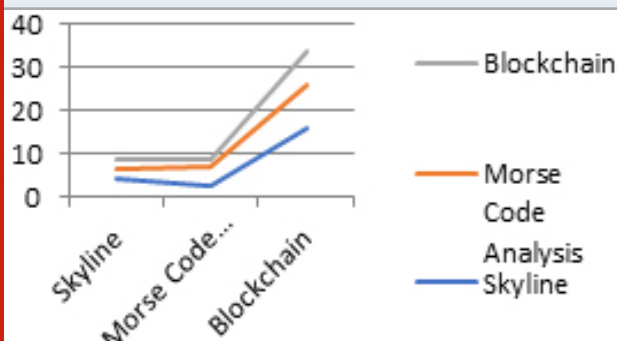
By using the Conceptual Graph the data can be effectively stored in the database for the further proceedings for the user those who search their valuable contents. At the same, the Conceptual Graph reduces the storage capacity of the information that has been put away in the server. Also, the conceptual graph effectively provides the searchresults to the clients. The conceptual graph reduces the additional storage spaces that have been stored. So in future proposal technique, most of the searchable encryption schema will be proposed using this Conceptual Graphs.

CONCLUSION

we proposed a completely secure horizon convention on scrambled information utilizing two non-intriguing cloud servers under the semi-fair model. It guarantees semantic security in that the cloud servers thinks nothing about the information including aberrant information designs, question, just as the inquiry result. What's more, the customer and information proprietor don't have to take an interest in the calculation. We likewise introduced a protected strength convention which can be utilized by horizon questions just as different inquiries. Moreover, we showed two enhancements, information apportioning and apathetic converging, to additionally diminish the calculation load.

At last, we introduced our usage of the convention and showed the attainability and proficiency of the arrangement. Alongside this, we present all the more new procedures like gatecrasher penetrate, deception information events and the encoded information just as the scrambled information and database. So the information that has been spared in the server is with calm better protection and security.

Future Enhancement: As for future work, we intend to streamline the correspondence time intricacy to additionally improve the presentation of the convention. Extra highlights like encryption and unscrambling utilizing cryptography just as pictures and recordings can likewise be executed if there should be an occurrence of hallucination information. Transcription systems can likewise be actualized for better future improvement.

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Challenges and Opportunities in Breast Cancer Treatment with Natural Component Curcuminn

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ABSTRACT

Among the many life-threatening cancers in the worldwide, the most common cancer found among females is Breast cancer and it stands second on cancer-related fatality. Curcumin is a natural dietary pigment from the root of the plant turmeric (Curcuma Longa Linn). Curcumin has the anti-cancer characteristics to suppress metastasis, progression and initiation of a variety of tumors. This present review aims to brief about the anticancer effect of curcumin in human breast cancer by in vivo as well as in vitro process. Also, the brief study is carried about apoptotic factors, cell cycle arrest, growth factors, signaling pathways, receptors and cancer stem cells in breast cancer. Electrophoresis techniques, photodynamic therapy, clinical trials of curcumin are also discussed.

KEY WORDS: APOPTOTIC FACTORS, BREAST CANCER, CANCER STEM CELLS, CELL CYCLE ARREST, CELL PROLIFERATION, CURCUMIN, IN VIVO AND IN VITRO.

INTRODUCTION

Curcumin(4-hydroxy-3-methoxyphenyl)1,6-hepta-diene- 3,5-dione], which is extracted from the plant Curcuma longa(turmeric), is such natural agent with anti-inflammatory and anti-antitumor effects(Bimonte et al., 2015). Curcumin possesses anti-carcinogenic, anti-inflammatory and anti-metastatic properties. Curcumin significantly restricted cancer growth and is considered to be a cancer chemotherapeutic agent and chemo preventive(Ko and Moon, 2015). The chemical structure of curcumin is shown in Fig:1 (Wang et al., 2016).

Figure 1: Chemical structure of curcumin
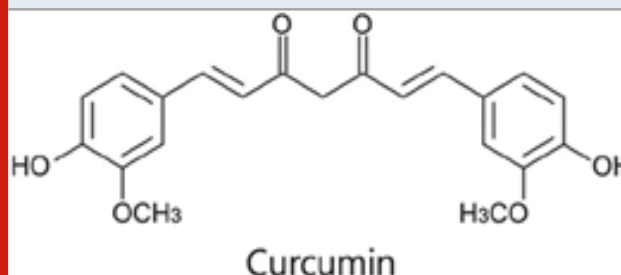
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Curcumin has been admitted as an effective anticancer agent and that regulates receptors (e.g., IL-8, CXCR4 and HER2), multiple intracellular signaling pathways, kinases (e.g., EGFR, JAK and ERK), transcription factors (e.g., STAT3, AP-1 and NF-κB), cytokines (e.g., TNF, MIP and IL) growth factors (e.g., EGF, NGF, and HGF) and enzymes (e.g., MMP, GST and iNOS) (Wang et al., 2016). Curcumin mediates breast carcinogenesis by its effect on apoptosis, cell cycle and proliferation, senescence, angiogenesis and cancer spread. Largely the NFkB, JAK/STAT, PI3K/Akt/mTOR and MAPK were the key signaling pathways involved and it also highlights the curcumin mediated cancer-related miRNAs, modulation of the tumor microenvironment, cancer immunity and breast cancer stem cells(Banik et al., 2017).

Many preclinical studies mainly focused on the anticancer efficiency of curcumin had tested in some breast cancer models. The effects of curcumin had tested in MDA. MB231 cancer cells by different groups. Curcumin played a vital role in angiogenesis in the mouse model of breast cancer and tumor growth. Curcumin wasanalyzed in both in vivo and in vitro studies. The term vivo refers to a study or experiment carried out within the living organism and vitro refers to a study or experiment occurring outside the living organism. In vitro analysis, curcumin plays a role in the apoptosis of MDA.MB231 cells and regulation of proliferation. In vivo analysis, curcumin inhibited tumor growth. Curcumin would be used as an adjuvant chemotherapeutic agent in triple-negative breast cancer treatment(Bimonte et al., 2015).

The term electrophoresis referred to as a technique in which a high voltage electrical pulse is applied to a cell that leads to the temporary formation of pores in that cell membrane. Nano encapsulated curcumin combined with electric pulses may provide a significant novel alternative for rising cancer treatment efficiency (Lin et al., 2014). This electro-turmeric-therapy is very useful to save the pain, suffering, agony and cost for the socio-economically tasked breast cancer patients in all countries (Sundararajan, 2012). Photodynamic therapy is a treatment in which a combination of special light rays and drugs are used to destroy the cancerous cells.

Photodynamic therapy (PDT) has high efficiency on breast cancer cells compared with free Curcumin. PDT provides greater efficacy and safety(Eskandari et al., 2019). This present review aims to show the anticancer effect of curcumin and its therapeutic potential. It gives the detailed data aboutin vivo and in vitro studies in breast cancer cells. Apoptotic factors, cell cycle arrest, growth factors, signaling pathways, receptors and cancer stem cells in breast cancer are also discussed in brief. Clinical trials, electrophoresis techniques and photodynamic therapy of curcumin were analyzed in this paper.

Curcumin–Molecular Target: Curcumin had anticancer effects by activating apoptotic pathways in human cancer cells and restricting pro-cancer processes, including metastasis, inflammation and angiogenesis.

They demonstrated that curcumin targets numerous signaling pathways such as mTOR, p53, Ras, AKT, PI3K, Wnt-β catenin and so on. Clinical studies also showed that either curcumin alone or in combination with other drugs produce promising anticancer effects in patients without causing any adverse effects(Kasi et al., 2016), (Song et al., 2019b).

The potential anti-metastatic mechanisms of curcumin including restriction of transcription factors and the signaling pathways (e.g., STAT3, ApP-1 and NF-κB), inflammatory cytokines (e.g., IL-8, CXCL1, CXCL2, IL-6), multiple proteases (e.g., MMPs, uPA), numerous protein kinases (e.g., FAK, MAPKs), regulation of miRNAs (e.g., miR181b, miR21) and heat shock proteins (HLJ1) were analyzed (Deng et al., 2016).The activities and expressions of various proteins, such as transcription factors, inflammatory cytokines and enzymes, and gene-products linked with proliferation and cell survival, can be modified by curcumin. Curcumin decreased the toxic action of mitomycin C. Though curcumin has a high cytotoxic effect on some cancer cells, curcumin is instable and insoluble in water. Solubilizing properties of rubusoside would increase the solubility of curcumin. The focus was on curcumin antitumor processes in human breast cancer cells(Liu and Chen, 2013).

Curcumin – Apoptotic Factors, Cell Cycle Arrest, Growth Factors, Signaling Pathways, Receptors, Stem Cells In Breast Cancer: The various molecular mechanisms with cell cycle arrest; G2/M and/or G0/G1 phase cell cycle arrest by up-regulating p53, p21/WAF/CIPI and Cdk inhibitor, inhibition of transcriptional factors; PPAR-γ, NFKB, TNFα, IL, STAT-3, and AP-1, downstream gene regulation; c-myc, Bcl-2, COX-2, NOS, Cyclin D1, TNFα, interleukins and MMP-9, growth factors; cell adhesion molecules, bFGF, EGF, TGFα, GCSF, IL-8, PDGF, TNF and VEGF; fibronectin, collagen and vitronectin which are involved in angiogenesis and also the effectiveness of curcumin and metastasis, when given in combined with chemotherapeutics like mitomycin, cyclophosphamide, doxorubicin etc. in treating human breast cancer had been reviewed(Kumar et al., 2015).Curcumin exerts its anticancer action through a molecular signaling network, human epidermal growth factor receptor 2 pathways, involving proliferation and estrogen receptor (ER). Experimental evidence showed that curcumin regulates cell phase-related genes, apoptosis and microRNA in human breast cancer cells(Wang et al., 2016).

The effects of micro bubbles combined with low-intensity pulsed ultrasound (LPUS) on the delivery and the cytotoxicity of curcumin to breast cancer MDA-MB-231 cells were studied. In the experimental condition, microbubbles (MBs) raised the plasma membrane permeability and level of acoustic cavitation; and cellular uptake of curcumin was improved by LPUS–MBs treatment, annoying curcumin-induced MDA-MB-231 cancer cells death (Li et al., 2016). Gallic acid (GA) and curcumin used their anti-tumor effects on MDA-MB-231 breast cancer cells. Restriction of cell proliferation (MTT assay), fluorescence microscopy, light microscopy,

cell cycle analysis, nitrite detection, measurement of mitochondrial membrane potential, ROS levels, GSH level, RT-PCR, Annexin V assay and Western blotting methods were applied.

The results showed that the combination of Gallic acid and curcumin strongly decreases the MDA-MB-231 cell growth(Moghtaderi et al., 2018). The antitumor action of curcumin and its action mechanism were tested in cultured breast cancer cell lines were analyzed. The MTT assay had been used to determine the effect of curcumin on the breast cancer cell, flow cytometry was used to identify alterations of the cell cycle and western blot analysis was used to identify the expression of signaling molecules in the apoptosis, proliferation and cell cycle. The results showed that curcumin significantly restricted the proliferation of various human breast cancer cells, such as MDA MB 468, T47D, MCF7 and MDA MB 231, with an IC50 at the micro molar level and indicating the antitumor activity of curcumin(Hu et al., 2018).

A multi-database search was done to know an overview of curcumin as a miRNA modulator and adjunct therapy in breast cancer and the significance of observations for the cancer therapy treatment was highlighted. These effects lead to a decrease in metastasis and tumorigenesis, and induction of apoptosis(Norouzi et al., 2018). The effects of curcumin on the expression of p53 and ERα in the presence of anti-hormones and hormones in breast cancer cells had been examined. Protein analysis showed a relative falls in the levels of ERα and p53 upon treatment with 5–60 µM CUR. Cell proliferation study revealed that curcumin alone caused a 10-fold decrease when compared to the treatment with estrogen, which suggests its antiproliferative effects (Hallman et al., 2017).

The effects of co-administration of nano-Pirarubicin and nano-Curcumin were examined. The produced sterically stabilized micelles (SSM) drug delivery systems have a good toxicity profile and enhanced efficacy. They measured the differences in NF-κB levels in two different ways: when Pirarubicin was used alone and combined with Curcumin. This study revealed that co-administration of SSM-Pirarubicin (PSSM) and SSM-Curcumin (CSSM) with the size of 12.81 nm increases the efficiency of Pirarubicin by decreasing P65, an NF-κB subunit (Eskandari et al., 2019).The role oftheWnt/β-catenin pathway and Sonic hedgehog (Shh) in curcumin inhibition of breast cancer stem cells (CSCs) was investigated. The authors showed that the levels of breast cancer stem cell markers were notably elevated in MCF7 and SUM159 sphere-forming cells. Results indicated that curcumin inhibition of breast cancer stem cells (CSCs) by down regulation of Wnt/β-catenin pathways and Shh(Li et al., 2018). Humanlemur tyrosine kinase-3 (LMTK3) primarily participated in regulation of estrogen receptor–α by phosphorylation activity. Here computational approach has been taking place to screen the LMTK3 inhibitors from curcumin derivatives dew to rational inhibitor design.

The initial re-docking and virtual screening resulted in finding of top three leads with strong connections in residues of the ATP-binding cavity and favorable binding energy. From this novel LMTK3 inhibitors desmethoxycurcumin, tetrahydro curcumin and curcumin 4,4′-diacetate had proposed with inhibition mechanism(Anbarasu and Jayanthi, 2018). In this paper glycogen synthase, kinase-3 β (GSK-3β) and Aldehyde dehydrogenase 1 (ALDHIA1) were the two proteins used. Three naturally occurring curcuminoids, such as bisdemethoxycurcumin, curcumin, and demethoxycurcumin along with five derivatives of curcumin (3,3′-bisdemethylcurcumin, 4,4′-di-O-(carboxy-methyl)-curcumin, 4-O-(2-hydroxyethyl) curcumin, 4,4′-di-O-allyl-curcumin and 4,4′-di-O-(acetyl)-curcumin) were evaluated and synthesized for anti-breast cancer potential by assessment of their antioxidant character and docking simulation, studied via ferric reducing ability potential (FRAP) assay, 2, 2′-azinobis-(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS•+) radical cation scavenging assayand2,2-diphenyl-1-picrylhydrazyl (DPPH•) radical(Kesharwani et al., 2015).

The understanding of breast cancer stem cells (CSCs) and their signaling pathways and phyto chemicals that affect the cells including resveratrol, curcumin,retinoic acid, sulforaphane, genistein,celastrol, indole-3-carbinol, 6-shogaol, 3, 3′-di-indolylmethane, vitamin E, quercetin, parthenolide, triptolide, tea polyphenols (epigallocatechin-3-gallate, epigallocatechin), pterostilbene, isoliquiritigeninandkoenimbin were summarized(Dandawate et al., 2016).The review was focused on the modulatory effect of curcumin and its anticancer effect in pathways of breast carcinogenesis. Curcumin mediates breast carcinogenesis by its effect on apoptosis, cell cycle and proliferation, senescence, angiogenesis and cancer spread. Largely the NFkB, JAK/STAT, PI3K/Akt/mTOR and MAPK were the key signaling pathways involved and it also highlights the curcumin mediated cancer-related miRNAs , modulation of the tumor microenvironment, cancer immunity and breast cancer stem cells(Banik et al., 2017).

In Vivo and In Vitro: Antitumor action of curcumin in ER-negative breast cancer cell is resistant to chemotherapy and curcumin is used to deregulate the expression of p65, cyclin D1and PECAM-1, which are regulated by NF-κB. In vivo generation of a mouse model of breast cancer, curcumin inhibited tumor growth and angiogenesis. In vitro curcumin played an important role in apoptosis and regulation of proliferation in MDA.MB231 cell (Bimonte et al., 2015).Natural products with chemo preventive action against breast cancer such as capsaicin, curcumin, sauchinone,genipin, lycopene, denbinobin and ursolic acid were studied. This paper gives a clear view of natural compounds and their mechanisms against chemoprevention of breast cancer(Ko and Moon, 2015).

Curcumin abolish proliferation of cancer cells by inducing their apoptosis and arresting them at different

stages of the cell cycle This survey focuses on the diverse molecular targets of curcumin which contribute to its efficacy against many type of cancers such as cancer lesions, pancreatic cancer colorectal cancer, multiple myeloma, breast cancer, chronic myeloid leukemia and prostate cancer (Shanmugam et al., 2015). In vitro cytotoxicity study, folate decorated nano structured lipid carriers (FA-CUR-NLCs)was tested in human breast cancer MCF-7 cells. The growth of MCF-7 cells was obviously inhibited in vitro. In vivo anti-tumor efficiency of the carriers was tested on mice bearing breast cancer model. FA-CUR-NLCs displayed the best anti-tumor action than other formulations (Lin et al., 2016).

Nanosuspensions of curcumin and docetaxel were taken. In vitro MTT assay was evaluated using MCF-7 cell for anti-breast cancer activity. In vivo bio distribution by tumor inhibition and the radio labeling study was conducted on mice. In vitro results showed that the cytotoxicity on the MCF-7 cell line was higher when compared to their suspensions. In-vivo results showed higher tumor inhibition rate up to 70% in MCF-7 cell treated mice(Sahu et al., 2016). Transferrin-poly(ethylene glycol)-curcumin nanoparticles (Tf-PEG-CUR NPs) were used here this paper provides similar results of previous articles(Cui et al., 2017).This survey means for differential oxidative stress-inducing properties of curcumin and Zn+2 ions.In vitro model of cell death was analyzed by FACS analysis. In vivo mode ZnO-PBA-Curcumin was found to adequately decrease the tumor growth in mice(Kundu et al., 2019).

Co-loading curcumin–phospholipid complex and NIR dye IR780 (CUR/IR780@SMEDDS) were characterized and the ability against breast cancer metastasis was tested by photo thermal and photodynamic assessment, invasion, cytotoxicity, and in vitro transformation in metastatic 4T1 breast cancer cells, and oral bioavailability study in rats in vivo and pharmaco dynamics study in tumor-bearing mice(Liu et al., 2019). A combination of curcumin and cisplatin enhanced breast cancer cell sensitiveness to cisplatin by down-regulating Flap endonuclease 1 (FEN1) expression in vivo and in vitro. Increased ERK phosphorylation contributes to the cisplatin-induced Flap endonuclease 1 (FEN1) over expression in breast cancer cells and cisplatin resistance. Inhibiting ERK phosphorylation stimulates the chemosensitizing action of curcumin to cisplatin by focusing FEN1. (Zou et al., 2018).

Epidermal growth factor receptor (EGFR)-aiming GE11 peptides connected with PEGylated polylactic-co-glycolic acid nanoparticles (PLGA) can be used to efficiently deliver curcumin, anti-cancer agent, into EGFR-expressing MCF-7 cells in vivo and in vitro. Treatment of tumor-bearing mice and breast cancer cells with these curcumin-loaded nanoparticles suppressed tumor burden compared with non-EGFR targeting nanoparticles or free curcumin, reduced the phosphoinositide 3-kinase signaling, increased drug clearance from the circulation and decreased cancer cell viability.(Liu et al., 2017).

The protein expression, cell proliferation, cell cycle and apoptosis in vitro on human breast cancer cells (MDA-MB-231) were studied. For in vivo murine breast cancer cells were fixed into BALB/c mice. The volume of the tumor developing was calculated and expression of p53 proteins and Ki67 was evaluated to analyze apoptosis and cell proliferation. (Moghtaderi et al., 2017). In vitro a pharmaceutical agent is faced by curcumin's reduction and in vivo application efficacy decreased because of metabolic changes and curcumin in breast cancer is blocked by its limited bioavailability. Enhancement of curcumin's bioavailability and efficiency can be achieved by modifying the chemical structure of curcumin (Mock et al., 2015).

In Vivo: Mice were treated with Curcumin loaded polymer, poly (lactide-co-glycolic acid) (PLGA) micro particle was injected monthly at varying period. Curcumin treatment decreased mammary vascular endothelial growth (VEGF) levels significantly, which reduces tumor formation. Curcumin with PLGA micro particles enhance tumorigenesis (Grill et al., 2018). Synthesis of curcumin-like hydrazide analogues and a series of curcumin resveratrol hybrid compounds and the effectiveness of their cytotoxic potential on tumor cell lines MCF-7 HepG2 (liver), (breast) and A549 (lung), The IC50 values for those compounds on cells (MCF-7) were not higher than those for resveratrol, curcumin, or curcumin combined with resveratrol. The collection of cells in mitosis onset in valued cultures was due to the ability of 4c to modulate nuclear kinase proteins, at least in part, which orchestrate important incidents in mitosis progression(de Freitas Silva et al., 2018).

A combination of metformin (MET) and curcumin (CUR) were examined with inoculating mice with EMT6/P cells and evaluating the apoptosis induction tumor growth and apoptosis induction in tumor sections. A combination of MET and CUR significantly reduced the Vascular endothelial growth factor (VEGF) expression, triggered Th2 immune response, showed no toxicity and induced Trp53 independent apoptosis (Falah et al., 2017). Curcumin treated with 300 mg/kg/day in athymic mice and the mice exposed to single-photon emission computed tomography scanning with Tc-99m tagged Vascular endothelial growth factor-c (VEGF-c) to detect the in vivo appearance of Vascular endothelial growth factor receptor (VEGFR2/3). In this Xenografts model, curcumin treatment decreased cell proliferation (Ki-67) and tumor volume compared to the vehicle-treated group (Carvalho Ferreira et al., 2015).

Ex–Vivo: Curcumin loaded deformable vesicles were marked by thin-film hydration method. Tween 80 and Sodium cholate were settled as standard edge activators and Transcutol, limonene, oleic acid and Labrasol were the penetration enhancers and evaluated for their efficiency in skin permeation. The ex-vivo permeation was studied on male albino mice skin was mounted on Franz diffusion cells. Cytotoxicity studies were examined using MTT assay on breast cancer cell lines (MCF-7) (Abdel-Hafez et al., 2018).

In Vitro: Curcumin alone or curcumin combined with piperine was used to limit breast stem cell self-renewal. They generated the genome-wide maps of the transcriptional changes that take part in mesenchymal-like (ALDH–/CD44+/CD24–) and epithelial-like (ALDH+) healthy breast stem cells following treatment with piperine and curcumin. They showed that curcumin aimed both stem cells by down-regulating expression of human breast stem cell genes, includingTP63, CD49f, PROM1 andALDH1A3. Novel mechanisms by which piperine and curcumin target the breast stem cell self-renewal by providing a mechanistic link between stem cell self-renewal and curcumin treatment, targeting lipid metabolism (Colacino et al., 2016).

The hetero-steroids of promising anti-cancer effects were taken for examinaion. Besides, the pro-apoptotic effects of the new compounds were investigated deeply. Several pyrimidino-steroid, triazolopyrimidino-steroid, pyridazino-steroid and curcumin-steroid derivatives were confirmed, synthesized and elucidated using the analytical and spectral data (Elmegeed et al., 2016). The therapeutic potential of curcumin loaded PHBHHx [poly(3-hydroxybutyrate-co-3-hydroxyhexanoate)] nanoparticles (CUR-NPs) and concanavaline was studied. Combined curcumin loaded NPs (ConA-CUR-NPs) for breast cancer treatment. The anticancer effect of ConA-CUR-NPs was measured in breast cancer cells MDA-MB 231 in vitro, and the results showed that the ConA-CUR-NPs had decreases the tumor cell effectively (Kilicay et al., 2016).

Curcumin loaded folate modified chitosan nanoparticles (NPs)were used. Chemical structures of the morphology of NPs, nanoparticle size in wet and dry state, zeta potential, physical state of curcumin in NPs, modified chains, cytotoxicity of NPs and drug release profile concanavalin by XRD, FE-SEM, DLS and FTIR, MTT assay against MCF7 and L929 cell lines, and UV–vis spectrophotometer. Results showed that nanoparticle size varied in the range of 119–127 nm in dry state and curcumin was loaded with nanoparticles(NPs) with 96.47% efficacy(Hallman et al., 2017).

Folate-conjugated lipid nano particles combine with paclitaxel and curcumin used to develop multifunctional nano medicine. The quicker release of curcumin from folate-conjugated curcumin and paclitaxel-loaded lipid nanoparticles enables correct p-glycoprotein inhibition which allows inclined cytotoxicity of paclitaxel and cellular uptake. Results indicated that folate targeted delivery of the multiple anticancer drugs by restricting the multi-drug resistance efficacy. In order to achieve the optimal sequential release of paclitaxel and curcumin, different amounts of 2-hydroxypropyl-β-cyclodextrin(HPCD) (0, 10, 30 or 50 mg) was injected to form an inclusion complex with curcumin is shown in Figure:2(Baek and Cho, 2017).

Mesoporous silica nano carriers were synthesized by natural chitosan polymer. These nano carriers act as a pH-responsive shield to raise the anticancer properties and solubility. Dose-response curves were plotted by testing three concentrations of Cur-SLN and free-Curcumin in combination with rising doses of IR (2–9 Gy). Dose Modifying Factor (DMF) and IC50 value were taken to quantify the sensitivity to combined treatments and to curcumin. The Cur-SLN radio sensitizing function was tested by metabolomic and transcriptomic approach, revealed anti-tumor effects and anti-oxidant (Minafra et al., 2019).

Figure 2: In vitro release of curcumin (CUR) and paclitaxel (PTX) in 0.1 % (w/v) Tween 80 solution (n=3, mean ± SD) (A). FPCN; (B). FPCHN-10; (C). FPCHN-30; (D). FPCHN-50
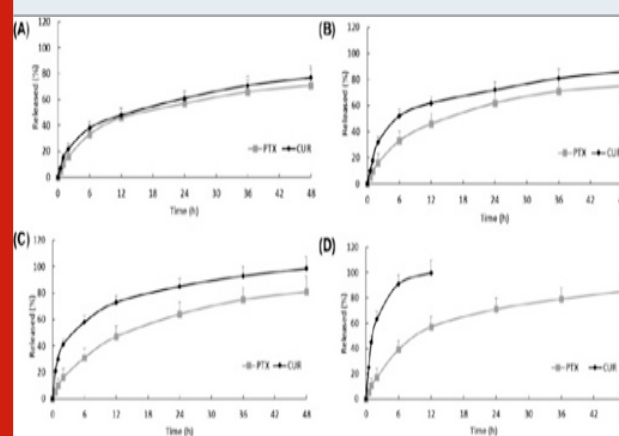
Bioinformatics was used to analyze the molecular mechanism of curcumin. To produce a breast cancer molecular network, the proteins of curcumin from PubChem were loaded with genes and implemented in breast cancer in NCBI within Ingenuity Pathway Analysis software. The gap junction signaling and 14-3-3-mediated adherents junctions as a main canonical signaling pathway targeted by curcumin were identified by Bioinformatics(Song et al., 2019a). The cytotoxicity of curcumin and lipopolysaccharide (LPS) alone and the curcumin combined with LPS on these cells was tested by WST-1 assay. The activation of lipopolysaccharide (LPS) stimulated IRF3/TLR4/TRIF signaling pathways was mediated by curcumin (CUR) in breast cancer cell lines in vitro. The release of type I interferon (IFN) levels and the expression level of TLR4 were treated with curcumin was determined and LPS by ELISA and RT-PCR analysis. The subcellular localization of interferon regulatory factor 3 (IRF3) and TLR4 were detected by immune fluorescence analysis (Kamel et al., 2019).

Curcumin was combined with solid lipid nano particles (SLNs), to improve the therapeutic efficiency for breast cancer. The encapsulation efficiency and drug loading in SLNs reached72.47% and 23.38%. The Cur-SLNs had a stronger cytotoxicity effect against SKBR3 cells. In vitro study demonstrated high efficiency of the curcumin was combined with solid lipid nanoparticles (Cur-SLNs) by SKBR3 cells. Cur-SLNs induced higher apoptosis action in SKBR3 cells when compared to the cells treated by free drugs (Wang et al., 2018). The anti-proliferative action

of curcumin and its effects on the apoptosis of human breast cancer cells were studied.

The study performed by an in vitro assay; MTT determined the anticancer activity of curcumin. The results showed that Mcl-1 gene expression decreased in treated groups and compared them to control groups(Koohpar et al., 2015). The cytotoxic and the apoptotic effect of citral and curcumin was evaluated in vitro assay. The synergistic effect of citral and curcumin was analyzed by a combination index study of Chou and Talalaymethod. (Patel et al., 2015). Investigations were done on the angiogenesis, inhibitory effects of BDMC-A, metastasis markers, on invasion and an analog of curcumin used in vitro with MCF-7 breast cancer cells and silico studies had proved that BDMC-A has more potential when compared curcumin(Mohankumar et al., 2015).

Curcuminwas utilized for green reduction and chemically exfoliated graphene oxide (GO) sheets. The $\pi-\pi$ attachment of curcumin molecules on the curcumin reduced graphene oxide (rGO) sheets were proved by Fourier transform infrared spectroscopes and Raman. The cells and rGO sheets resulted in the morphological transformation of the cells as well as apoptosis(Hatamie et al., 2015).Poly (N-isopropylacrylamide-co-methacrylic acid) (PNIPAAm–MAA) was utilized in the drug delivery system. This study examined the cytotoxic potential of curcumin loaded with the NIPAAm-MAA nanoparticle, on the breast cancer cell line MCF-7. The results showed that the curcumin-loaded NIPAAm-MAA has a high cytotoxic effect on the breast cancer cell and efficiently restricts the growth of breast cancer cell population when compared with free curcumin(Zeighamian et al., 2016).

Curcumin and paclitaxel were tested with two human breast cancer cells as the basal-like MDA-MB-231 and the luminal MCF-7that are either negative or positive for hormonal receptors HER2, estrogen receptor, and progesterone receptor. Results showed that curcumin combined with paclitaxel decreases the c-Ha-Ras, Bcl-xL, Rho-A and p53 gene expression in comparison with control and substances alone in breast cancer cells MCF-7. These two substances combined or alone decreased gene expression of NF-κB and Bcl-2(Quispe-Soto and Calaf, 2016). Berberine and Nano-curcumin, in combination and alone were tested in MCF-7 cells using the MTT cytotoxicity test. In this study, MCF-7 cells are treated with Nanocurcumin and Berberine in combination or alone, with various concentrations for 48 h. Cytotoxicity of Nano-curcumin was greater than Berberine with IC50 of 7.348 mg/ml when compared to 63.62mg/ml (IC50 of Nano-curcumin). And this decreases cell viability(ZiaSarabi et al., 2018).

An examination of the potential of curcumin in the prevention of epithelial-mesenchymal transition (EMT) activation in MCF-7 cells produced by endoxifen. MCF-7 cells were reacted with Endoxifen 1000 nM+beta-estradiol 1 nM with or without (8.5μM or 17 μM) curcumin and also MCF-7 Cells treated with dimethyl sulfoxide 0.001% as the negative control. After eight weeks of treatment, the cells were computed, analyzed for total reactive oxygen species, vimentin, mRNA E-cadherin, TGF-β expression and morphological changes were observed using a transmission electron microscope and confocal microscope and addition of curcumin did not protect the activation of EMT(Paramita et al., 2018). In this paper, curcumin loaded magnetic silk fibroin core¬-shell nanoparticle was used for the comfort release of curcumin into human breast cancer cells were analyzed. Curcumin loaded magnetic silk fibroin core-shell nanoparticle revealed higher cellular uptake and enhanced cytotoxicity in the (MDA-MB-231cells) Caucasian breast adenocarcinoma cell line evidenced by cellular uptake and assay (Song et al., 2017)

The anticancer action of curcumin on cytotoxicity and cell viability on human breast cancer MCF 7 cells was examined using lactate dehydrogenase assays and 3 (4,5 dimethyl 2 thiazolyl) 2, 5-diphenyl-2H-tetrazolium bromide. The results showed that the curcumin inhibited cell viability and produced cytotoxicity of breast cancer MCF 7 cells in a concentration and a time-dependent manner by increasing caspase 3/9 activitiesand inducing apoptosis(Wang et al., 2017). The potential efficiency of epigallocatechin gallate (EGCG) and curcumin against to discover the molecular mechanisms of anticancer effects and cancer stem cell(CSC) were investigated. The result showed that EGCG and curcumin act as antitumor agents to suppress breast CSCs. NFκB signaling pathways and STAT3 could serve as targets for decreasing CSCs(Chung and Vadgama, 2015).

A CCK8 assay evaluated the cell viability and cell proliferation in MDA-MB-231 and MCF-7 adherent cells were determine by colony formation assay. The result showed that curcumin could act as an anti-metastasis agent for human breast cancer(Hu et al., 2019).The action of curcumin on chemo resistance in doxorubicin-resistant breast cancer MDA MB 231/DOX and MCF 7/DOX cell lines was examined. monolayer transport, Cell Counting Kit 8, ATPase activity assays and western blot were performed during this study. The result showed that curcumin reversed doxorubicin resistance in breast cancer MDA MB 231/DOX and MCF 7/DOX cells by restricting the ATPase effect of ABCB4.

Curcumin–Electrophoresis: Eight, 100μs electrical pulses, 1200V/cm to deliver nanocurcumin and curcumin into cells and study their anti-tumor activity over 72 hours. Nano encapsulated curcumin combined with electric pulses may provide a significant novel alternative for rising cancer treatment efficiency(Lin et al., 2014). Electrical pulses should effectively use nanoparticle-encapsulated curcumin. The results of these studies were to elucidate the molecular mechanisms using curcumin on triple-negative breast cancer cells (TNBC) that have indicated that they restrict the proliferation of TNBC cells. This electro-turmeric-therapy is very useful to save the pain, suffering, agony and cost for the socio-economically tasked breast cancer patients in all countries (Sundararajan, 2012).

Curcumin was encapsulated within the nanoparticles (CNP) was tested in vitro on MDA-MB-231, (ATCC HTB26) live breast cancer cells. After that electrical pulses were applied six, 100μs, 1200V/cm to deliver CNP into cancer cells and study their anti-tumor activity for 72 hours. The results indicated that the combined treatmentof CNP+EP may provide a significant novel alternative for rising cancer treatment efficiency (Sundararajan et al., 2015). Curcumin loaded with multi-layer iron oxide magnetic nanoparticles (MNPs) are used and multi-layer iron oxide magnetic nanoparticles allow correct encapsulation of hydrophobic curcumin in the CD shell and curcumin adsorbed into the polymeric layers. The curcumin loaded MNPs inhibit the breast cancer cells MCF-7 more efficiently than free curcumin(Akrami et al., 2015)

Curcumin–Photodynamic Therapy: Carrier-free curcumin nanodrugs (Cur NDs) exhibited light-sensitive drug release behavior, distinct optical properties, resulting in the rising of reactive oxygen species (ROS) generation and photodynamic therapy (PDT) have a high efficiency on breast cancer cells compared with free Curcumin. PDT provides greater efficacy and safety(Sun et al., 2019). Curcumin loaded nano structured lipid carriers (CUR-NLCs) makeup by high shear hot homogenization method were tested by, in vitro drug release, determination of particle size (PS), zeta potential (ZP), polydispersity index, drug loading percent and entrapment efficiency percent. Optimization was based on the testing results using the response surface modeling (RSM). CUR-NLCs enhanced its cytotoxic anti-cancer properties and cell penetration both in light and in dark conditions(Kamel et al., 2019).

Methylene blue-curcumin, ion-pair nanoparticles and single dyes as photosensitizer were compared for photodynamic therapy (PDT) efficiency on MDA-MB-231 cancer cells and also various light sources effect on activation of a photosensitizer (PS) were considered. The results demonstrated that the red light LED activates both dyes better than the blue light LED for singlet oxygen producing(Hosseinzadeh and Khorsandi, 2017).

Curcumin wasinserted into layered double hydroxide (LDH) and used as a nanohybrid photosensitizer in human breast cancer cells by photodynamic therapy. The photodynamic effect of the curcumin–LDH nanohybrid and curcumin was studied on the human breast cancer cell line MDA-MB-123. The optimum irradiation time for blue LED was determined on photodynamic therapy for both curcumin–LDH nanohybrid and free curcumin. Nanohybrid curcumin–LDH showed more effective photodynamic effects on the cancer cells as compared to free curcumin(Akrami et al., 2015).

Clinical Trials: Olive-derived polyphenol hydroxytyrosol loaded with curcumin and omega-3 fatty acids would reduce musculoskeletal symptoms and C-reactive protein (CRP) in breast cancer patients by adjuvant hormonal therapies. This prospective, multicenter, single-arm, open-label, omega-3 fatty acids, the clinical trial enrolled for 45 post-menopausal breast cancer patients [n = 45] with elevated CRP taking predominantly aromatase inhibitors to get a combination of curcumin and hydroxytyrosol for one month. CRP, pain scores on the Brief Pain Inventory and other inflammation-associated cytokines were measured before therapy, at the end of treatment and one month after completion of treatment. CRP levels decreased during the therapy and Pain scores also reduced during the treatment(Martínez et al., 2019).

Curcumin has a low induction of side effects among other components. Antitumor effect curcumin against different types of cancer. All these justifies the development of new laboratory research and especially of clinical trials to evaluate the dietary supplement in both the oncological population and the healthy (Doello et al., 2018). An overview of basic science and clinical and pre-clinical data on curcumin in the field of oncology for different types of cancers were reported. Curcumin modulates through signaling pathways in cancer cells, comprising the NF-κB, JAK/STAT and the TGF-β pathways. After getting favorable results in multiple phase III trials, phase I–II trials in different indications were currently undertaken to test for direct anti-cancer effects(Willenbacher et al., 2019). Several clinical trials have examined its action in breast cancer patients, including a recent trial in patients, who have breast cancer receiving radiotherapy. Many approaches have been developed to raise its rate of absorption and delivery of curcumin with the adjutants as well as various conjugation to increase its bioavailability(Tajbakhsh et al., 2018).

CONCLUSION

This paper presented the review on possibilities of curcumin based breast cancer treatment through the anticancer effects of curcumin in human breast cancer by in vivo and in vitro process. Even though curcumin has poor bioavailability, poor aqueous solubility, fast metabolism, chemically unstable and used in limited systemic distribution, it can be made affordable by combination with other chemical substances. When curcumin combines with several drug and chemical analogs to improve the stability, anticancer activity of breast cancer and drug delivery systems, it redced cell proliferation and regulated cell cycle arrest and apoptotic factors. In vivo studies shows that there is an effective decline in tumor cell on mice and in vitro,the higher cytotoxicity in the human breast cancer cell and reduce the cancer cell in the breast. Nano encapsulated curcumin combined with electric pulses may provide a significant novel alternative for rising cancer treatment efficiency. Though various studies were done on the cancer treatment with curcumin, the research focus is required to tap the opportunities of treating cancer with natural remedy.

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Prism: Privacy-Aware Interest Sharing and Matching in Social Networks

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ABSTRACT

Social networking services use profile matching to help users find friends with comparable characteristics, including entertainment, location, historical background, and more. But privacy concerns often prevent customers from simplifying the process. In a social network, customers face the threat of hacking, leakage or disclosure of the confidentiality of their personal data nearby. The proposed method, the Protocol for mapping the sharing of information on confidentiality, allows customers to maintain a healthy interest in others without revealing their true interests and profile. Therefore, common goals should be considered in such a way as to protect privacy. PRISM allows customers to find mutual benefits without revealing their games. Unlike current practice, PRISM is not required to display server-based entertainment. Moreover, the protocol can deal with situations that have not been discussed before, and provides a powerful solution. Using an attacker reveals the underlying mechanism of any duplication attempt. To control the risk of disclosure of confidentiality, only the minimum interest attribute of the user excludes the actual profile attributes. It is free and prevents customers from hacking a profile.

KEY WORDS: MOBILE SOCIAL NETWORKS, INTERESTS, PROFILE IN SHAPE- MAKING, PRIVACY.

INTRODUCTION

In the early days, in addition to the continued availability of computers in network offerings, the online social community has grown incredibly fast as the number of cellular gadgets such as smartphones and medicines has increased. Technologies that include GPS and Wi-Fi localization strategies for cell phones enable real-time device creation and sharing of device location updates. The location-based mobile communication community is a cybernetic device that is part of the cellular gadgets within the local physical realm with the use of each smartphone and Wi-Fi communication. The location-based community of social networks in the area of network-based social networks allows users to communicate in public spaces. Airports, trains, and stadiums. As a result, the privacy issue on such sites has gained much interest in all the research community and the mainstream media. The goal is to improve the set of privacy controls and defaults, but this is limited by not looking deeply into client privacy settings on websites. Although there are significant residues of privacy and unequal consumer opportunities, the extent to which such privacy violations still occur remains to be determined. Thanks to the improvement of mobile devices and online social networks (OSN),

people can connect with anyone from anywhere. Mobile Social Networks (MSNs) are a growing trend of cellular generation that integrates wireless word sharing and social networks. MSN benefits from Delayed Networks (DTN) and Creative Networks. The main purpose of this example is to offer users services such as neighborhood based offers, text organization services, partner selection services, media sharing offers and social games. One of the most common deployments of using MSN is to search for profiles. There are a number of useful MSN apps that help matchmaking find clients with common interests and help clients lose their social life-like attitudes, even when it comes to fitness issues. Although it is a profitable way to identify exceptional interests, there are many issues that need to be discussed when looking for partners. During matchmaking, the customer wants to express his aspirations to various clients in order to protect their interests. If you are not sure that different users have the same hobbies, there are many conditions in which one person does not wish to disclose all his or her desires to another customer. Consider a situation in which a victim in a sanatorium wants to find someone with the same illness or symptoms.

But the patient does not want to reveal his illness to anyone else. This type of matching situation makes it difficult for consumers to know about privatization. By providing non-public information about their privacy without the support of an appropriate system, users are at risk each offline and offline. Therefore, the mentioned problems should be seduced as soon as the corresponding utility grows. Social social bureaucracy is a community of social ties that establish the foundation of common interests among non-public family members. It connects people using a special online utility that allows customers to communicate with other people, communicate proportionally and share reviews, delivery messages, percentage pictures and videos. Using simple web barriers allows online social networks to communicate with many people. The line, which includes Facebook, LinkedIn and Twitter, is closely linked to social networking sites. Social networking sites allow users to create profile pages, as well as customize the appearance of pages and manage private management.

Social networking sites contain millions of users and great opportunities for sharing information between users. Social Community Analysis (SNA) is the mapping and tracking of relationships and flows between people, enterprises, companies, computers, and various relevant statistical / understanding objects. The nodes in the network are people and companies, and hyperlinks show relationships or flows between the nodes. Respect for social networks causes social changes in people, human exchange and dialogue between attitudes. On the one hand, people can use the online community to chat with friends, comment and discuss social issues. In addition, social networks are growing in their daily lives, or to a large extent maintaining a community of real social family members. Social computing studies content materials significantly in the data age and on the laptop, as there are no problems with the

development and testing of behavior. Since human behavior and behavior are closely interconnected, personality forecasting increases as the cost of education and enterprise forecasting increases. The most important help is as follows:

- Prism provides convenience and privacy, allowing you to find mutual entertainment for the user. The newspaper discusses unsolicited attacks on consumer privacy and provides an effective way to prevent such attacks. We advise that it is desirable to protect the SIB from attacks by limiting an individual to more than one device.
- In addition to Tact's current strategies, the assumptions about Trusted Third Celebration (TTP) are diminishing as it fails to convey consumer desire for TTP.
- M PRISM implementation and evaluation using previous methods show that PRISM provides better protection against various types of attacks without significantly reducing overall performance. On a mobile social network, the user is more likely to steal personal information. In these cases, attackers can instantly associate private real profiles with a real user and then perform further attacks. Lack of confidentiality can lead to unwanted spam and fraud, cause social damage, harm and threaten black letters. Our main goal is to improve existing matchmaking protocols to help users make conflicts without revealing unwanted records.

MATERIAL AND METHOD

Existing System: Matching profiles is important for a good sized mobile social network. Finding a healthy, talented, similar person nearby is always a priority for any social community. The mobile social community can also provide regulatory attention to privacy security issues related to personal user community choices and exposure to common computing. In a mobile social network, a person runs the risk of hacking the privacy of his non-public information space.

A. Disadvantages
- Situations In such cases, attackers can connect private real-time profiles to users in real time without delay, and then launch further attacks.
- Loss of privacy will expose users to unwanted spam, fraud, social identity and harm and make them victims of blackmail

Proposed System: In order to protect all these problems from hacking, a leak protocol introduces an appropriate protocol. As such, it matches the personal data of customers accordingly. The main goal is to improve the existing protocol for organizing matches so that users can ensure its safety without revealing undesirable facts.

Advantages

The machine contains four important duties.

- Protocol offer a secure privateness keeping a good way to find mutual hobby of consume.
- Provide powerful approach to save you from hammering to user's profile.
- These encompass assaults all through matchmaking interest revealing.
- Provide protection towards Sybil attacks by using restrictive consumer via at most one device.

Preliminaries: This section includes attack version, build dreams, system version, assumptions, and cryptographic tool used in Prism.

Attack version: Prism considers both active and passive attacks. An attacker can detect a passive attack without changing the message. An active attacker uses an attacker with a number of functions, including modifying, playing, and redistributing messages. Active attacks include impersonation and human-based attacks. These users are interested in more information than is allowed, including key statistics or encrypted entertainment. When the parties are working in concert, one of them may try to find out more about the opposite birthday party, showing only a fraction of the interests. Therefore, the role of the attacker with the capabilities mentioned above in our protocol can be verified by the initiator and responder.

B. Design dreams

Our layout desires are as follows:

- Each applicant initiator should very easily understand the mutual encounter established between them. No data other than related games should be recognized for any holiday.
- The assumption of trust must be reduced. Therefore, the TTP server must ensure the number of classes very effectively and know nothing about the actual games.
- For many functions that can be proven using strict validation, there must be a higher limit.
- When it comes to matchmaking, no consumer should get the opposite unfair advantage. This includes attacks where the user can further determine the values that are applicable for unreasonable success.
- Match In a fruitful match, both events must express their exaggerated interests to each other, and none of them can benefit. This type of protocol can prevent an attack. The protocol should additionally prevent Sybil attacks.

C. System model

There are 3 people in our car model as described below:

Ident Personal Identifier (ITV): verifies the client's legal affiliation and high limits on the number of his or her games. It initiates machine parameters,

acts as a means of resolving disputes in the event of a claim, and takes important steps to remind the attacker.

Launcher: Launches the protocol by sending classes to other users.

Respondent: this is the user who responds to the launch request by sending entertainment to search for partners. Alternative information about the initiator and the responder using each other's ITV. To simplify the process, we call Launcher Alice and Respondent UserPop.

D. Assumptions

PRISM is primarily based on the following assumptions.

Omer IDV relies on maintaining customer specificity. However, we will no longer forget the resentment of malicious entertainment as usual. Therefore, the protocol partners may ask the IDV for his or her permissions.

Once the Match Matching Protocol is started, it is rejected as the most effective once it has been completed.

At some point in the protocol, users secure their security controls.

V. Modules

- Social Member Module
- Identity Verifier Module
- Match Making Module
- Interest Revealing Module
- Graph Report Module

A. Social Member Module

- In this module, new customers are accredited to register their information.
- After that the person gets the access permission for login their info through a login.
- Users can use their account through they logged in.
- The Login Module is that allows customers to enter a User Name and Password to log in.
- This module may be located on any Module Tab to permit users to login to the utility.
- After successful login, consumer account can be redi- rected to the home page.
- The person can replace the profile with more data.
- This updating can help the alternative customers to select he/she has a friend.

B. Identity Verifier Module

- Initial setup phase consists of the initialization of all requests from clients.
- It first initiates a request with identification verifier (IV) and identification verifier verifies the request and generates a unique identification, then it provide specific IDs (UID) to the person.
- With the assist of precise identity person only can

login to their gadget.

C. Match Making Module

- After finishing touch of initial setup section the matchmaking segment is used to inform the man or woman's interest. Following step shows how matchmaking degrees paintings
- User1 prepares a matchmaking request that consists of her exponentiated pastimes, and sends his/her request to user2.
- User2 view the data of user1 and profile mating then he/she accept are declining the request.
- If user1 accept the request they can without problem replacing the ones messages.
- If user2 decline the request there was no further communication with the ones peoples.

D. Interest Revealing Module

- User1 and user2 interchange their matched pursuits a good way to make it certain that every occasions have as it should be comparable suits.
- User1 and user2 must have exactly equal and same amount of suits. Either they have no comparable interests or they ought to have the same wide type of suits with the identical values of hobby.
- Let 1 p be the number of matching interests of the user for 1 year, and q be the variety of matching interests of the user for 2 years.
- As indicated above, P and q are compatible entertainment in each of the components, and if they are not true, then p and q want to form precisely.
- Interesting It is interesting to note that User 1 and User 2 do not recognize values that are unambiguously consistent. They only want their calculated values (p for user 1, q for user 2).
- This assures user1 in addition to user2 that the alternative fee ought to be identical as theirs.
- User1 generates a random mystery n1, concatenates her pastimes which might be matched with Bob in alphabetic order, and sends it to user2 as a commitment.
- Similarly, user2 creates n2, computes and sends this to user1. Next both activities change n1 n2 and discover hash price of ab. Both events check whether or no longer

$$H(Ai)== \quad h(Bi).$$

If yes, the matchmaking is a success, else the victim sends the protocol recordings to IdV.

File Sharing: If the Matchmaking Interest revealing section is an achievement, then handiest user can proportion the Files, media, files and statistics and many others.

E. Graph Report Module

- In this module, the profile matching will confirmed

to the specific matched customers after you have the profile healthy score he/she could be capable of technique to be as a chum.
- The profile matching is calculated 3 fundamentals Personal, Basic and Life fashion. The graph suggests the Personal score are based totally at the Qualification Native and so on.
- The Basic score is calculated via way of the easy needs they require to be as a pal like mother tongue, Marital Status, running place and so on.
- And subsequently the lifestyle score is calculated B.Table structure for table post
- Through their favorites like favorite movies, favored color, preferred tune, music director, actor, actress, meals behavior.

RESULTS AND DISCUSSION

System Architecture

Figure 1: System Architecture

Database Diagram

Table A. Structure for table friend request			
Field	Type	Null	Default
Id	int(10)	Yes	NULL
user_id	int(10)	Yes	NULL
user_name	varchar(255)	Yes	NULL
requester_id	int(10)	Yes	NULL
requester_name	varchar(20)	Yes	NULL
Status	varchar(255)	Yes	NULL

Table B. structure for table post

Field	Type	Null	Default
Pid	int(11)	Yes	NULL
Uid	int(11)	Yes	NULL
Image	varchar(255)	Yes	NULL
Content	Text	Yes	NULL
title	varchar(255)	Yes	NULL

Table C. structure for table user

Field	Type	Null	Default
Uid	int(11)	Yes	NULL
Name	varchar(255)	Yes	NULL
Gender	varchar(255)	Yes	NULL
Photo	varchar(255)	Yes	NULL
Dob	varchar(20)	Yes	NULL
Mobile	bigint(20)	Yes	NULL
Email	varchar(255)	Yes	NULL
Pwd	varchar(255)	Yes	NULL
Qualification	varchar(255)	Yes	NULL
Education	varchar(255)	Yes	NULL
Indus	varchar(255)	Yes	NULL
Occupation	varchar(255)	Yes	NULL
City	varchar(255)	Yes	NULL
m_status	varchar(255)	Yes	NULL
Religion	varchar(255)	Yes	NULL
n_place	varchar(255)	Yes	NULL
Address	varchar(255)	Yes	NULL
Pincode	int(10)	Yes	NULL
eating_habits	varchar(255)	Yes	NULL
mother_tongue	varchar(255)	Yes	NULL
Hobbies	varchar(255)	Yes	NULL
Interests	varchar(255)	Yes	NULL
fav_music	varchar(255)	Yes	NULL
fav_read	varchar(255)	Yes	NULL
image1	varchar(255)	Yes	NULL
image2	varchar(255)	Yes	NULL
image3	varchar(255)	Yes	NULL
image4	varchar(255)	Yes	NULL
fav_place	varchar(255)	Yes	NULL
fav_movie	varchar(255)	Yes	NULL
fav_actor	varchar(255)	Yes	NULL
fav_actress	varchar(255)	Yes	NULL
fav_music_director	varchar(255)	Yes	NULL

CONCLUSION

Social Specified Edition offers inexperienced security and hobby sharing protocol on mobile social networks. There are new types of attacks and their powerful resolve. Unlike successful methods, Prism does not require the user to enjoy it as a way to show hobbies, check identity, and resolve conflicts for those who rely on the third holiday. With an implementation indicating the possibility of IS prism. Furthermore, using full protection and sophisticated analysis, it also demonstrates Prism's reliability in its competition against various attacks in addition to its performance. In the future, we intend to improve the security of Prism because we no longer rely on a foundation / software platform that uses a platform / software to prevent attacks against Sibyl and both protocols against the user. We intend to mix this resistance with a full encryption mechanism in prevention.

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Performance Measure of Intuitionistic Fuzzy Queuing Model using Intuitionistic Pentagonal Fuzzy Numbers

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ABSTRACT

This paper proposes a method to construct the membership function and non- membership function of the performance measures of the queuing systems where the arrival rate, service rate are intuitionistic fuzzy variables represented by intuitionistic pentagonal fuzzy number. The idea is to transform intuitionistic fuzzy queue to a family of conventional crisp queue. The performance measures are expressed by both membership functions and non membership functions rather than by crisp values, when the information given in the queuing systems are vague and imprecise. In this paper we study a queue with first come first served discipline and infinite population. Numerical example is given to illustrate the situation.

KEY WORDS: (α,β)-CUT, ARRIVAL RATE, SERVICE RATE, INTUITIONISTIC PENTAGONAL FUZZY NUMBERS, QUEUING SYSTEM.

INTRODUCTION

Uncertainty plays a major role in engineering and science problems. Solution for imprecise problem is difficult to arrive by means of mathematical modeling, decision making, so on. Various techniques have been formulated to tackle uncertainty. Fuzzy sets and fuzzy logic (Zadeh, 1965; 1978), complementary to probability, is best technique to deal with modeling the problems with uncertainty, imprecision, and vagueness. Fuzzy sets have several applications in fields like process modeling, control theory, decision making and expert system so on.

Literature Review related to Intuitionistic Fuzzy sets: Intuitionistic fuzzy set (IFS) was proposed by Atanassov (1986) which is a generalization of fuzzy sets is a powerful tool to deal with uncertainty. A prominent characteristic of IFS is that it assigns to each element a membership degree as well as a non-membership degree. Different types of queueing problems together with fuzzy queues have been dealt with by many researchers (Buckley, 1990; Chen, 2004; Gross, 1985; Li, 1989; Kao, 1999). Also the concept of pentagonal fuzzy number were introduced by the researchers (Mahapatra and Roy, 2013; Panda and Pal, 2015) along with its arithmetic operations.

Literature Review related to fuzzy queuing models: Fuzzy queuing model (Lie et al,. 1989; Nagoor Gani et al,. 2015) proposed a method for Generalized Trapezoidal

Intuitionistic Fuzzy Numbers and studied various characteristics. Panda and Pal (2015) studied different types of queueing problems and with fuzzy queues. Intuitionistic pentagonal fuzzy numbers (Ponnivalavan et al,. 2015) with basic arithmetic operations are studied and used the accuracy function as a ranking parameter. As an extension to pentagonal intuitionistic fuzzy numbers (Sankar Prasad Mondal, 2018) were used to describe the integral equations. The multi - server queuing model were first introduced (Thamotharan, 2016) by means of triangular and trapezoidal fuzzy numbers. Uthra (2017) described generalized intuitionistic pentagonal fuzzy number and developed a new ranking technique using centroid concept. The analysis of the performance measures of fuzzy queue using pentagonal fuzzy numbers (Visalakshi and Suvitha, 2018) gave the solution procedure for the queue with single server, first come first served discipline and the system size is infinite.

MATERIAL AND METHOD

Methods and Concepts: In this section we recapitulate the basic definitions and results related to Intuitionistic fuzzy sets and Queuing systems from well known literatures.

Definition 2.1: Let X be a universal set. Then the fuzzy subset A of X is defined by its membership function $\mu_A: X \to [0,1]$ which assign a real number $\mu A(x)$ in the interval [0, 1], to each element $x \in X$, where the value of $\mu_A(x)$ at x shows the grade of membership of x in A. The membership function of a fuzzy set is known as a possibility distribution.

Definition 2.2: Given a fuzzy set A in X, then the α-cut is defined as $\alpha_A = \{x \in X: \mu_A(x) \geq \alpha\}$.

Definition 2.3: A fuzzy number A is a subset of real line R, with the membership function μ_A satisfying the following conditions:

- $\mu_A(x)$ is piecewise continuous in its domain.
- A is normal, that is there exists some $y \in A$ such that $\mu A(y) = 1$.
- A is convex, that is

$\mu A (\lambda x_1 + (1-\lambda) x_2) \leq \min(\mu A(x_1), \mu_A(x_2))$, for all x_1, x_2 in X.

Two types of fuzzy numbers are widely used by researchers. They are triangular and trapezoidal fuzzy numbers. Pentagonal Fuzzy number a generalization of both triangular and trapezoidal fuzzy numbers is used to study performance measures of fuzzy queues.

Definition 2.4: Let X be a universal set. An intuitionistic fuzzy set(IFS) Ã in X is an object of the following form: Ã = { (x, $\mu A(x)$, $\upsilon A(x)$): $x \in X$ }, where the function μA: X → [0.1] and υA: X→[0,1] are the membership and non membership functions. It should satisfy the condition that $0 \leq \mu_A(x) + \upsilon A(x) \leq 1$ for all $x \in X$, When $\upsilon A(x) = 1 - \mu A(x)$, for all $x \in X$, is an ordinary fuzzy set.

Definition 2.5: (α-β)-cut of IFS Ã is the crisp subset (α-β) A = {x ∈ X : $\mu A(x) \geq \alpha$, $\upsilon A(x) \leq \beta$} of X, where α,β,∈ [0,1] and α+β ≤ 1.

Note that (α,β)A defined as the crisp set of elements x which belong to A at least to the degree α and which does not belong to A at most to the degreeβ

Definition 2.6: Intuitionistic Fuzzy Number IFN Ã is defined as follows:

i) intuitionistic fuzzy subset of the real line
ii) normal, i.e., there is any $x_0 \in R$ such that $\mu\tilde{A}(x0) = 1$, $\mu\tilde{A}(x0) = 0$
iii) a convex set for the membership function $\nu\tilde{A}(x)$. That is
$\mu\tilde{A} (\lambda x_1 + (1-\lambda)x_2) \geq \min(\mu\tilde{A}(x_1), \mu\tilde{A}(x_2))$ for all x_1, $x_2 \in R$ and $\lambda \in [0,1]$
iv) a concave set for the non-membership function $\upsilon\tilde{A}(x)$. That is $\upsilon\tilde{A} (\nu_{x1} + (1-\lambda)_{x2}) \leq \max(\nu\tilde{A}(x_1), \nu\tilde{A}(x_2))$ for all $_{x1, x2} \in R$ and $\lambda \in [0,1]$

Definition 2.7: Sankar Prasad Mondal (2018). A Pentagonal Intuitionistic Fuzzy Number with asymmetry PIFNAS of an intuitionistic fuzzy set id defined as A1 = (a1, a2, a3, a4, a5; b1, b2, b3, b4, b5; r1 , r2 , s1 , s2) whose membership and non-membership function are defined as:

Figure 1: Pentagonal Intuitionistic Fuzzy Number with asymmetry
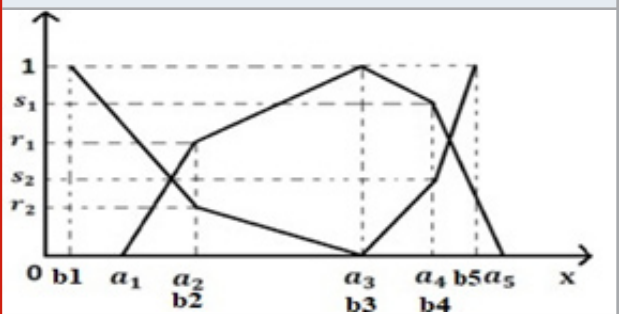
$$\mu_{\tilde{A}}(x) = \begin{cases} 0 & \text{for } x < a_1 \\ r_1 \frac{x - a_1}{a_2 - a_1} & \text{for } a_1 \leq x \leq a_2 \\ 1 - (1-r_1) \frac{x - a_2}{a_3 - a_2} & \text{for } a_2 \leq x \leq a_3 \\ 1 & \text{for } x = a_3 \\ 1 - (1-s_1) \frac{a_4 - x}{a_4 - a_3} & \text{for } a_3 \leq x \leq a_4 \\ s_1 \frac{a_5 - x}{a_5 - a_4} & \text{for } a_4 \leq x \leq a_5 \\ 0 & \text{for } x > a_5 \end{cases}$$

$$\nu_{\tilde{A}}(x) = \begin{cases} 1 & \text{for } x < a_1 \\ 1 - (1-r_2) \frac{b_2 - x}{b_2 - b_1} & \text{for } b_1 \leq x \leq b_2 \\ r_2 \frac{b_3 - x}{b_3 - b_2} & \text{for } b_2 \leq x \leq b_3 \\ 0 & \text{for } x = a_3 = b_3 \\ s_2 \frac{x - b_3}{b_4 - b_3} & \text{for } b_3 \leq x \leq b_4 \\ 1 - (1- s_2) \frac{x - b_4}{b_5 - b_4} & \text{for } b_4 \leq x \leq b_5 \\ 1 & \text{for } x > b_5 \end{cases}$$

where r_1, r_2, s_1, $s_2 \in [0,1]$ and $r_2 \leq s_2 \leq_{r1} \leq s1$. (α,β) –cut or parametric form of PIFAS is given by

$A(\alpha,\beta) = \{ x \in X : \mu\tilde{A}(x) \geq \alpha, \nu\tilde{A}(x) \leq \alpha \} =$

$[(A_{1L}(\alpha), A_{2L}(\alpha)), (A_{2R}(\alpha), A_{1R}(\beta)) ; (A'_{1L}(\beta), A'_{2L}(\beta)),$
$(A'_{2R}(\beta), A'_{1R}(\beta))]$, where

$$A_{1L}(\alpha) = a_1 + (\alpha/r_1)(a_2 - a_1), \qquad \alpha \in [0,r_1]$$
$$A_{2L}(\alpha) = a_2 + \left[(1-\alpha)/(1-r_1)\right](a_3 - a_2), \quad \alpha \in [r_1,1]$$
$$A_{2R}(\alpha) = a_4 - \left[(1-\alpha)/(1-s_1)\right](a_4 - a_3), \quad \alpha \in [s_1,1]$$
$$A_{1R}(\alpha) = a_5 - (\alpha/s_1)(a_5 - a_4), \qquad \alpha \in [0,s_1]$$

$$A'_{1L}(\beta) = b_1 + \left[(1-\beta)/(1-r_2)\right](b_2 - b_1), \quad \beta \in [r_2,1]$$
$$A'_{2L}(\beta) = b_3 + (\beta/r_2)(b_3 - b_2), \qquad \beta \in [0, r_2]$$
$$A'_{2R}(\alpha) = b_4 - (\beta/s_2)(b_4 - b_3), \qquad \beta \in [0, s_2] \qquad (2.1)$$
$$A'_{1R}(\beta) = b_5 - \left[(1-\beta)/(1-s_2)\right](b_5 - b_4), \quad \beta \in [s_2,1]$$

where $A1_L(\alpha)$, $A2_L(\alpha)$, $A'_{2R}(\beta)$, $A'_{1R}(\beta)$ are increasing functions and $A_{1R}(\alpha)$, $A_{2R}(\alpha)$, $A'_{2L}(\beta)$, $A'_{1L}(\beta)$ are decreasing functions with respect to α, β.

RESULTS AND DISCUSSION

Solution Procedure: Consider a general queueing system with one server. Let X and Y denote crisp universal sets of inter-arrival time and service time respectively. The inter-arrival time Ã and Service time Š are IFS where it is represented as

$\tilde{A} = \{(x, \mu A(x), \nu A(x)): x \in X \}$,

$\check{S} = \{(x, \mu S(y), \nu S(y)): y \in Y\}$ \qquad (3.1)

where $\mu A(x)$ and $\mu S(y)$ are corresponding membership

functions and $\nu A(x)$ and $\nu S(y)$ are non-membership functions. The (α,β)-cut of Ã and Š are defined as

$\tilde{A}(\alpha,\beta) = \{x \in X: \mu A(x) \geq \alpha, \nu A(x) \leq \beta\}$ \qquad (3.2)

$\check{S}(\alpha,\beta) = \{ y \in Y: \mu S(y) \geq \alpha, \nu S(y) \leq \beta\}$ \qquad (3.3)

where the $\tilde{A}(\alpha,\beta)$ and $\check{S}(\alpha,\beta)$ are the crisp sub sets of X and Y respectively. Using (α,β) -cuts, the interarrival time and service time can be represented by different levels of confidence intervals.

The queue adapts a first come first served discipline and infinte population where both arrival time and service time follows Poisson and exponential distributions with parameters λ' and μ' which are intuitionistic fuzzy variables.

To find the membership and non-membership function of the perfomance measures of L' = x/(x – y) ; W'= L'/x; Pb' = x/y where x = $\tilde{A}(\alpha,\beta)$ and y = $\check{S}(\alpha,\beta)$. We give a numerical example to illustrate the situation. Let us recall the definition:

Interval Value arithmetic:
Let [a, b] and [c, d] be two interval numbers. The basic arithmetic operations are defined as follows.

i)   [a, b] + [c, d] = [a + c, b + d],
ii)   [a, b] − [c, d] = [a − d, b − c],
iii) [a, b] * [c, d] = [min(ac, ad, bc, bd), max(ac, ad, bc, bd)],
iv)   [a, b]/[c,d] = [a,b] * [1/d,1/c]
v)   α[a,b] = [αa,αb] for α> 0 and α[a,b] = [αb,αa] for α<0

Example 3.1. Consider IFM/IFM/1 queue where both arrival rate and service rate are PIFNAS represented by λ' = [3, 4, 5, 6, 7; 2, 4, 5, 6, 8; r¬1 = 0.5, r_2 = 0.2,s_1 = 0.75, s_2 = 0.3] and μ' = [11, 12, 13, 14, 15; 10,12,13, 14, 16; r¬1 = 0.5, r¬2 = 0.2,s¬1 = 0.75, s2 = 0.3] per hour respectively. Then by equation (2.1) we get

α	P1L(α)	P2L(α)	P2R(α)	P1R(α)	P'1L(β)	P'2L(β)	P'2R(β)	P'1R(β)
						Table 1. Lower and upper limit of the membership and non-membership of Pb		
0	0.272727			0.466667		0.384615	0.428571	
0.1	0.285714			0.461885		0.407407	0.414636	
0.2	0.298246			0.457016	0.333333	0.428571	0.400003	
0.3	0.310345			0.452059	0.319149		0.38462	0.4105
0.4	0.322034			0.44701	0.304348			0.416666
0.5	0.333333	0.384615		0.441867	0.288889			0.422681
0.6		0.375		0.436628	0.272727			0.428571
0.7		0.365079		0.431289	0.255814			0.434344
0.8			0.393939		0.238095			0.440000
0.9			0.411764		0.219512			0.445445
1			0.428571		0.2			0.450980

Our aim is to derive the membership and non-membership of the mean number of customers in the system L' = x/(y-x), the mean waiting time in the system W' = L'/x and P' = x/y (utilization factor), the idle probability = Po' = 1- Pb', where x= Ã(α,β) and y = Š(α,β). The probabilities are given in the following Table 1:

(membership and non-membership values) and refer Fig 2, 3 & 4.

Figure 2: Membership function of arrival rate
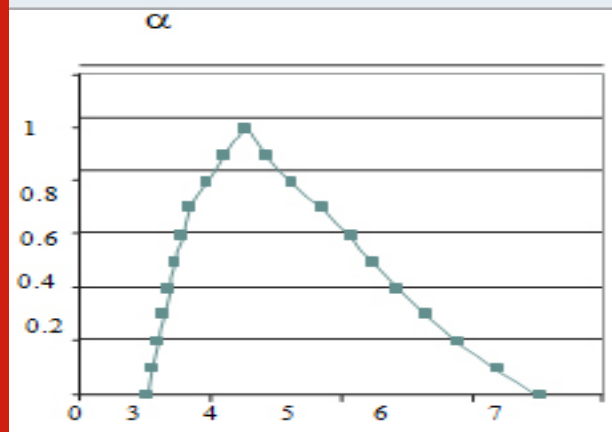
Figure 3: Membership function of service rate
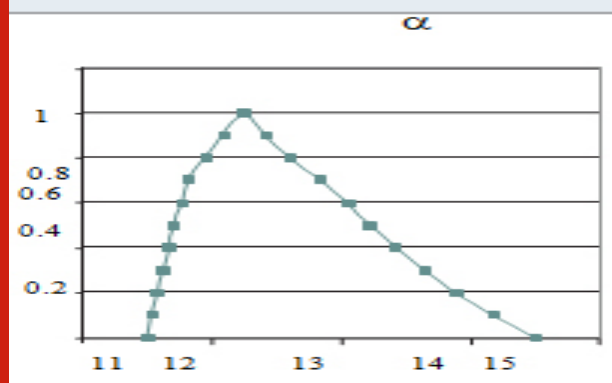
Figure 4: Membership interval of P_b
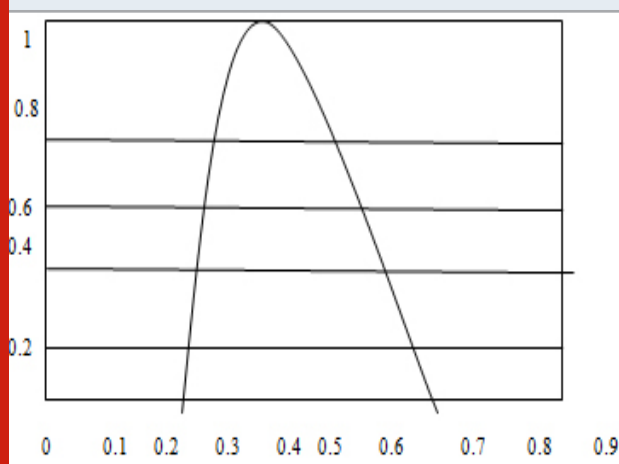
CONCLUSION

In this paper, we introduced the concept of Intuitionistic fuzzy set concept to classical queue models and analyzed the system performance for the queue discipline as first come first served using intuitionistic pentagonal fuzzy number which can be described by membership functions and non-membership functions. Numerical example considered in this paper validate the result.

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Prediction of Heart Disease Using Machine Learning

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ABSTRACT

Cardiovascular disease is a general phrase that indicates that it is working abnormally. Babies can also have congenital heart disease. Each and everyday people affected by heart disease is increasing in number. Still, it is one which is prevailing among people, regardless of their age. This kind of disease is common for both men and women. So the prediction of this disease in an efficient manner is the most challenging duty. Heart rate classification is done by electrocardiogram (ECG) and many new IoT techniques, but something great can be achieved by using machine learning (ML) algorithms. Machine Learning is efficient in predicting heart diseases. This information can provide essential information to doctors to carry out on their diagnosis for patients. Machine learning helps us to achieve by resulting in the greatest accuracy rate. By taking this into account, we are focusing on learning techniques for prediction of heart disease. In ML, particularly we are focusing on the AdaBoost classifier to get good results. Adaptive boost (AdaBoost), a meta-learning algorithm which comes under ML techniques. It can be used in conjunction with some other types of learning algorithms for improving performance. Thus by using AdaBoost classifier, it achieved 98% of accuracy.

KEY WORDS: ADAPTIVE BOOST(ADABOOST), ELECTROCARDIOGRAM(ECG), MACHINE LEARNING(ML)..

INTRODUCTION

Machine Learning has become a strong tool that can make predictions supported an oversized amount of information. It is become so popular in recent times that its application is discovered in our day to day activities. Machine Learning, often noted as predictive analysis or predictive modeling can be defined because the ability of computers to find out without being programmed

explicitly. It uses programmed algorithms to research computer file for predicting output within an appropriate range, so we are able to use the AdaBoost algorithm. It is difficult to spot the disease associated with heart due to several risk factors like diabetes, high cholesterol, high pressure level, vital sign, also includes lots of other factors. Many of those techniques in data processing and neural networks (Hamido et al,. 2018) are used to search out the severeness of cardiovascular diseases. The severeness of this disease is can be predicted by various kinds of methods like Genetic algorithm (GA),K-Nearest Neighbor Algorithm (KNN) (Mai et al,. 2017) , Naive Bayes (NB), Support Vector Machine(SVM), and Decision Trees (DT) (Yang et al,. 2018).

The character of this disease is very complex and should handle with care. With the help of bioscience and data

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processing can be used for locating the metabolic syndromes. Therefore, data processing along classification helps to predict the cardiopathy and data investigation. It is known that decision support systems (DSS) (Saima et al,. 2018) , is used for prediction of accuracy of events associated with this disease. AdaBoost algorithm is still used to boost performance of any machine learning algorithm. We are visiting implement this project using the software used is Anaconda which is an open-software used for platforms like programming languages like python and R for processing large scale data's, ML oriented applications, data science and analytics. The dataset used in prediction of this disease is taken from the UCI repository of machine learning.

There are mainly thirteen attributes used, namely age, ap_hi, gender, id, height, weight, ap_lo, cholesterol, glucose, smoke, alcohol, cardio. Thus, use feature exaction to select some specific features for further processing.

MATERIAL AND METHOD

Related Works: Rajesh R. Tully et al. With the support vector algorithm, we proposed heart rate classification using the non-linear decomposition method. Their classification objectives include a two-element allocation method for classifying approximately five types of heartbeats, including the normal anterior atrial contraction, the anterior contralateral ventricles, the left and right bundles of the branchial branches. Continuous minimum optimization algorithm and support vector machine learning algorithm (SMO-SVM) are used, and its advantages are: First approach demonstrates remarkable performance with 98.01% sensitivity, 99.49% specificity and 99.20% accuracy for MIT-BIH database. And 95.15. The% sensitivity for the IN CART database, 98.37% specification and 97.57% accuracy, and its disadvantage is that providing a classifier with redundant functions increases the cost of computations and often reduces performance (Rajesh et al,. 2017).

K. Yang proposed to diagnose cardiovascular disease using a support vector machine, 2018. Introduced a two-dimensional SVM based compression method for diagnosing cardiovascular disease. The algorithm, the support vector machine (SVM), falls under the category of supervised learning algorithm, which can be used for classification problems and regression problems (Yang et al,. 2018) . SVM uses the hyperplan method to classify patients with heart disease. The classification accuracy obtained for this technique is 88.24% obtained by the core radial basis function (RBF). Lack of efficiency for big data is a disadvantage. Proposed Decision Support Systems (DSS) 2018 (Saima et al,. 2018) based on machine learning systems by Saima Safdar et al.

The algorithm used is a decision support system. (Digital Signature Standard (TSS) is a digital signature algorithm (DSA) developed by the US National Security Agency (NSA) to create a digital signature for authentication

of electronic documents. ... Specified in the Federal Information Processing Standards (FIPS). An analysis of the different models and without comparison on the basis of the comparison, he classifies, compares and assesses. Inaccessible and available in real time.

Ur Acharya, H., This system cannot be used for a large database with an accuracy of 94.95%, a sensitivity of 93.72% and an accuracy of Net 1 and 95.11%, an accuracy of 95.13%, a sensitivity of 91.13% and a specification 95.88% for Net 2. And using a deep convulsive neural network to detect myocardial infarction using ECG signals, 2017, Elsevier uses it to automatically determine the normal and IM pulse of the ECG (with and without noise). The algorithm used is an alternative neural network. The ECG pulse with and without noise is 93.53% and 95.22% accuracy, respectively (Acharya et al,. 2017).

Hamido Fujita et al., Deep Ordinary Neural Network, 2018, Springer, which provides automatic detection of heart failure using ECG signals, serves as diagnostic assistance for cardiologists, providing a more objective and faster interpretation of ECG signals. The algorithm is a convolutional neural network, and four different data sets (A, B, C and D) were used to train and validate the data. Of the four sets, set B reached a maximum accuracy of 98.97%, specificity and sensitivity of 99.01% and 98.87%, respectively.

Three data sets did not give the expected result (Hamido et al,. 2018). Isad Arafasadi, R. Alizadehani used automated decision-making for the diagnosis of cardiovascular diseases using a hybrid neural network - genetic algorithm, 2017 (Arabasadi et al,. 2017). The most accurate hybrid method for diagnosing coronary heart disease. The hybrid neural network-gene algorithm (Siva Kumar et al, 2018) . This method can increase the efficiency of neural networks by about 10% by increasing its initial weight using a genetic algorithm to offer the best weight for neural networks. In addition to genomic methods, there are many powerful evolutionary and intelligent methods, such as evolutionary technology and particles. Swarm optimization (Vetriselvi et al,. 2019).

Ke Uyer, A. Alhan proposed consecutive fuzzy neural networks trained using the proposed genetic algorithm based on the heart algorithm, 2017 (Uyar et al,. 2017) This study proposes a genetic mechanism (GA) based on a series of fuzzy neural networks (RFNNs) trained to recognize heart disease. The algorithm used is a continuous fuzzy neural network (RFNN). The results showed that 97.78% accuracy was obtained from a test kit that lacked decision-making ability. A synthesis of prognostic models based on a continuous neural network for the initial risk of heart failure, 2018 (Ankeeta et al,. 2018), Journal of Biomedical Informatics, using a large and multidimensional EMC dataset. Continuous neural networks (RNAs) have been used to predict disease risk using electronic medical records (EMCs). The neural network has established a general generalization of

deep learning models based on RNN in hospitals and clinics with different characteristics. The accuracy of RNN models varies by patient group..

RESULTS AND DISCUSSION

Proposed Method: In this study, we've used the Ada-boost classifier to predict cardiovascular disease effectively. It is very easy for classifying the info and to improve accuracy. Normalization of knowledge is done using data pre-processing. The redundancy and therefore the size of the dataset are reduced using feature extraction. Thus using this dataset, prediction may be done accurately. Section A sums up about data preprocessing, Section B comprises of feature extraction, Section C explains about Ada-boost classifier, Section D is for evaluating the performance measures and outcome of this project.

Table 1. Attributes and Description	
ATTRIBUTES	DESCRIPTION
Id	ID number
Age	in days
Gender	1 - women, 2 – men
Height	cm
Weight	kg
ap_hi	Systolic blood pressure
ap_lo	Diastolic blood pressure
cholesterol	1: normal, 2: above normal, 3: well above normal
glucose	1: normal, 2: above normal, 3: well above normal
smoke	whether patient smokes or not
alcohol	Binary feature
Active	Binary feature
Cardio	Target variable

A.Data Pre–Processing: The data within the dataset are pre- processed. Data Preprocessing may be a technique that is accustomed convert the information into a clean data set. In other words, whenever the info is gathered from different sources it's collected in raw format which isn't feasible for the analysis. There are a complete of 5005 patient's data, among that 5 patients records are with some missing values. Those 5 records are removed and therefore the remaining 5000 records are used in pre-processing. Data cleaning and Data transformation are done (Marikani et al,. 2017). Data cleaning is essentially the task of removing errors and anomalies or replacing observed values with true values from data to urge more value in analytics. Data cleaning is completed to seek out the missing and noisy data. Data transformation is done to normalize the info (Matjaz et al,. 2018).

A few steps might be required with your dataset, generally, they are:
• Data Quality Assessment

• Feature Aggregation
• Feature Sampling
• Dimensionality Reduction

If the patient is having the symptom the value is set to 1 else 0.

B.Feature Extraction: Feature Extraction aims to reduce the number of features in a dataset by creating new features from the existing ones (Mai et al,. 2017). Feature Extraction techniques can also lead to other types of advantages such as:

• Accuracy improvements.
• Over fitting risk reduction.
• Speed up in training.
• Improved Data Visualization.
• Increase in explain ability of our model.

Figure 1: Feature Extraction
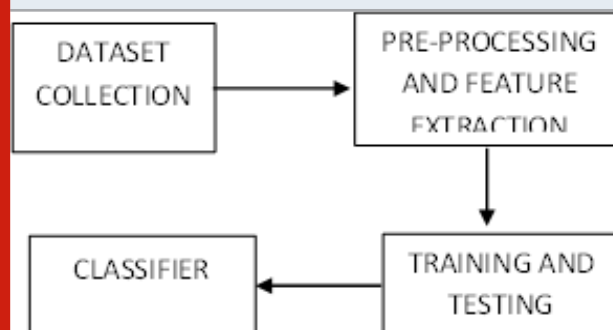
For feature extraction, two attributes are selected among the 13 attributes are cholesterol and cardio. This is because these features help to detect heart disease accurately. The remaining attributes are important for clinical records. The algorithm used for this process is random forest. These features are been used by the AdaBoost classifier to classify the data. Thus the experiment was repeated with all these 13 attributes (Wuyang et al,. 2017).

C.Adaboost Classifier: Ada Boost (Adaptive Boosting) is a machine learning meta-algorithm designed by Yao Freund and Robert Shafır. It can be used in combination with a variety of learning methods to increase productivity. The results of other learning methods ("weak learners") are combined into a weighted sum representing the end result of the advanced classifier. The data set is collected from the UCI machine repository and used to predict heart disease. This can be combined with any method, for example, Random Forest. The Adapust algorithm is based on three ideas. The first idea is that Adaboost brings together many weak students and creates a classification. Weak students are almost stumped. A second idea is that some stumps receive more information in classification than others (Divya et al,. 2018). The third idea is to take into account the mistakes of previous stumps. To find the sample

Formula: $\dfrac{1}{\text{Total number of samples}}$

For processing the heart disease using AdaBoost classifier using stump we take two features of data, thus we can predict those suffering from chest pain and the one who doesn't. The prediction of error in the data set can be processed by adding the sample weight by

Formula : TOTAL ERROR= SUM OF SAMPLE

WEIGHT

So that total error of the chest pain will be determined, using this we can determine amount of say and this is calculated by Formula:

AMOUNT OF SAY = 1/2 LOG(1-TOTAL) ERROR/ TOTAL ERROR

A new sample weight has been generated for incorrect data, by Formula:
NEW SAMPLE WEIGHT = SAMPLE WEIGHT * Eˆ AMOUNT OF SAY

For the remaining data, it is generated by Formula:
NEW SAMPLE WEIGHT = SAMPLE WEIGHT * eˆ- AMOUNT OF SAY

While normalizing the sample weight the efficiency has been increased so that processing can be done easily (Zhanpeng et al,. 2017) . The next new table has been created by selecting random columns from the old table.

D. Performance Measures: Thus by using this Ada boost classifier, we can achieve 98% of accuracy. The confusion matrix is one of the easiest methods used for finding the accuracy of a model. It is mainly used for classification problems. This gave us a clear result of not only accuracy but also for efficiency and specificity.

CONCLUSION

This study proposed an alternative approach to the classification of cardiovascular disease using the Adapoost classifier, which supports clinical data and patient test results. He achieved an overall accuracy of 98%. Using the random forest algorithm without cross-checking gave an overall accuracy of 82.895% [17]. Thus, we were able to achieve the best level of accuracy using the increment method.

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MPPT based Harmonic Reduction in PV Module for Grid Connected System

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ABSTRACT

Gradually the nonlinear load present in industrial areas and residence is growing immensely. Because of this nonlinear load intervention the harmonics are enormously produced. The of nonlinear load in house is growing daily. Due to these nonlinear load's harmonics are generated. This paper gives a virtual impedance for inverter affiliated distributed generation (DG) devices and PI controller is used for the harmonic contemporary monitoring inside the internal loop. In order to extract the maximum power, The MPPT strategies made to analyze the Photovoltaic module, to avoid the variation of electricity from the PV due to the fast-varying atmosphere situation. Harmonics compensation will be done by the use of the virtual impedance technique. Nevertheless, with the growing enact of distributed generation (DG) in resident regions and industrial regions, consisting of photovoltaic (PV), fuel cell, windmill and have DG-grid interfacing inverters. In this project, photovoltaic (PV) grid interfaced inverter is managed to provide the harmonic reimbursement through virtual impedance approach. The residential load and industrial load are modeled in this paper by the simulation. Also, the system operation with and without compensation method also carried out. The THD levels of the node related to the load is decreases. The consequences of harmonics and virtual impedance technique are analyzed through the evaluation and simulation. In this paper take into account the PV as DG gadget.

KEY WORDS: RESIDENT DISTRIBUTION SYSTEM, DISTRIBUTED GENERATION (DG), HARMONIC COMPENSATION, PHOTO VOLTAIC (PV), POWER QUALITY IMPROVEMENT.

INTRODUCTION

PV Panel Grid Connected System: The System consists of PV panel, DC-DC chopper, MPPT controller, inverter, control loop and virtual impedance. The PV module in this Fig 1 is a two-degree conversion network, which incorporates a boost chopper that boosts up the PV module output to the DC link voltage level with MPPT control is concatenated to the grid through the system inverter. The reference current output from the PV gadget has components (i) the essential aspect (ii) the harmonic components. Concluding, the PV module current output is restrained with two loop controls, containing an exterior output current manage loop and an interior (LC) filter control loop.

The electrical load appliance load characteristics are obtained from domestic model. In order to improvise the power quality strength and controlled. The PV module are connected to the distribution device version through the inverters. MPPT manage tracking to obtain the maximum power with good power quality and also act as harmonics-controlling virtual impedance from

PV panel by way of the distinctive type of algorithms used A grid-connected PV module system is typically composed of five major components: a) PV module used to produce electric energy from solar radiation, b) a boost chopper used to convert boost the dc voltages produced by the PV arrays to a high dc voltage, c) an inverter transfers high dc voltage to a 1φ and 3φ AC voltage, d) the converter operation with MPPT capability has been controlled by controller, and e)voltage/current harmonics generated by the inverter are nullified by the filter. The virtual impedance effect is created between the grid and the load by vary the reference current or voltage of the controller through the inverter.

Figure 1: PV grid connected system.
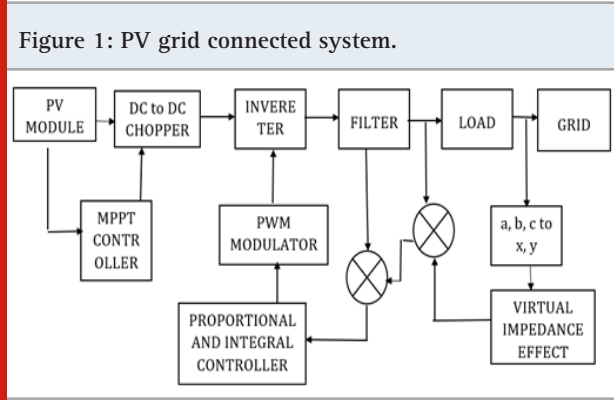
MATERIAL AND METHOD

Photovoltaic Cell Model: A PV cell is primarily a skinny wafer of semiconductor fabricated p n junction diode. The electromagnetic radiation emitted from the sun energy can be immediately transformed to electricity through photovoltaic impact. While exposed to the sunlight, photons with extra strength than the band-gap energy of the semiconductor creates. That band gap energy will create some electron-hole pairs based on the radiation fall on the module. The simplified model of a PV cell is as tested in Figure 1. PV cellular modeled as diode circuit.

The source current Iph1 indicates the cell photo current. Rsh1 and Rs1 are the intrinsic shunt and series resistances of the cell respectively. Normally the range of Rsh1 will be very big and that of Rs1 may be very small, as a end result they will be ignored to streamline the assessment. PV cells are collected in huge gadgets called PV modules which are similarly interconnected in a series-parallel configuration to shape PV arrays. The mathematical model of the PV panel as given in equation (1.1) - (1.4)

Module photo voltaic current

$$I_{ph1} = \frac{[Iscr1 + Ki\,(T1-298)]*\lambda1}{1000} \tag{1.1}$$

PV Module Reverse Saturation current

$$I_{rs1} = \frac{Iscr1}{e^{[(q.Vopc/Ns.k.A.T)]}} \tag{1.2}$$

The PV Module saturation current Io changes with the cell temperature which is given by

$$I_{01} = I_{rs1}*[T_1/T_{r1}]3\exp^{[q*Ego\{(1/Tr1)-(1/T1)\}]} \tag{1.3}$$

The Current value of the PV module is

$$I_{pv1} = N_{p1}*I_{ph1} - N_{p1}*I_{o1}[\exp^{\{(q*Vpv1+Ipv1*Rs1)/NsAkT1\}}] \tag{1.4}$$

Where,
$V_{pv1} = V_{oc1}$, $N_p=1$, $N_s=36$

MPPT Technique: This paper gives a innovative procedure to enhance the tracking velocity of the Modified Perturb &Observe. This approach is named the EPP that makes use of one estimate mode among every two perturb modes. The operations of the estimate mode and the perturb mode present in the EPP method are similar to the ones of the Modified Perturb &Observe method explained above. When compared with the Perturb &Observe technique, the EPP method proposed in this paper, with an addition of the estimate mode, considers the converting irradiance in the control that significantly improves the MPPT performance.

Figure 2: Harmonic level in resident and industries
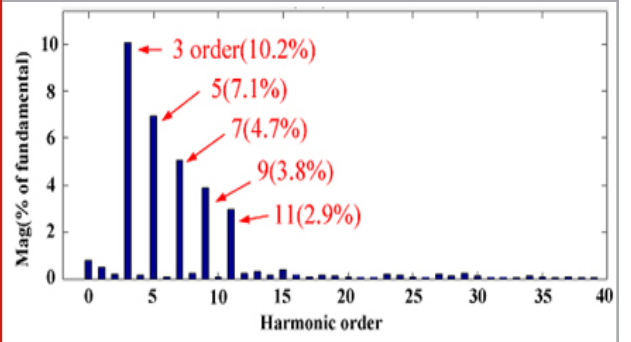
While comparing both the MP&O and EPP technique, the EPP technique that uses one estimate mode for each perturb modes will increase the tracking velocity of the MPPT, without reducing the tracking accuracy. The modified EPP method has a monitoring pace of about 1.5 times quicker than the MP&O approach, yet the delay time of both the methods remains same. Thereupon the more advantageous one is modified EPP method than the MP&O technique.

Home and Industrial Load Model: In the resident side load and industrial load comprise of PC, CFL, transformer, fan and so on and furthermore in some opposite side the ventures likewise found. with the goal that this sort of load is considered for the compensation of harmonics. In this paper the motor, PC, CFL are taken for the demonstrating.

Harmonic Compensation Strategy: A voltage-controlled Distribution Generation unit is proposed in to compensate the harmonic of the Distribution Generation unit is spoken to act as a controlled voltage source with the impedance in the cascade arrangement. The harmonic segments of the voltage controlled source are modified by the voltage present in the harmonic of the point of common coupling (PCC) with a positive criticism gain. Virtual inductive proportionate impedance is acquainted right now to remunerate the harmonics in the system, hence the impedance's most of the part is inductive at harmonics frequencies. This technique is very appealing for use in a microgrid. Voltage-controlled DG is significant for giving the microgrid voltage and frequency control. G is the feedback gain. The range for the G is 0 to ∞.

The negative sequence current will be generated in the DG network because of the virtual impedance similar to the real impedance, while it is exposed to lopsided load or uneven voltages and cause a voltage drop in the DG. Nevertheless, if needed, the negative sequence current because of virtual impedance and the harmonic current sharing strategies can likewise be actualized to improve the microgrid power quality when critical harmonics and uneven burdens available. After acquiring the virtual impedance voltage drop, this voltage drop will be joined into the voltage control circle of the DG inverters.

Figure 3: virtual impedance-based controller
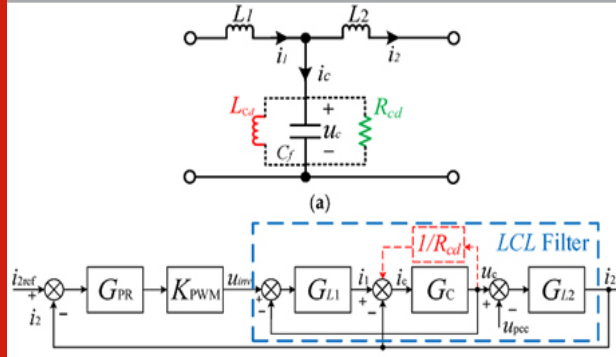
The power control circle will develop the reference voltage, and the virtual impedance voltage drop is negotiated from the reference voltage to create the virtual impedance impacts. For the DG framework with a yield LC filter, a multi loop voltage control conspire is embraced, where the output loop utilizes a PI controller. Be that as it may, in a microgrid with critical harmonic loads, it is wanted to utilize numerous harmonic resonant controllers at harmonics. For the internal loop, a corresponding controller Kind (gain)is utilized.

RESULTS AND DISCUSSION

The performance of each block associated in the simulation results is talked about in the part. The output voltage with and without compensation, gate pulse of MPPT to the converter, demonstrated below From Fig 4, we saw that by expanding the sun powered insolation

level. The power output from PV module increases. The peak point is the MPP of the PV.

Figure 4: PV charecteristics of PVmodule
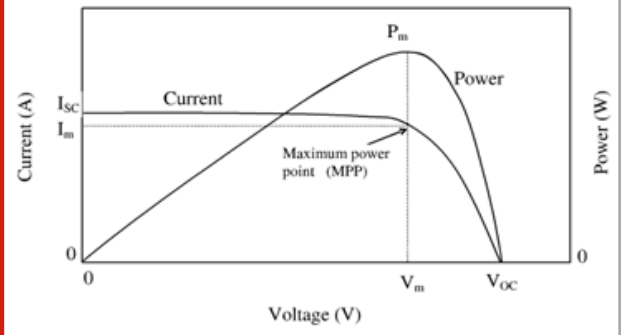
Performance of Dc-Dc Chopper: From the fig 5 it is obviously seen that the boost converter ventures up the voltage from 10 to 20 volt as per the parameters determined before, satisfying the ideal states of output current being 0.4 A at frequency 50 kHz. The efficiency of the boost converter is 94.16%. The frequency of activity is 50 kHz. The output current obtained from simulation, which is 0.4 A. The output voltage acquired from simulation, which is 15 V. Duty Cycle is kept up above 20%.

Figure 5: Boost Circuit Output (Time VS Voltage)
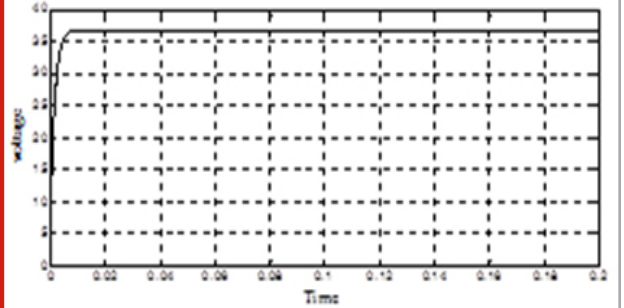
Performance of MPPT: The gate to the switch in the DC-DC converter is produced by the MPPT. Fig shows 6 that the gate pulse to the switch associated with the DC-DC converter. This pulse produced by the MPPT calculation. The gate pulse produced by the MPPT is given to the boost circuit switch.

Figure 6: MPPT output (time Vs duty cycle)
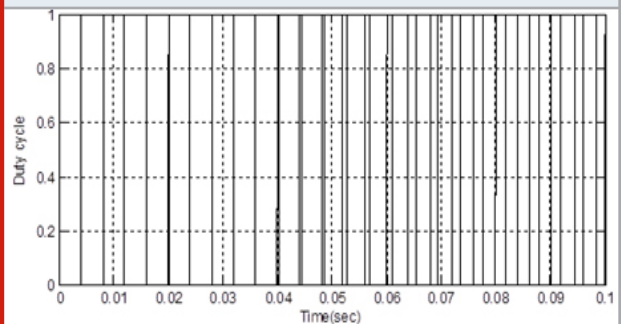
Output Voltage Without Virtual Impedance Compensation:
In X axis notice the time and in the Y axis voltage range. The distortion from the output is repaid by interfacing the virtual impedance strategy. Without virtual impedance compensation the system voltage is distorted from the basics. The THD scope of the system arrives at high an incentive than the evaluated esteem.

Figure 7: Output voltage without virtual impedance compensation
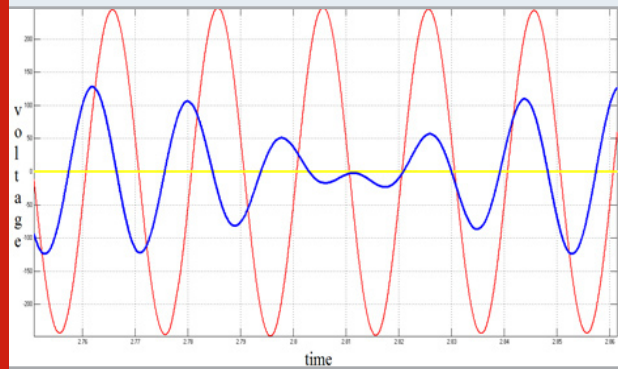
The system without virtual impedance compensation isn't performed well, the part are associated truly to the system to give the compensation in different kinds of compensation and the segments cost and impact made by this gear additionally considered for the correct compensation. Additionally, the activity of the component depends some factor if any change happens in that the absolute activity gave by this hardware influenced. The output for this sort of activity is indicated figure 7

Output Voltage with Virtual Impedance Compensation:
From the outset, the characteristics of DG1 in grid connected activity is examined. Right now, DG impedance is controlled inside the structured range, along these lines the stability and little disturbance influence dismissal capacity will be ensured. During the transient, about 10 Var diminishes in the reactive power (Q-a). The reactive power coupling disturbance influence is decreased by around 75%, while the dynamics of real power following is kept up to be the equivalent. Note that in spite of the fact that the real power is marginally influenced, just around 15 W power disturbance occurs, and it tends to be settled quickly.

Contingent upon the reactive power difference, the virtual impedance is managed deceptively to guarantee a quick reactive power tracking. As talked about beforehand, when the reactive power transient finishes, the virtual reactance and resistance reestablish gradually to their initially structured values. Therefore, the virtual impedance reclamation process doesn't cause any power variations. The presentation of the DG framework during 9% grid voltage sags. Accordingly, the current surge during grid voltage sag is diminished clearly.

The outcomes are taken for the single DG system no one but it very well may be determined for the other DG systems associated. At the point when the fixed

virtual impedance is embraced in the simulation, 19.5A peak to peak current is produced. True to form, when the aggravation ride-through capacity is empowered in Fig. 8, the impedance ($\omega 0$ (LV +ΔLV), (RV +ΔRV)) can be tuned by line current magnitude.

Figure 8: Output voltage with virtual impedance compensation
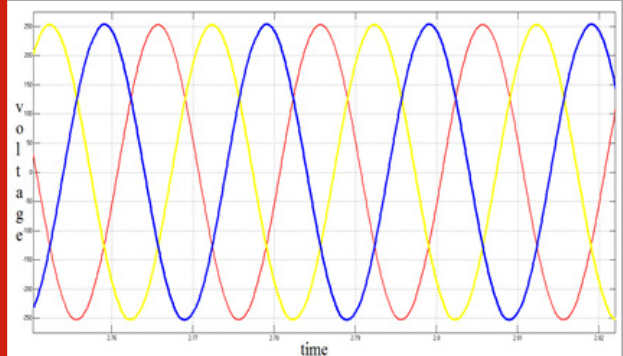
THD of Voltage: Examination of the waveform as appeared, found the total harmonic distortion (THD) is around at 90.27%. When exposed to compensation, the waveform is currently continuous, practically sinusoidal and in phase with the supply voltage. Allude to Fig. 9 visually indicated that when utilizes virtual impedance strategy the supply waveform become smoother and low ripple contrasted with hysteresis. Likewise, the THD level is diminished from 2.65% when apply virtual resistance from 1.50% utilizing virtual inductor. Total harmonic distortion is determined by the proportion between the harmonic voltage to the fundamental voltage.

Figure 9: Output voltage THD
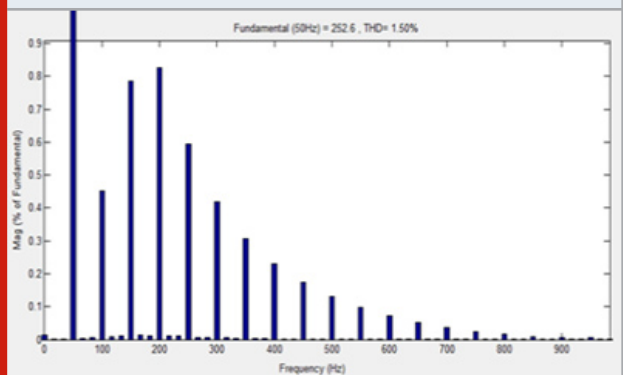
THD of Current: Investigation of the waveform as appeared, found the total harmonic distortion (THD) is around at 90.27%. When exposed to compensation, the waveform is presently continuous, practically sinusoidal and in phase with the supply voltage. Allude to fig. 10 outwardly demonstrated that when utilizes virtual impedance strategy the supply waveform become smoother and low ripple contrasted with hysteresis. What's more, the THD level is diminished from 3.65% when apply virtual resistance from 2.09% utilizing virtual inductor.

Figure 10: Output current THD
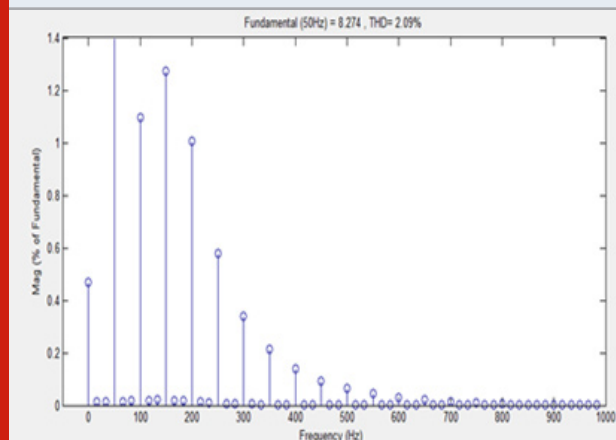
CONCLUSION

In this paper the DG impedance structure and execution approach is proposed. Furthermore, to improve the performance of the DG units in a micro grid ,a transient impedance voltage drop and a versatile transient virtual impedance strategy feed forward compensation conspire are proposed. Examinations are led to demonstrate the proposed structure, execution approach, and control techniques. We investigated utilizing residential and industrial system DG-grid connected inverters as virtual harmonic impedance to damp the system harmonics and improve the power quality. In the literature the virtual resistance system is utilized to give compensation be that as it may, in this paper inductor is taken for the compensation. The THD level is diminished from 2.6% to 1.5% in voltage and 3.93%in current. After such an assurance has been made, legitimate needs can be doled out to the inverters in the distribution system for optimal compensation performance.

The MPPT method are utilized to follow the most extreme power from the PV panel and give the gate signal to the boost circuit. in this project 5th &7th order are redressed. In future work, Fuzzy logic control is utilized. The distinctive compensation for the system associated with the node will examine to give the need to the inverter. Consider a smart grid arrangement of the DGs with correspondence so as to control the support from each PV inverter consequently as indicated by the distinguished need. Additionally, to give an exact adequacy examination of the harmonic compensation by utilizing PV inverters for the duration of the day/season/year, the utilization of a factual home model of a resident and industrial framework and solar irradiance noteworthy information could likewise be thought of. The ideal arrangement of the capacitor will be discovered in future.

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Development of IoT Architecture for Physically Challenged People Using BLYNK Server

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ABSTRACT

Now a very speed of life keep monitoring of physically challenged people are very difficult .By checking the health report of physically challenged people at residence is a tough task. Especially long aged physically challenged peoples should be continuously monitored and their relatives need to be informed by their health report from periodic while at work. So we need an innovative system that automated this work with ease of operation. Our project keep towards a smart physically challenged people health monitoring system that has used Sensors to monitor physically challenged people health and uses net connection to inform their relatives in case of any problems happened. Our project haschecked the temperature as well as human heartbeat sensing to keep track of health.Objective of this project work was to propose and develop an Internet of Things (IoT) based system for physically disabled people. A dynamic system consisting of sensors, nodemcu esp866, Wi-Fi connected over an internet was developed. Communication between hardware and software was done using RS232 communication. With this system, patient on reaching the Higher Limit (HL) or Lower Limit (LL) can send alerts to all the mobile numbers entered over the network. The BLYNK IoT android application was used to send the Notification through touch on buttons. Thus BLYNK IOT based physically challenged people health tracking system effectively uses internet to monitor physically challenged people health stats and save lives on time.

KEY WORDS: INTERNET OF THINGS, HIGHER LIMIT, BLYINK IOT, HEALTH CARE**,** NODEMCU,.

INTRODUCTION

Patients suffer from wide variety of disabilities can upto the range in severe from low of stamina to loss of health. Physical inability results in physical difficulties of different variation.The IoT technology provides proactive help to patients with it advanced human machine interaction by internetworking physical devices and embedded sensors which enables these objects for collecting and exchanging data. Physical disability results in physical difficulties of different levels.(Murugesan. S et al., 2019) The IoT technology provides proactive help to patients by internetworking physical devices and embedded sensors.(S.Vijayalakshmi et al., 2020) Paralyzed patients are provided with unobtrusive support by the caregivers with the help of an application where a combination of services such as, Patient monitoring system of physically challenged peoples.

Aim of IoT: IoT diminishes human intercession, empowers gadgets/items to watch, distinguish and comprehend a circumstance IoT can interface gadgets installed in different frameworks to the web. These items can be controlled from anyplace. The availability causes us to

catch more information from better places, guaranteeing expanding proficiency and improving wellbeing and IoT security. IoT stages can help associations in lessening cost by improving procedure proficiency, resource use and profitability. The improvement and mix of data, methodology and things on the web would make logically critical and increasingly open entryways for individuals, organizations and enterprises. An IoT application includes electrical, clinical, data innovation, widespread space examine. All the components hear bat sensor, temperature sensor,mems sensor and nodemcu are connected over an internet IoT blynk Platform. Digital convertor is the way to convert the sensors signal into digital value which is controlled by Microcontroller. Communication in between software and hardwarecan be done using of RS232 cable communication. Patients are receiving the HigherLimit (H.L) either Lower Limit (L.L) send alerts to all the smart mobile numbers given over the network. The new android application is provided to patient and text messages are sent to the doctor, caregiver and family member.

Assistance of physically disabled with IoT: This system utilizes Temperature and heartbeat sensor for following wellbeing of genuinely tested individuals. Both the sensors are associated with the Arduino-uno. To follow the patient wellbeing small scale controller is thus interfaced to a LCD show and wi-fi association with send the information to the web-server(wireless detecting hub). If there should be an occurrence of any unexpected changes in persistent pulse or internal heat level alarm is sent about the patient utilizing IoT. This framework additionally shows patients temperature and heartbeat followed live information with timestamps over the Inter arrange. In this manner physical tested individuals wellbeing checking framework dependent on IoT utilizes web to adequately screen understanding wellbeing and helps the client observing their friends and family drom work and spares lives.

MATERIAL AND METHOD

Survey Report: Creators proposed a home robotization framework for old and incapacitated individual utilizing Xbee. These frameworks help in controlling the electric apparatuses utilizing Xbee module. Driven's and Monitor show is utilized to caution the client. The correspondence between remote control and the base is finished with the assistance of RF signals. (Rani Gowshalya, M. G et al., 2015). Examine about the keen home innovation for free living individual with inabilities and older individuals utilizing shrewd home innovation. Right now have to clarify about vitality sparing, support for the old and impaired, Safety and Security, remote sensor hub and various sorts of sensors that can be utilized in home mechanization.(S.R.Paveethra et al., 2020). Presents a keen home framework utilizing ZigBee based voice

controlled remote. LabVIEW programming is utilized for the voice acknowledgment framework. Diverse voice orders are utilized to control the electrical apparatuses. (Praveen, A.Anton Amala et al., 2018). Gives survey of home computerization framework for handicapped individuals utilizing mind PC interface .this exploration incorporates control and checking home machines from graphical interface utilizing cerebrum PC interface that utilization an info source and being control remotely.(C.Kalavalli et al., 2020).

Proposes a home machines controlling framework through spoken orders utilizing handheld gadgets and ZigBee module. This framework utilizes voice orders and SMS orders to control the apparatuses. At the point when the voice orders are given then it is changed over to instant message and sent through GSM. ZigBee module is utilized to control numerous focuses at once. Creators have proposed structure and usage of voice controlled remote canny home computerization framework dependent on zigbee.In these framework various kinds of sources of info are given like voice, message and direct contribution from the client to control the various machines through transfer circuit and signal is utilized for cautioning framework.(M.Kavitha et al., 2020). Presents home robotization framework utilizing Bluetooth and android application. Low voltage initiating switches are utilized in input side. It impart the control sign to the controller board which PIC Microcontroller here. Controller switches the apparatuses as indicated by the given information gadget and controller sends the status of the machines to GUIs. (Umamaheswari, K et al., 2015).

Proposes social insurance in home robotization frameworks with discourse acknowledgment and versatile innovation. This framework incorporates creating framework with discourse acknowledgment, discourse combination; face acknowledgment, controls for Arduino equipment and keen application for remote controller.(Paveethra, S.R et al., 2015). Presents home robotization utilizing ZigBee innovation. Voice orders are changed over by HM2007 board and afterward given to controller board. The controller board sends the controlling orders to various gadgets through ZigBee module. ZigBee modules are utilized at both sending and getting end.(Raghavi, R et al., 2015) Existing IoT system has used think speak cloud. Here it's the possibility of uploading the data only. The main drawback is higher cost to develop the module for data transfer and low data rate, low speed compared with proposed work IoT module, High power consumption.

Proposed Design: The block diagram of proposed model is shown in fig.2. It is the stream outline of the activity at the controller end. At the point when the controller board is turned on, the board will set up association with

the web if the association comes up short and it will attempt again to interface. In the event that association is built up, at that point the controller assembles the sensor information from all the sensors in the house. At that point the information is sent to the client through web. At the point when the controller peruses the sensor information it will contrast it and the preset edge esteem. On the off chance that the worth is more noteworthy/ lower than the edge esteem then the client is alarmed and the incitation did.

Figure 1: Basic model of IoT Architecture
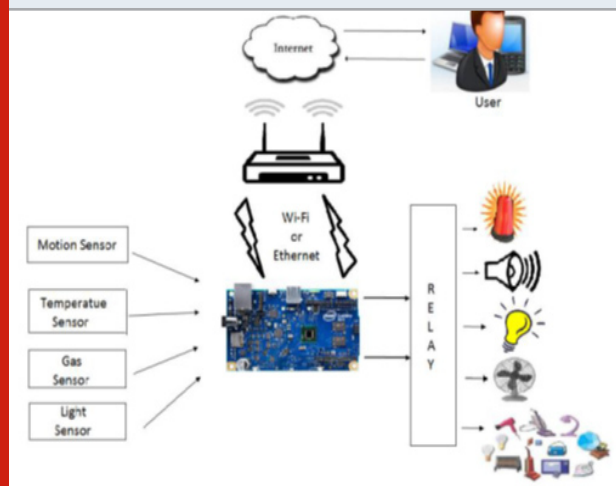
Simultaneously, the controller likewise pauses and gets the client orders to enact and incite the framework according to the client order like turning on and off of the electrical apparatuses. The genuinely tested individual needs any crisis, press the crisis button, the IoT gadget consequently sends the warning to closest medical clinic, relative individuals and approved individual. We need to proposed the Novel new Free ioT cloud Platform 24hrs for Monitoring the data utilizing BLYNK nearby Server.

Figure 2: Operation of proposed model
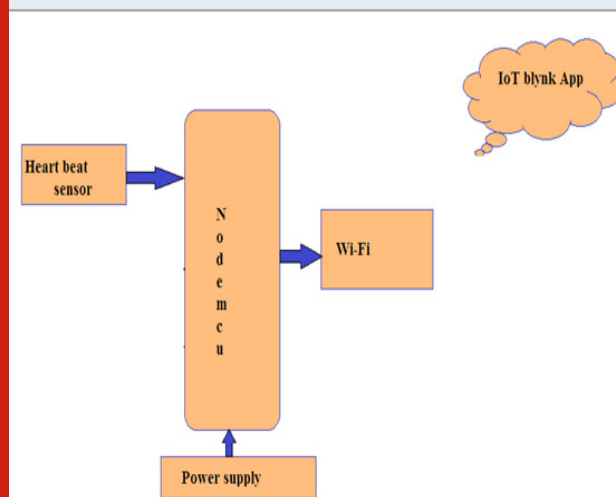
Figure 3: Connction of patients caring peoples with network
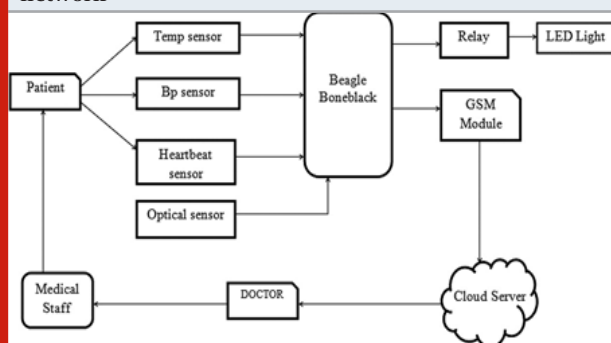
The figure.4 shows the flowchart for proposed system. The sensors are associated with a microcontroller to follow the status which is thus interfaced to a LCD show just as Wi-Fi association so as to transmit alarms. In the event that framework recognizes any unexpected changes in truly tested individuals heartbeat or internal heat level, the framework naturally cautions the client about the genuinely tested individuals' report on IOT and moreover shows nuances of heartbeat and temperature of really tried people live over the web.

Figure 4: Flow chart for proposed system
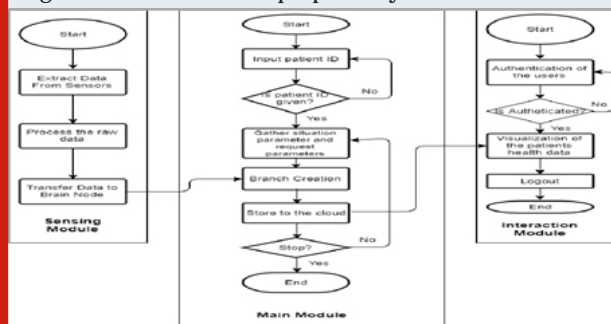
Figure 5: Hardware developed for patient heath monitoring with MAX30102
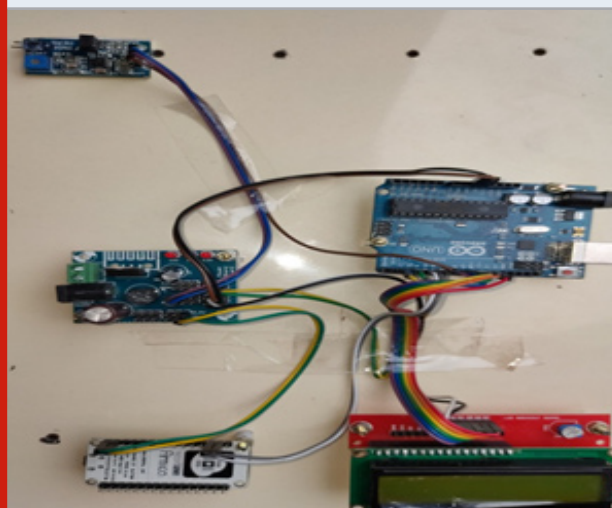
RESULTS AND DISCUSSION

A. Hardware Implementation: The implementation of hardware in proposed system has developed and its connected with cloud with BLYNK app. The hardware consists of power circuit board, controller circuit with nodemcu and sensors. The figure.5 Shows the hardware developed for patient heath monitoring . It contains the pulse oximeter (MAX30102) sensor has used to check the heart beat of the patient.

The MAX30102 gives a total framework answer for make facilitate the plan in process for PDAs and wearable gadgets. The MAX30102 works in a solitary 1.8V force supply and a different 5.0V force supply for the interior LEDs. Correspondence is through a standard I2C-perfect interface. The module can be closed down through programming with zero backup current, permitting the force rails to stay fueled consistently.The heart beat rate oximetry module made with the MAX30102 is an upgraded version of the MAX30100 that can be used to measure heart rate oximetry on the wrist. It can be applied to smart wear fields such as sports watches.

B.Output: The Figure.6 Patient monitoring report in Blynk server. When connected with Wifi the body temperature and human body heartbeat values are displayed in LCD and also we can see in the mobile Blynk app.

Figure 6: Patient monitoring report in Blynk server
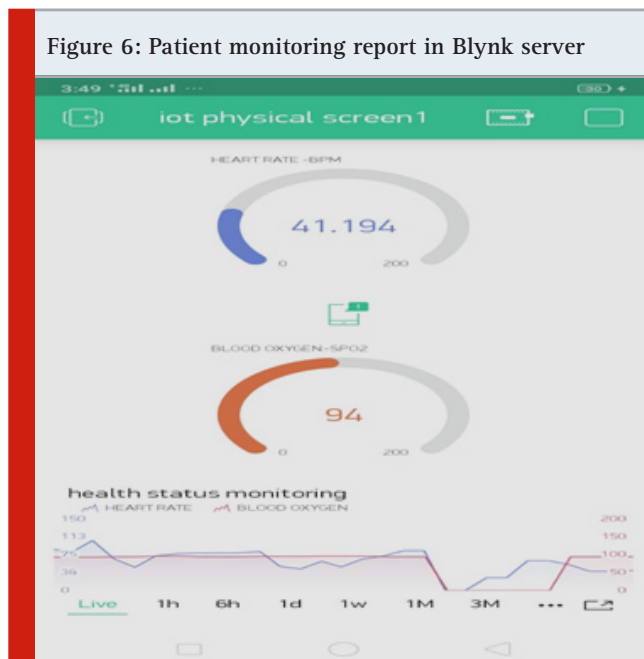
The main advantage of the systems is easy to access free IoT platform using IoT Blynk server, High speed dual core processor IoT module, Low cost, Very low power consumption (3.3V), High security as it supports authentication and machine learning.

CONCLUSION

IoT is technology has widely used in now a days and we found the some importance of healthcare monitoring systems. The feasible and compact size of sensors with IoT will produce the big impact on patient's life. By the help of these systems, the end user can monitor the patients remotely through the smartphones, computer with internet connection.

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Compression Techniques for Electrocardiogram

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ABSTRACT

Electrocardiograph machine is a non invasive methodology that measures, records and store the electrical potentials generated by the heart. As the electrocardiogram (ECG) is non-stationary ,it is very much tedious to study and analyze the ECG signals. India is one of the countries where the percentage of people suffering from cardiovascular diseases (CVD) is very high. Abnormal electrocardiograms called as arrhythmia occur in the people having CVD. Hence, it is necessary to store the ECG of the patients to have an accurate medical history to give accurate treatment during medical emergency. Sometimes, ECG of people in rural areas has to be sent to long distances through telemetry. In all these situations, there is a necessity to compress and store ECG to minimize the storage requirements and reduce the transmission time, if ECG has to be transmitted.This makes the compression of ECG absolutely necessary without losing the significant clinical information during the reduction of bits during storage. In this research work, the performance analysis of ECG signal has been made for different compression schemes namely, Discrete Cosine Transform , Fast Fourier Transform and multiwavelet transform. Performance of transform is analyzed in terms of   percent root mean square difference along with compression of the ECG that were downloaded from the MIT-BIH database that contains arrhythmia ECG. It is found that multiwavelet is more efficient to compress the electrocardiogram signals.

KEY WORDS: COMPRESSION RATIO, TRANSFORM TECHNIQUES, ELECTROCARDIOGRAM , SIGNAL COMPRESSION

INTRODUCTION

Electrocardiogram was first developed by William Einthoven to record the electrical activity of the heart in the early 1900s. The origin of the heart beat is the sino atrial node and this potential travels through the various muscle fibers in the heart. ECG gives great amount of information on the normal and abnormal condition of heart. However,as the ECG is non-stationary, it is becomes cumbersome to study and diagnose the heart conditions from the ECG through visual inspection. ECG is extensively used for the diagnosis of heart diseases (Lee et al 1999). The goal for ECG signal processing is to separate the useful ECG signal component from the various undesired noise signals, so as to derive an accurate diagnosis. The ECG represents two phases namely, the depolarization and repolarization of the heart

muscle fibers. The depolarization is related to the P-wave and QRS-wave. The repolarization phases is related to the T-wave and U-wave ventricle repolarization).

The heart is composed of two main parts, separated by the septum. The human heart is made up of four chamber, i.e., right atrium, left atrium, right ventricle and left ventricle (Pranob K Charles 2011). The depolarization of the heart muscles causes the contraction in the corresponding heart muscles. Again, repolarization results in relaxation of the auricles and ventricles. These electrical activity can be acquired via ECG sensors connected to the human chest and arms as per the Einthoven triangle. One cardiac cycle of the ECG wave is shown in Figure1.

Figure 1: ECG signal over one cardiac cycle
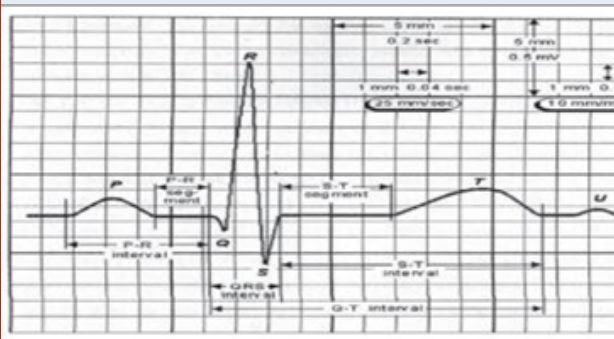
ECG , consisting of P-QRS-T waves is much vital to diagnose most of the cardiac diseases. ECG recordings lead to the generation of bulk quantity of data to be stored or transmitted to a long distance. Hence, ECG compression has become the need of the hour to extract data from the database. Various research has been done with respect to the compression of the signal. The main objective of ECG compression is to conserve the vital diagnostic information in the ECG that has been reconstructed from the original signal. Compression schemes that are having less complexity are useful in healthcare application developed in Android platform, such as to monitor the patient in real time. A compression algorithm must allow the reconstruction of the data with acceptable fidelity (Pushpendra Singh et al 2012, Kabir SS et al 2017).Hence, the compression schemes are categorized as lossless and lossy compression.

Quality of the ECG signal remains good thought their storage requirements are minimized during the compression of ECG signal. This reduction in memory to store ECG helps to minimize the time and bandwidth needed to send the same through wired /wireless communication. ECG data compression algorithms can be classified into three categories, namely : 1) Direct time domain technique 2) Transformational approaches 3) Parameter extraction technique. The direct data compression methods make a direct compression of actual sample ,mostly in time domain(Priyanka et al 2013).These algorithms have the drawbacks such as sensitiveness due to sampling rate, levels of quantization

and interferences in high frequency. Transform based compressions are done by the use orthogonal transform to the signal that results in good compression ratios due to high energy compaction(Bashar A. Rajoub 2002). The extracted parameters are used to find the apriori features. The objective of data compression is to increase the storage efficiency, transmission bandwidth conservation and reducing the transmission time (Rajankar S.O et al 2010, Robert S. H. Istepanian et al 2001 , Sani Muhamad Isa et al 2013).

MATERIAL AND METHOD

Compression And Distortion Measurement , Results and Discussion: The formulae to calculate compression ratio and percent root mean square difference are given below that are used to analyze the performance of the compression algorithms.

3.1 Percent Root Mean Square Difference: Percentage Root mean square Difference (PRD) is given as

$$PRD = x100 \sqrt{\frac{\sum_{n-1}^{N}(x(n)-\bar{x}(n))^2}{\sum_{n-1}^{N}x^2(n)}} \quad (1)$$

3.2 Compression ratio: The compression ratio (CR), which is given by equation (2)

$$CR = \frac{b_{original}}{b_{compressed}} \quad (2)$$

where b represents bits.

Compression Techniques
Fast Fourier Transform

Fourier transform is given as

$$X(K) = \sum_{n=0}^{N-1} x(n)e^{-j2\pi nk/N} \quad (3)$$

where k=0, 1, 2, 3....N-1

X (K) is the FFT of a signal x(n)

The FFT Compression Algorithm
Step 1: ECG is decomposed into x,y,zcomponents .

Step 2: Frequency and time interval between two samplesis found.

Step 3: The FFT for ECG is found before and after compression.

Step 4: Error is found by inverse FFT.

Step 5: Then compression ratio and Percent root meandifference is found .

The drawback of FFT is that it does not give sufficient knowledge about the accurate location of frequency in time domain. Figure 2 shows the steps involved in signal compression for transform techniques.

4.2 Discrete Cosine Transform: DCT compression can restore original signal from reduced coefficients.

The DCT signal is represented as

$$F(U) = w(u) \sum_{x=0}^{N-1} f(u) \, cos(\frac{\pi(2u+1)x}{2N}) \quad (4)$$

$$w(u) = \sqrt{1}/N \ \ for \ u=0$$

$$w(u) = \sqrt{2}/N \ \ for \ u \neq 0$$

DCT Compression Algorithm
Step 1: Decompose ECG into x, y, z components.

Step 2: Frequency and time interval between two samples is found.

Step 3: The DCT of original and compressed ECG is found

Step 4: Error is found after calculating inverse DCT

Step 5: Then compression ratio and Percent root mean

Difference is found to find error

Figure 2: Block diagram of ECG compression using a transformation technique
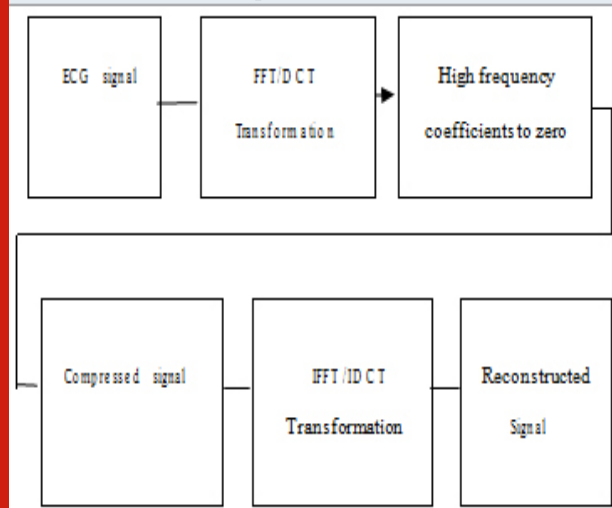
The input ECG signal is taken from MIT-BIH arrhythmia database to which either FFT or DCT transform is applied.

Then high frequency coefficients are made to zero by thresholding to obtain compressed signal. To reconstruct the signal compressed signal is applied to decompress and inverse FFT or DCT transform is applied. Then the required parameters such as compression ratio and percent root mean square difference are calculated for various ECG records.

Multiwavelet Transforms: The input signal is downloaded from the MIT-BIH database. In general, compression is done with decomposition and thresholding or quantization is applied to compress the signal. But similar technique is not to be used directly in the multiwavelet and hence prefiltering is done apriori to input before using the multiwavelet decomposition. Then reconstruct the signal and error is found out. Figure3 shows the multiwavelet after one level decomposition.

Figure 3: Sub-bands after one level decomposition

L₁L₁	L₁L₂	L₁H₁	L₁H₂
L₂L₁	L₂L₂	L₂H₁	L₂H₂
H₁L₁	H₁L₂	H₁H₁	H₁H₂
H₂L₁	H₂L₂	H₂H₁	H₂H₂

RESULTS AND DISCUSSION

The MATLAB simulation is carried for different transform techniques to determine the compression ratio and percent root mean square.

DCT Compression Waveforms

Figure 4: Simulation Results of DCT Compression Analysis
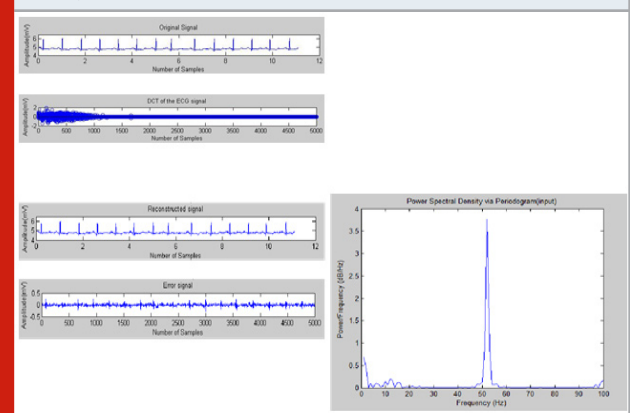
The above Figure 6 shows DCT Compression Waveforms (a) Original signal of ECG for record no 100 (b) DCT of

the ECG signal (c) IDCT of the reconstructed signal (d) Error signal

Table 1. Compression ratio of DCT for different records of ECG signal			
s.no	Record no	Compression ratio	PRD
1	100	85.1800	1.2589
2	114	86.4800	1.3685
3	210	87.7300	1.4920

Table 1 shows the performance result of DCT transform for different ECG records taken from the MIT-BIH database.

Table 2 shows the performance result of FFT transform for different ECG records taken from the MIT-BIH database

Table 2. Compression ratio of FFT for different records of ECG signal			
s.no	Record no	Compression ratio	PRD
1	100	86.2300	1.1661
2	114	87.6200	1.2657
3	210	88.9600	1.3693

Output of Multiwavelet transform

Figure 7: Simulation result of level one decomposition in Multiwavelet transform
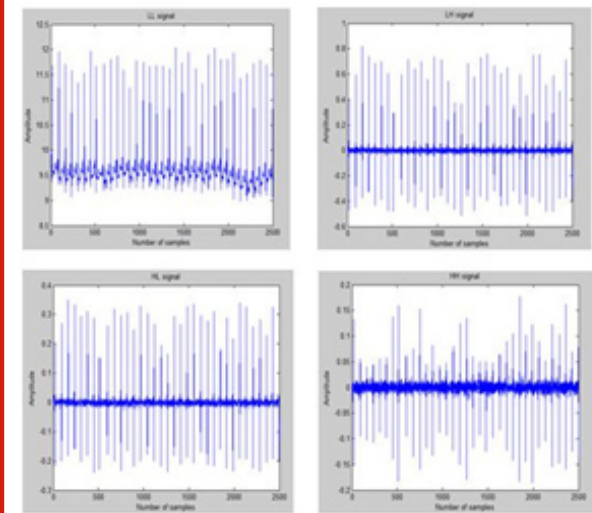
Figure 8: Reconstructed signal of ECG using Multiwavelet transform

Figure 5: The original ECG signal with 10000 samples
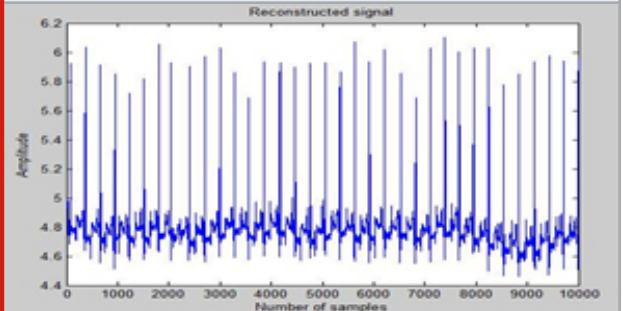
Figure 9: Error signal of ECG obtained using Multiwavelet transform

Figure 5 shows the original electrocardiogram signal that has been taken for the analysis of multiwavelet transform with 10000 samples.

Figure 7 shows the level one decomposition of original signal with 10000 samples into LL, LH, HL, HH signals with each 2500 samples of electrocardiogram signal

Figure 8 shows the reconstructed signal of ECG with only LL and HH signal. In which receiver can extract the original signal.

Figure 9 shows the error between the original and reconstructed signal of ECG using multiwavelet transform. In which the original signal is reconstructed using LL and HH signal. Thus the remaining LH and HL is displayed as error signal. In multiwavelet transform the Original signal is taken with 10000 samples. In which level one decomposition is applied to obtain LL, LH, HL, HH signals. Thus in this reconstructed signal is constructed using LL and signal. Thus in multiwavelet

transform 5000 samples has been compressed as compared with the original signal.

CONCLUSION

The ECG from MIT-BIH database was used to find the performance of the various ECG compression algorithms. The efficiency of the ECG data was analyzed based on compression ratio and PRD. An ECG compression algorithm should efficiently reproduce the original ECG before compression to achieve good fidelity for an accurate diagnosis of the ECG arrhythmia Multiwavelet compression proves to be more efficient out of the various algorithms analyzed. To further improve the signal quality for transmission through channel various other wavelet transform methods has to be proposed to improve the compression ratio.

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Automatic Water Management System for Farming and Bio Medial Applications

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ABSTRACT

In this paper, an efficient solar photovoltaic array fed water pumping system is proposed for farming and other bio medical applications. A Zeta Converter (ZC) is proposed to provide continuous current to the electrical drive systems and to extract maximum power from solar photovoltaic array. The proposed system provides an independent electrical system for farming applications with reduced power quality issues. The system is integrated with Global System for Mobile Communication (GSM) system to obtain an automatic water pumping system; thereby wastage of water can be minimized. The suitability of proposed system at practical operating conditions is demonstrated through simulation results using proteus simulation software and the results are validated through experimental prototype results.

KEY WORDS: ZETA CONVERTER, MOISTURE SENSOR, GLOBAL SYSTEM FOR MOBILE COMMUNICATION (GSM), DC MOTOR, FLOAT SENSOR

INTRODUCTION

In the current scenario, water crisis is one of the most important issues in our living planet. Several steps and policies are initiated by an Indian Government to meet the water demand and to achieve Non-polluted water from the resources. On an average, 70 % of the water is utilized for industrial and agricultural purposes. Even though, advanced technologies are smart enough to provide hygienic water but the water utilized for agriculture purpose is not appreciated. By considering the above factor as most important and to utilize the technology towards the society needs, an automatic water pumping system is developed. The aim of this project is to provide a solution for automatic control of water pumping system for irrigation/farming applications. In the proposed system, Zeta power converter is proposed to operate DC motor and an automation process is achieved through micro controller and GSM based technologies. Quantity of water discharge can be controlled through the solenoid valves.

GSM is used to transmit the information received from the sensors to the microcontroller to operate the pump. A relay is operated through microcontroller which is used to activate the respective solenoid valve through the driver circuits. The major objectives of the proposed article are to develop and implement an automatic water management system for irrigation and other applications, the system supports water management decision, which determines the controlling time for the process and monitoring the

whole system through GSM module (Harsha Kukde et al., 2017; Anjanee Kumar et al., 2016; Bhim Singh et al., 2016; Rajan kumar et al., 2016; KK Namala et al., 2016; Merlin Suba et al., 2015).

The system continuously monitors the water level in the tank and provide accurate amount of water required to the land. On the other hand, the operating temperature of the solar panel is increased with increase in solar radiation. In order to achieve the better performance of solar panel, the cooling system is necessary to the PV panel system. Experimentation has been conducted to obtain better cooling system for solar panels and it is inferred that Aluminum and Zinc thin metal sheets plotted solar panel frames provided better thermal absorption compared to conventional frames. The proposed work is organized into seven sections.

MATERIAL AND METHOD

Mathematical Model of A Photovoltaic Module: A solar cell is basically a p-n junction fabricated in a thin wafer of semiconductor. The electromagnetic radiation of solar energy can be directly converted to electricity through photovoltaic effect. Being exposed to the sunlight, photons with energy greater than the band gap energy of the semiconductor creates some electron hole pairs proportional to the incident irradiation. The equivalent circuit of a PV cell is as shown in Figure 1.
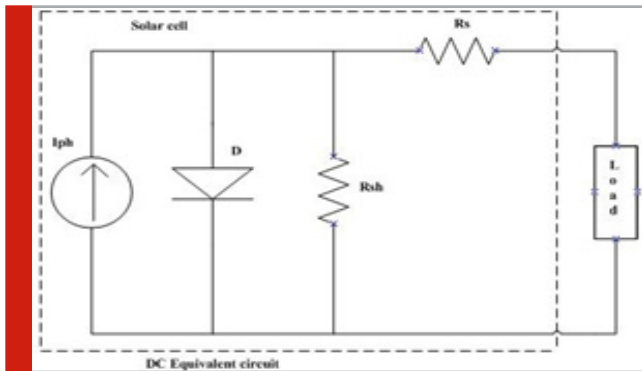
The current source Iph represents the photo voltaic current. Rsh and Rs are the intrinsic shunt and series resistances of the photo voltaic cell, respectively. Usually the value of Rsh is very large and that of Rs is very small, hence they may be neglected to simplify the analysis. PV cells are grouped in larger units called PV modules which are further interconnected in a parallel-series configuration to form PV arrays. The photovoltaic panel can be modeled mathematically as given in the following equations

Module photo-current can be expressed as

$$I_{ph} = [I_{SCr} + K_i (T-298)] * \lambda / 1000 \tag{1}$$

Module reverses saturation current is given as

$$I_{rs} = I_{SCr} / [\exp(q V_{oc} / N_s kAT) - 1] \tag{2}$$

The module saturation current I0 varies with the cell temperature, which is given by

$$I_0 = I_{rs} \left[\frac{T}{T_r}\right]^3 exp\left[\frac{q*E_{g0}}{Bk}\left\{\frac{1}{T_r} - \frac{1}{T}\right\}\right] \tag{3}$$

The current output of PV module is given as

$$I_{pv} = N_p * I_{ph} - N_p * I_0 \left[exp\left\{\frac{q*(V_{pv}+I_{pv}R_s)}{N_s kAT}\right\} - 1\right] \tag{4}$$

Structure of Smart Irrigation System: Output power of the solar panels is effectively utilized by the proposed high power zeta converter configurations. The zeta converter boosts the solar panel voltage and its output is fed to the DC pump which is used to pump the water from the reservoir tank to the main tank (Singh et al., 2015; Praveen et al., 2015; Rajan Kumar et al., 2016; Ramasami Uthirasamy et al., 2015). A float sensor is present in the main tank to indicate that the level of water in the tank is low or high. Driver circuit 2 is used to turn ON/OFF of the zeta converter switch. If the water level in the reservoir is low, then the DC pump is turned OFF through driver circuit 3.

Driver circuit 3 operates the solenoid valve 2 to turn open or close the valves to land 2. Driver circuit 4 operates the solenoid valve 1 whether to open or close the valves to land 1. The moisture level of various fields (land 1 and land 2) can be measured; monitored using moisture sensor and the information is send to Global System for Mobile communication (GSM) is used to send information to the farmer based upon the land requirements. The output of the moisture sensors is given to the driver circuit (3 and 4) to open or close the valves. The equivalent structure of the proposed system is shown in Figure 2.

Figure 2: Structure of proposed system
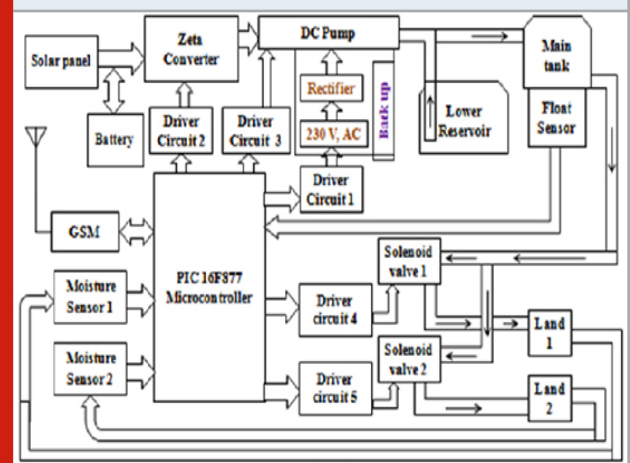
Operation of Zeta Converter: A zeta converter is a DC-DC converter which has been designed and developed using passive components (Singh et al.,2016; Jha et al., 2015; Uthirasamy et al., 2015; Kumar Chinnaiyan et al., 2013). Zeta converter is capable of operating in continuous conduction mode. Zeta converter is an option

for regulating an unregulated input-power supply, like a low-cost wall wart. To minimize board space, a coupled inductor can be used for voltage boosting process. Zeta converter consisting of an input capacitor, CIN an output capacitor, COUT, coupled inductors L1a and L1b, an AC coupling capacitor CC, a power PMOS FET,Q1 and a diode, D1. Capacitor CC will be in parallel with COUT, so CC is charged to the output voltage, VOUT, during steady-state CCM. Figure 3 shows the voltages across L1a and L1b during Continuous Conduction Mode operation.

Figure 3: Equivalent circuit of zeta converter
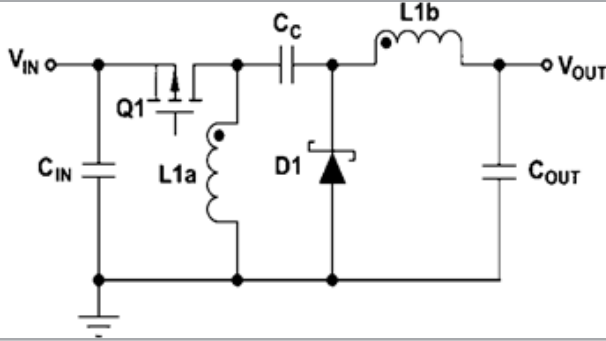
Modes of Operation: Mode 1 (Q1 is ON): Capacitor C_c will be in parallel with C_{OUT}, so CC is charged to the output voltage, V_{OUT}, during steady-state Continuous Conduction Mode (CCM). The equivalent structure of mode 1 operation is shown in Figure 4.

Figure 4: Mode 1 (Q1 is ON)
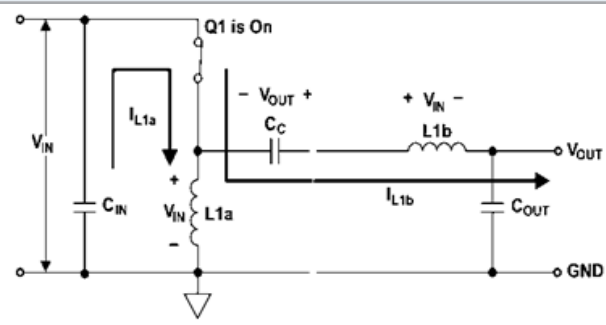
Mode 2 (Q1 is OFF): The voltage across L1b must be VOUT since it is in parallel with COUT. Since COUT is charged to VOUT, the voltage across Q1 when Q1 is off is VIN + VOUT; therefore the voltage across L1a is –VOUT relative to the drain of Q1. When Q1 is on, capacitor CC, charged to VOUT, is connected in series with L1b; so the voltage across L_{1b} is +V_{IN}, and diode D_1 sees V_{IN} + V_{OUT}. The equivalent structure of mode 2 operation is shown in Figure 5.

Mathematical Modeling: Assuming 100% efficiency, the duty cycle, D, for a ZETA converter operating in CCM is given by equation

$$\text{Duty cycle, } D = \frac{V_{OUT}}{V_{IN} + V_{OUT}} \tag{5}$$

Figure 5: Mode 2 (Q1 is ON)
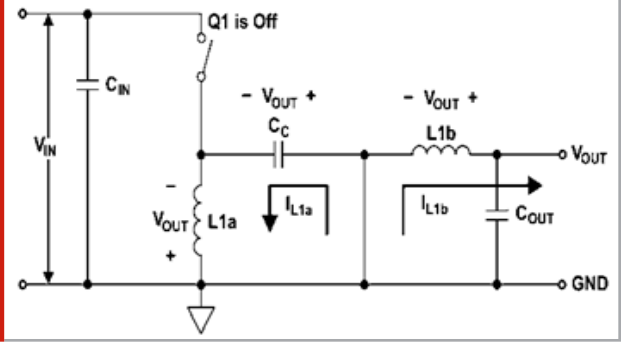
One of the first steps in designing any PWM switching regulator is to decide how much inductor ripple current, $\Delta IL(PP)$, to allow. Too much increases EMI, while too little may result in unstable PWM operation. A rule of thumb is to assign a value for K between 0.2 and 0.4 of the average input current. A desired ripple current can be calculated using equation

$$\text{Inductor Ripple Current, } I_{L(PP)} = K \times I_{OUT} \times \frac{D}{1-D} \tag{6}$$

The inductance required in a coupled inductor is estimated to be half of what would be needed if there were two separate inductors. The minimum value of inductance is given by equation

$$L1a_{min} = L1b_{min} = \frac{1}{2} \times \frac{V_{IN} \times D}{\Delta I_{(PP)} \times f_{SW(min)}} \tag{7}$$

To account for load transients, the coupled inductor's saturation current rating needs to be at least 1.2 times the steady-state peak current in the high-side inductor. The steady state peak current is calculated using equation

$$I_{L1aPK} = I_{OUT} \times \frac{D}{1-D} + \frac{\Delta I_L}{2} \tag{8}$$

Figure 6: Interconnection of all six subsystems
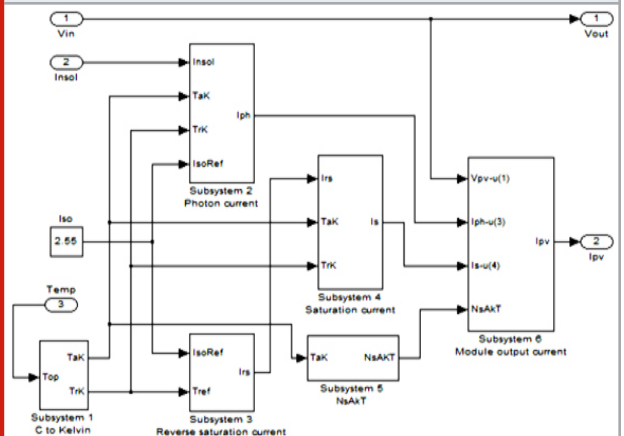
Simulated Models and Discussion: The simulation model of front end PV system of the proposed project is carried out using MATLAB software and the valve initialization, sensors activation are carried out using proteus software. A model of PV module with moderate complexity that includes the temperature independence of the photocurrent source, the saturation current of the diode, and a series resistance is considered based on the Shockley diode equation. Being illuminated with radiation of sunlight, PV cell converts part of the photovoltaic potential directly into electricity with both I-V and P-V output characteristics. Interconnection of all the subsystems is shown in Figure 6.

- Subsystem 1 converts the module operating temperature given in degrees Celsius to Kelvin.
- Subsystem 2 takes following inputs; Irradiation, 1 kW/ m2 = 1, Module operating temperature, TaK = 30⁰ to 70⁰C, Module reference temperature TrK = 25⁰C, Short circuit current (ISC) at reference temperature = 2.55 A. This model calculates the short circuit current (ISC) at given operating temperature.
- Subsystem 3 takes short circuit current ISC at reference temperature = 2.55 A and Module reference temperature TrK = 25⁰C as input. Using equation 2, the reverse saturation current of the diode is calculated in subsystem 3.
- Subsystem 4 takes reverse saturation current Irs, Module reference temperature TrK = 250 ⁰C and Module operating temperature TaK as input and calculates module saturation current.
- Subsystem 5 takes operating temperature in Kelvin TaK and calculates the product NsAkT, the denominator of the exponential function in equation (4).
- Subsystem 6 executes the function given by the equation

$(I_{PV} = u(3)-u(4)*(exp((u(2)*(u(1)+u(6)))/(u(5)))-1)$ (9)

Model of PV system is shown in Figure 7. The workspace is added to measure Ipv, Vpv, Ppv in this model. The time tout is stored in workspace with scope model can be used to plot graph. I-V output characteristics of PV module at constant temperature are shown in Figure 8.

Figure 7: Simulink model of PV module
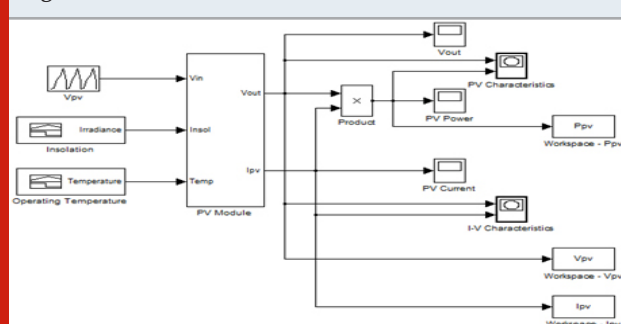
Figure 8: Output – I-V characteristics with varying Irradiation
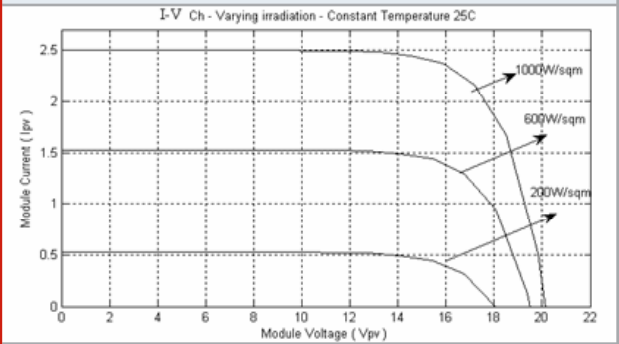
Figure 9: Output – P-V characteristics with varying irradiation
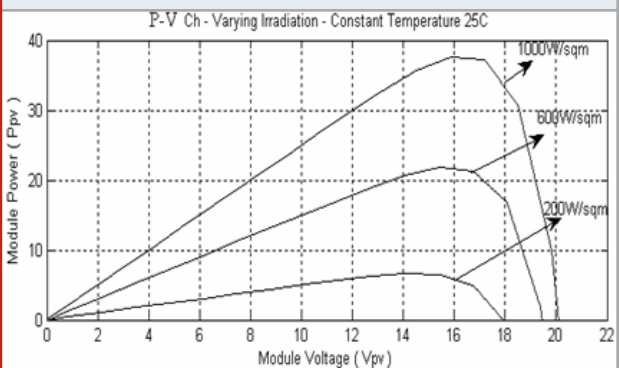
The output characteristics of PV module with varying irradiation at constant temperature are shown in Figure 9. When the irradiation increases, the current output increases and the voltage output also increases. This results in net increase in power output with increase in irradiation at constant temperature. When the operating temperature increases, the current output increases marginally but the voltage output decreases drastically. It results in net reduction in power output with rise in temperature. The results are verified and found matching with the manufacturer's data sheet output curves.

Figure 10: Simulation model of virtual LCD display
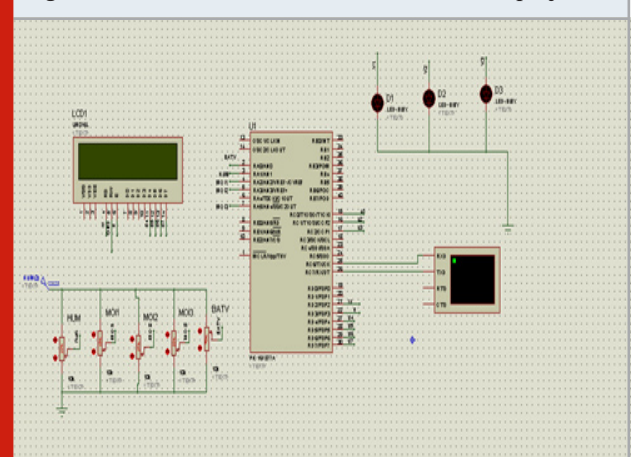
The simulation model of valve initialization and sensors activation is shown in Figure 10 to Figure 13. In this model, let MOI 1, MOI 2, MOI 3 are the moisture sensors placed in of the each lands respectively. Let D1, D2, D3 be the valves that are responsible for the flow of water on each land. The amount of moisture content in each land will be displayed in the LCD display. The information about the condition of each lands and the command pulse given by the user will displayed in the virtual display. The moisture sensors will senses the moisture content in each land and gives the signal to the controller unit. The controller will be programmed with a predefined value (For example: Here in this simulation the predefined value is 20 units). If in the case the sensor output value goes below the predefined value then automatically a message will be send through GSM to the user that the particular land or more than one land is under dry condition. Various commands given by the users to open the valve for different lands as represented in Table 1.

Table 1. Various commands given by the user

Command	Description
*1	To open the water flow valve of land1
*2	To close the water flow valve of land1
*3	To open the water flow valve of land2
*4	To close the water flow valve of land2
*5	To open the water flow valve of land3
*6	To close the water flow valve of land3

RESULTS AND DISCUSSION

Figure 14: Driver circuit output to solenoid valve 1
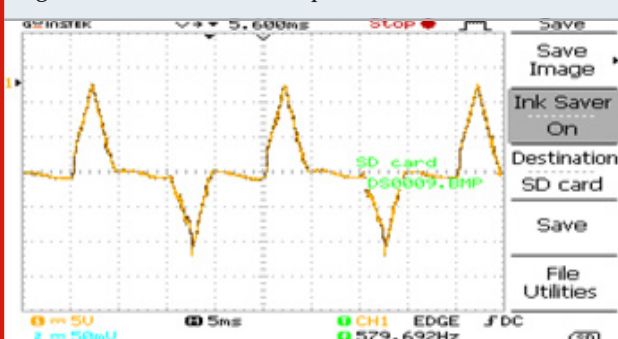
Figure 14 shows the tripping signal waveform of the driver circuit. Depending upon the tripping signal the solenoid valve 1 get open or closed. The obtained output waveform has the magnitude of 12V and 50 Hz frequency. Figure 15 shows the output voltage waveform of driver circuit. Depending upon the pulse output from the driver circuit, the MOSFET switch in the Zeta Converter will ON/OFF. The snapshots of the experimental setup of the proposed system are shown in shown in the Figure 16.

Figure 11: Simulation output for all the valves in open condition

Figure 12: Simulation output for valve 1 in open condition

Figure 13: Simulation output for valve 1 and 3 in open condition

Figure 15: Driver circuit output to the converter
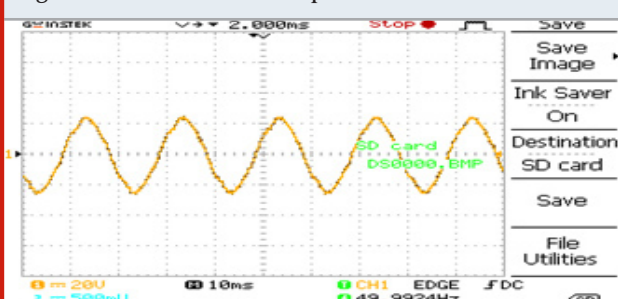
Figure 16: Experimental setup

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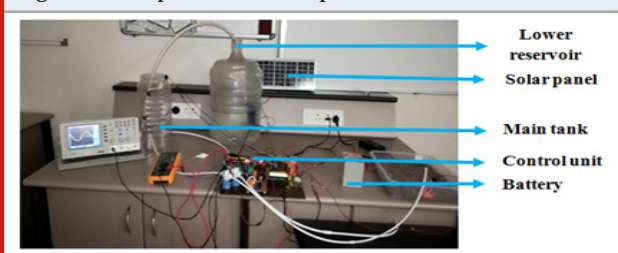
CONCLUSION

The smart solar photovoltaic array ZETA converter fed pump has been proposed and its suitability has been demonstrated through simulated results and experimental validation. The proposed system has been designed and modeled appropriately to accomplish the desired objectives and validated to examine various performances under various conditions. The performance evaluation has justified the combination of ZETA converter and DC pump for SPV array based water pumping. Thus, this system avoids over irrigation, under irrigation, top soil erosion and reduce the wastage of water. By implementing this system, agricultural, horticultural lands, parks, gardens, golf courses can be irrigated. Thus, this system is cheaper and efficient when compared to other type of automation system. In large scale applications, high sensitivity sensors can be implemented for large areas of agricultural lands.

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A Convolutional Neural Network Approach to Determine Gestational Age of Ultrasound Fetal Images

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ABSTRACT

The length of the pregnancy of a woman is measured by gestational age. It is usually measured in terms of number of weeks. It is used to understand the development of the human in the uterus. The growth of the fetus is seen through ultra sound scan images. Fetal weight estimation serves an important task in assessing the high risks existing during pregnancy. Ultrasound fetal images provide valuable information for better understanding of the developmental stages. Such manual parametric determination subjects to multiple decisions resulting in causing observational errors. Fetal images undergo enhancement, filtering, segmentation process to extract the significant features with enhanced quality. Though there are several methods in existence, this research is focused on determining the gestational age by applying convolutional neural network (CNN) as one among the prominent methods of deep learning. The earlier works are carried out to offer a solution for higher weeks of the gestational age of the fetus whereas this research is focused on finding the same for the lower gestational age of the fetus. Instead of considering the gestational age of 10 weeks and higher, this study is carried out with lower age of five weeks. The proposed method is able to detect clearly about the gestational age of the fetus.

KEY WORDS: CONVOLUTIONAL NEURAL NETWORK, DEEP LEARNING, EDGE DETECTION, FETAL IMAGE, IMAGE ENHANCEMENT, PROBABILISTIC BOOSTING TREE CLASSIFIER, ULTRASONOGRAPHY.

INTRODUCTION

Computational methods for image processing are an attractive area of research in health care domain. It is an important aspect of nature science. The image analysis using computational methods are carried out based on different features like spatial and spectral. The neural network models are used for image analysis and prediction based on the selected features. The deep networks model can be applied over the features (Fu, 2018). The proposed method in the research was applied over the multidimensional data with state of the art neural networks methods.

The remote sensing domains are using image analysis for its various applications (Signoroni et al., 2019). It provides a good review about how to apply the image processing techniques for remove sending applications. It is worthy to find the work carried out by the researchers in the recent past in the same domain. Edge detection problem is the most significant phenomenon in the area of image processing (Ahmed, 2019). Video surveillance, text detection, disease prediction and vehicle detection

are few of such application domains. The efficiency of the edge detection algorithm is based on the illumination condition. If any image has variation in it, then it would badly affect the same. This causes a computational overhead of the algorithm. The proposed method by the researchers would not use any post processing step for edge detection. It also helps to reduce the noise and it is not required to apply any pre-processing techniques.

Over the geographical location, it is very difficult to identify the road networks. This will help the intended users to find any part is whether a road or there is no availability of path. (Parajuli et al., 2018) made an attempt in this case. It used pixel-wise segmentation and depth features in a larger neighbourhood context. It also used the color space and depth values in three dimensional Lidar images. The multiple strategies used in the work improve the prediction of the proposed work. There are few proposed methods to identify the freshwater stingray by the researchers in the past decade. It is vital to determine the gestation status by using ultrasonography for a business trade in Thailand (Daochai, 2016). The application used captive female stingray which is 4 to 12 weeks old. The characteristics of the scanned images were three stages of gestation – first, mid and final.

It is also covered all size of pregnant female stingrays with 6.5 MHz frequency as it is suitable one. It is also found that the variant in frequency can also be employed to identify the implanted embryo or trophonemata. The non-professional photographers are taking snaps of wild flowers with blur effect. It raised new challenges in flower image processing (Chen et al., 2019). The convolutional neural network technique with two-step automatic classification method can be used for such an image processing to reduce the noise level. The proposed technique would apply as the second phase after the preprocessing step that is the identification of blue existence or not. The accuracy is also improved in this technique. The cause of breast cancer is having the high prevalence (Cheng et al., 2010).

All over the world, it is considered as the second leading cause for women. Hence, the high mortality is to be identified at early stage. This will improve the control over the disease. In another sense, it also save lives and reduces the cost of death penalty. The disease presence can be detected from the ultrasound images. With the advent of computer-aided diagnosis systems, the accuracy of the diagnosis can be improved and eliminate the operator dependency. The proposed method is evaluated over the computer aided diagnosis system for the disease prediction. The smart phones are becoming as part of everybody's life for every aspect of day-to-day activities. It is also used to capture the images by using

the camera available in the device. The machine learning techniques are applied to find solutions to wide varieties of problems. The image processing is one among the areas where in the convolution neural networks can be used to find the appeal of an image (Potchen et al., 2019). The targeted result is to identify the number of "likes" that an image can have in a social media platform. The existence of noise in the photography would result poor quality with low sharpness of the images. The features to enhance the images available in the cameras would be expensive. These may not be used to change the quality of the image by means of increasing the resolution. Hence, it is required to enhance the image (Singh et al., 2019). The CNN provides better results over the image structure and to differentiate the features and textures.

There are three basic methods used to help estimate gestational age (GA) are (i) menstrual history (ii) clinical examination and (iii) ultrasonography. The first two methods are subject to considerable error and should only be used when ultrasonography facilities are not available. 3-Dimensioal MRI can be used to determine the birth weight of the foetal body at terms. The body volume of the foetal images from the MRI is calculated from the reconstructed MRI data (Liao et al., 2019). The proposed method used the higher density coefficient. The comparative results also shown that the proposed model would have more efficiency by the study. (Kong, 2017) proposed a method to extract generic style features from a set of fine paintings. Generic style features describe these fine paintings from the global perspective, integrate features of brush strokes, color and pose contrast, scale information and orientation etc. We first obtain feature representation from these fine paintings using deep convolutional neural network, and then select generic representation from obtained representation. Finally, migrate visualized generic style features to input content image. The disadvantages of the usage of ultra sound scan machines are the required trained personnel and the difficulty in the deployment in remote areas (Torres, 2019).

The postnatal examination can be used as an alternate to the scan images. It is also pointed that it would produce varied results in a subjective matter and based on the examiner's experience. It used minimal features like face, ear and foot of the newborn for the estimation of gestational age. It is estimated that the alternate method improves the prediction compared with the earlier methods used for the same problem. This inference can be used to estimate the gestational age for a small dataset also where the ultra sound image is not available. The key word searching model is used for semantic image search, as an active area of research in the field of digital image processing (Chinpanthana, 2018). The proposed model uses object and action to classify the relationship that

exists among them. It is also identified that this would improve the performance with maximum success rate.

Genetic algorithms are used to find solution for wide varieties of problems as a soft computing technique. A development of neuro-fuzzy algorithm can be used for the automatic detection of fetal measurement (Kaur, 2019). This works in three phases. The first phase is an auto pre-processing technique, the second is the feature extraction and the final one is the classification of foetus growth either in normal or abnormal condition. The proposed model was compared with different parameters which include precision rate, sensitivity, recall, specificity and F-score. The assessment indicator called as confusion matrix is also used with cross-validating with another machine learning technique known as SVM. It also compares the well-known classification methods including ROC curves. Deep learning has attracted the researchers for its effectiveness of results. It is being applied to solve spectrum of problem domains. Image processing is also such a domain. One among the deep learning techniques called CNN can be applied to object detection, image recognition and speech recognition (Wei, 2018). The objective of this was three fold – introduction, structure and study trends in five aspects.

FIgure 1
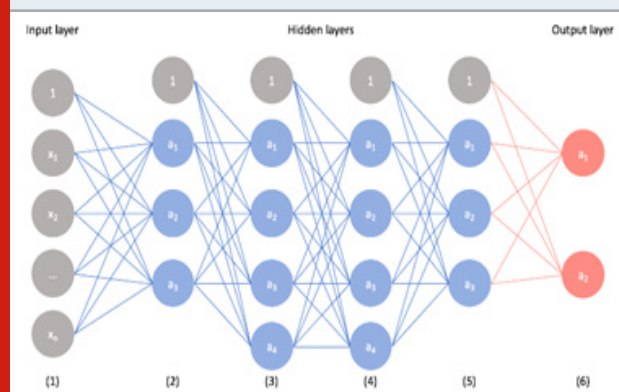
The structure of ANN with multi layers is used to coin a new term called deep learning or deep neural networks (Albawi, 2017). The capability of handling of such structure is being considered as a powerful tool and hence it has its popularity. The performance of CNN in the application domains such as computer vision and natural language processing is excellent. The convolution is a mathematical linear operation between matrices. The digital image processing technique is applied to computer vision. It trains the computers in order to interpret and understand the visual world. The deep learning models are utilized to accurately identify and classify the objects. The CNN is applied for fruit classification (Lu, 2018). It is interesting that the same classification such as color of fruits is available in the market.

Hence, the combination of multiple machine learning techniques would have higher accuracy rate in terms of its prediction. The amount of image data generated in today's world is unprecedented. The structure of the neural networks is similar to the human neural network which contains the neurons. The entire network has the capability to identify and classify different objects based on train and test strategy. The analysis, detection and classification of images for a range of tasks can be carried out by deep CNN (Tripathi, 2019). The technique can be used for automated image processing and the simplification of image related tasks. An interesting study was conducted related to this research in India (Hiwale, 2017). The appropriateness is systematically evaluated using fetal weight estimation models. The dataset of 300 pregnant women were used for the study. The estimation of fetal weight was done by using 34 different models, for each case. The pre-processing of the dataset was done by factors are the gestation age, low birth weight. Some of the measures were used to evaluate the effectiveness and efficiency of the models taken for study. The study also revealed that there is a difference between the errors on Indian population with the native populations.

The deep learning model has spectrum of techniques including RBM, auto encoder, Deep Belief Networks, sparse coding and CNN. It is applied to wide variety of problems like object tracking, scene labelling and post estimation to name a few. (Guo et al., 2017) is a simple CNN model for image classification. The reason for choosing CNN for image processing application is its promising results nevertheless of considering the volume of the dataset. The effectiveness of the CNN is in this study was assessed by benchmarking datasets. The ultrasound medical images are the source of data in present days for the identification of the fetus. The deficiency or abnormality of the fetus, if any, can easily be identified and it will help for action-taken study and to save the pregnant woman (Rawat, 2018). It summarises the literature and the investigation approaches in clinical domains. It also presented the categorisation of fetal images from the ultrasound 2D images.

The parameters such as gestation age, fetal growth and fetal weight are used to detect the abnormality of the fetus. Optimisation techniques are part of artificial intelligence (AI). It is used to reduce the cost and to improve the efficiency of the proposed model in the problem domain. The image processing application adopts computer technology to provide a platform. (Zhang, 2019) is an image processing technique in which the AI technique is applied for the study. The image segmentation is done by using ant colony optimisation algorithm. It offers the segmentation in an effective way. The performance is also improved significantly by using the adoption of the technique. The input data taken for the study is always playing a vital role.

The images taken for study would have noise and it will result the efficiency of the prediction of the chosen model. Hence, (Shen et al., 2016) proposed a randomly transforming feature maps. The features of dependencies are reduced which can directly be used by the CNN models. The combination of transform-invariant answer would provide better input for the feature maps. The training would become easy without the necessity of the supervision. The optimization process is also removed for the proposed model. The model provides improvement significantly. The proposed model was also tested from ranges of datasets from small scale image recognition to large scale image recognition to image retrieval.

MATERIAL AND METHOD

Fetal growth estimation is an interesting problem in health care. It estimates not only the age of the foetus but also the delivery of the baby and the growth of the foetus. The fetal growth can easily be distinguish by accomplishing the genetic neuro-fuzzy approach. This will help to easily identiy the abnormalities present in the images. Due to the advent of image enhancing technologies, the determination of the foetus is determined by the ultrasonic images. The ultrasound parameters are evaluated by correlation analysis. The statistical methods are also used to determine the age.

The ultrasonic fetus images are transformed to binary images in which the feature valued matrix is extracted. Thresholding produces binary images with incorporated bounded false regions. Pre-processing stages comprises the gray scale conversion of images, noise removal and enhancement. The reflected ultrasound beams are obtained from interfacial tissues of human possessing lower contrast level. This provides the capability for effective feature segmentation and also involved in preserving edges. Hence it is difficult to distinguish and identify the coarse and fine detailed images. Combining PBT with convolutional neural network enhances the accuracy by predicting the error within a shorter time period and also results in estimating fetal weight accurately. Filtering of contrasted images eliminates the speckle noises. The added speckle noise further minimizes the image contrast thus resulting in ring artefact on edges. In this, Histogram Equalization is utilized to enhance the image contrast thus providing detailed visibilities.

A CNN is a neural network model that has one or more convolutional layers. It is used in various domains like image segmentation, image processing and classification. It is also used for other auto correlated data. The Convolutional layer is the core building block of a CNN that does most of the computationally heavy lifting. As the ultrasound image has so many features, which needs to be fed into the network. It accepts a volume of

size where Wi are the width of the image and Hi are the heights of the image and Di is the number of channels. It requires four different hyperparameters K, F, S, P which are the number of filters, spatial extent, the stride and the amount of zero padding respectively. The network produces the output as where and D2 = K. A kernel is the first part in the convolutional layer which carrying out its corresponding operation or the same can also be called as Filter. The advantage of using CNN is the feature extraction of the image can be easily adjusted by the network. A special kind of activation layer called softmax is used to find the final (output) layer.

RESULTS AND DISCUSSION

In this research of automated estimation of gestational ages, the ultrasound fetal images are pre-processed in order to enhance the brightness. The image sizes are considered as 512x512 pixels. The images are obtained in different weeks to validate the effectiveness of the model. The contrasts of the images are also enhanced. There are ten different parameters are used tas hidden levels of the convolutional neural network. The input images in figures 2 (a), 3 (a) and 4 (a) are fed to canny edge detection method. The CNN performs better in determining the edges of the fetus whatever the age of the fetus are.

Figure 2: A five week fetal ultrasound image

(a)   (b)
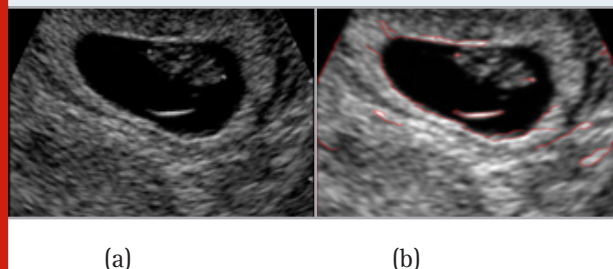
Edge detection with CNN
(b) The original image of a fetus

Figure 3: A six week fetal ultrasound image
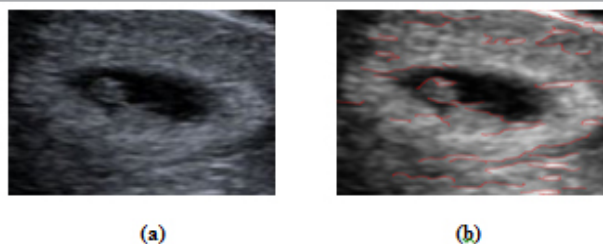
(a)   (b)
Figure-3 A six week fetal ultrasound image
(a) The original image of a fetus
(b) Edge detection with CNN

It is able to determine the age of the fetus in five weeks, six weeks and ten weeks. The image of the five weeks fetus is very tiny but still the CNN is able to detect the

age of the fetus. The Gaussian filter, Gradient magnitude and Gaussian smoothing are used to enhance the quality of the predicted image. They are also depicted in as results in 2 (b), 3 (b) and 4 (b). The maximum number of features is extracted in order to include the resulted information which comprises both relevant and non-redundant features. The resultant images provide soft thresholding that provides the necessary and sufficient information to eradicate the redundancies in the results. The soft thresholding segmentation is used to enhance the image that is suitable for estimating the anatomy parameters.

Figure 4: A ten week fetal ultrasound image
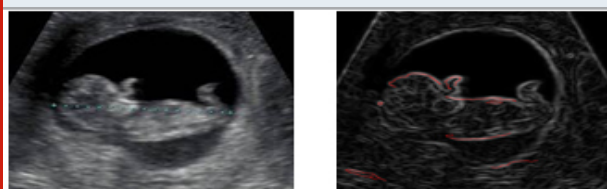
Figure-4 A ten week fetal ultrasound image
(a) The original image of a fetus
(b) Edge detection with CNN

CONCLUSION

The machine learning algorithms are used for tremendous applications without its boundary. In recent days, such algorithms are also applied over the image processing applications. The medical imaging techniques are used for determining the gestational age. Though there are variety of methods available to do so, the computational methods are also penetrating to enhance the image quality and for determination. The Gestational age guides to estimate the fetal weight in accurate manner. Probabilistic Boosting Tree (PBT) classification evaluates the fetal anatomy measures effectively and the integrated CNN predicts the fetal weight in terms of gestational age. The proposed method overcomes the diagnosing error occurring due to manual evaluation and the developed model uses different cases to determine parameters statistically. As this technique comprises training optimization, its performance can be further enhanced by accumulating additional measurable data parameters.

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Forecasting of Power Generation in Hybrid PV-Wind System

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ABSTRACT

Because of the inconsistencies and variability, expanding the dispersion level of reusable vitality (RE) assets to the force framework prompts challenges in activity. Dependable system movement requires a definite estimate of made force by non conventional systems. Solar and wind are the basic piece of non conventional resources joined into the power structure. This paper explain a desire methodology for solar and wind made ability for the accomplishment, incredible measure for exactness in various atmosphere order or estimation.

KEY WORDS: FORECASTING MARKOV CHAIN, PHOTOVOLTAIC AND SOLAR SYSTEM.

INTRODUCTION

Mix of non conventional system to the force framework has increased significant enthusiasm for ongoing years because of the absence of charcoal discharge due to the capacity age cycle. Though there are non – contaminant, sustainable and accessible in many destinations as there is no requirement of fuel ,solar and wind have been the most essential pieces of non conventional systems are brought together in mass force framework. (A. Bonfiglio et al,. 2014) To improve the monitor maintainability and specialized highlight, the half and half vitality plants including various sorts of renewable system and vitality stock tiling forced frame work as initiated with the framework. The cross bread of hybrid plant have been inspected as the sparingly, actually a solid plant. (A. Subramaniya Siva et al,. 2019)The breeze and solar

energy delivered the high irregularities power, does the force framework activity and control turns out to be progressively indicated by expanding their penetration either as cross over inexhaustible force or unconnected non conventional system save their tasks. (Archana et al,. 2018).

According to the announcement, anticipating the solar or wind vitality creation and provincial scale be more essential for transmitting the framework and administrators and supervisors while creating the intermediate switch and high haul arranging of the transmitting framework, (Prabhu, et al,. 2019) particularly concerning the rood-fringe streams or source framework with less flanking hazard. (K.Dhayalini, et al,. 2018) This clarifies why much ongoing examination have been quick to solar or wind created forecasting of hybrid power the two technology have been used in forecasting of hybrid systems. (M.J.Sanjari, et al,. 2017) A few investigations tried their expectation of sun based brightness level and flow of air quickness and change everything to a force created in the solar or wind systems by utilizing predetermined scientific method. (M.J.Sanjari, et al,. 2014; M. Marinelli, et al,. 2015; M. Asensio et al,. 2016).

ARTICLE INFORMATION

Right now, the issues are not considered for example, tilt edge and control activities of the sun oriented for the wiring framework, the shadow impact of trees, structure and some gathering and counter clockwise activities of renewable resources. Some methodology legimately explain in the yield intensity of nonconventional energy. The contrasted with aberrant solar or wind power expectation the strategies prompts more significant match for precision in the light of the fact that the nonlinear conduct of various components in the RE webpage are shown as produced product as power associating to the forth framework. (N. Etherden, et al,. 2016; P. García, et al,. 2014; Subramaniya Siva. A et al,. 2019) Consequently, immediate non conventional energy expectation if the concentrated right now.

MATERIAL AND METHOD

Markov chain process is long advance procedure yet it shows happens the specific mistake can be cleared without moving to the past steps. When contrasting with the framework vector machine, markov chain technique shows result precisely. The principal request markov fasten has been applied to estimate Hybrid Photovoltaic and wind framework to decide [9]the information dependent on the already measure data tests .since the primary request Markov anchor can show the typical fluctuation. If the half and half PV-Wind system. It brings about huge vulnerabilities and blunders for Hybrid photovoltaic and wind power framework particularly in a transient gauge.

Figure 1: Proposed Block diagram
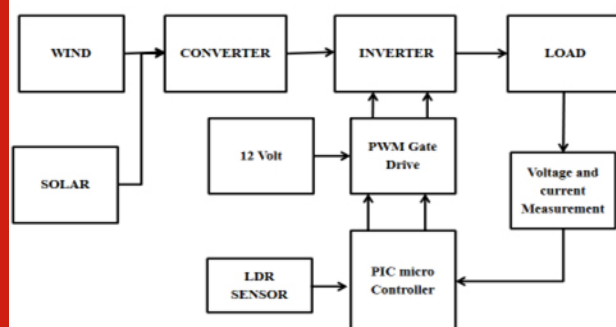
The energy which is obtained from sun is called solar energy. It produces an AC Power .the energy which is obtained from the flow of air is called wind energy. It produces a DC Power and the rectifier is used to convert the DC Power to AC Power. Then AC Power are passed to the Converter, the converter used here is the Boost converter. The boost converter is used to increase the voltage then they are passed to the Inverter. The Inverter converts AC to DC Power then they are passed to the load, before passing to the load voltage and current are

measured by using voltage and current measurement, then their passed to the PIC Microcontroller. The peripheral interface controller is used to see the output, then their passed to the PWM Gate drive. The pulse width modulation gate drive is used to drive the current when the capacitor is associated with MOSFET. Then they are passed to the inverter .From the inverter they are passed to the AC Load. From ac load they are passed to the Grid. The grid is nothing but an interconnected network.

It is utilized to deliver high current at low force contribution from the controller IC. A door drive is utilized when the beat with adjustment can't create the yield current which is required to drive the GAE capacitance of Metal Oxide Field Effect Transistor (MOSFET).

RESULTS AND DISCUSSION

A) Output based on software system

Figure 2: PV System
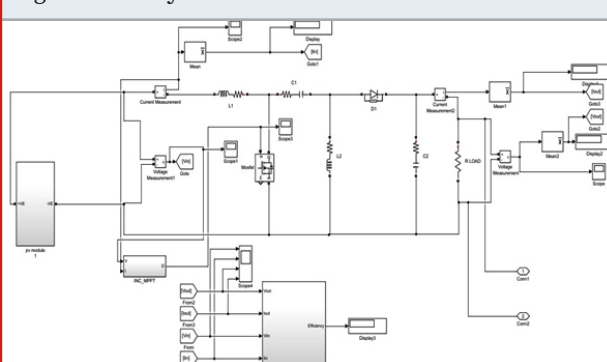
Figure 3: PWM Generator
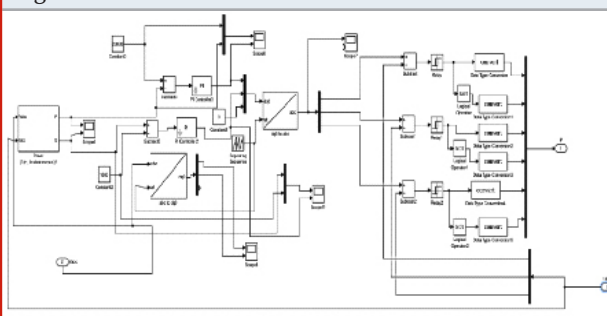
Figure 4: Wind system
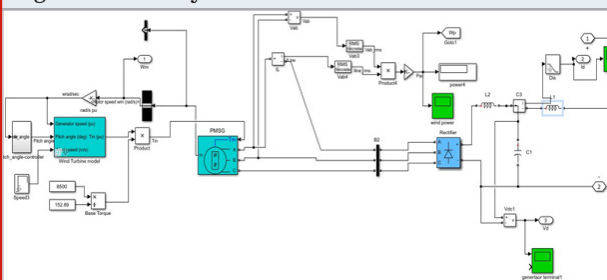
B) Real and reactive power

Real power is called as true power and the reactive power is nothing but the unused power

Figure 5: Real & Reactive power
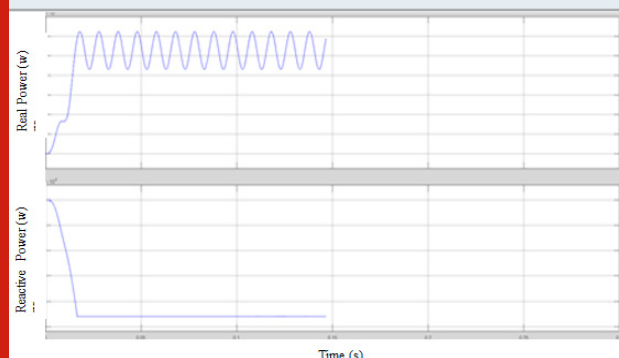
C) DC–DC converter

Figure 6: DC to DC Converter
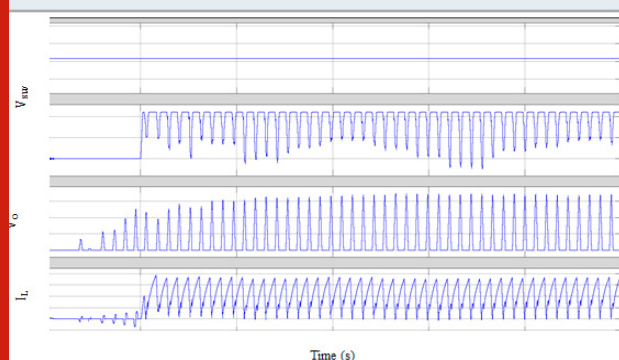
D) Output based hardware system: The energy from the sun falls into the solar panel and it undergoes into the photovoltaic effect and produces AC power and they are passed to the battery. The battery used here is Lithium ion battery

Figure 7: Snapshot of forecasting prototype
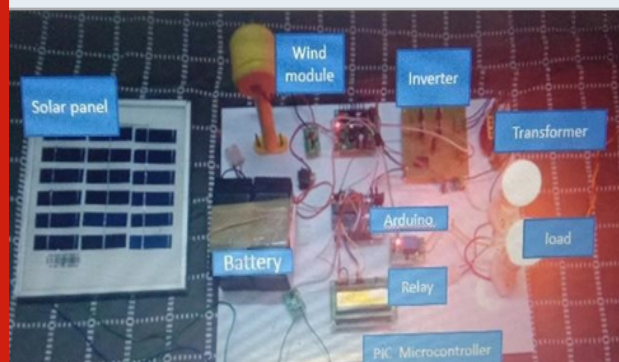
which is rechargeable one. The capacity of the battery is about 12V.The air from the atmosphere are passed to the nozzle of the wind turbine. The wind turbine used here, consists of 2 blades with the capacity of about 3Watts,

4.5A and DC motor is present inside the wind turbine. The capacity of solar panel is about 12V, 3Watts, 4.5A and the energy from the solar and wind is now passed to the battery. The voltage sensor are used to sense the voltage from the battery and they passed arduino-UNO which is used to check the output by using system from the arduino they are passed to the LCD which is used to display solar and wind turbine voltage which from the wind turbine the power is passed to the PWM Gate drive the PWM gate drive is used to drive the current acts as an PIC Microcontroller and they are passed to the relay when the capacitor is associated with MOSFET from the PWM gate drive the DC voltage passed to the inverter. The inverter is used to convert DC voltage to AC voltage and they are passed to step-up transformer which is used to step-up the voltage [15] the capacity of step-up transformer is about 120V /230V, 4.5Aand they are passed to AC Load. In the absence of Power from the solar and wind the supply is taken from the grid.

CONCLUSION

Subsequently the paper, the multivariate Markov Chain (used to reduce the error easily but it is along chain process) was evolved to predict the solar and wind created power. Likewise, to improve the accuracy it is used. The solar and wind power affiliation is excluded, the Well found strategy models the relationship among, solar and wind power and Warmth List and prompts larger gauge certainty. The eventual outcome of the orchestrated system, which counterparts well with the estimation information from the veritable solar and wind plants. To develop the introduce methodology continuously material to be in true estimation.

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Design and Development of LabVIEW Based Battery Monitoring System For Electric Vehicles

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ABSTRACT

There is a substantial increase in the development of electric vehicles which promotes the development of battery monitoring system (BMS). Based on the capacity of battery the electric cars can run up to certain kilometres. After that the batteries are to be refilled or to be swapped with some other filled battery without interrupting the devices' performance. Drained batteries are given to the charging station. The charging station contains 'n' number of batteries. Monitoring the real time parameters of batteries provides necessary data useful for the management of batteries efficiently. Individual monitoring of every battery increases the time and human effort. In the proposed work LabVIEW based hardware was developed for automatic monitoring of battery parameters like Voltage, Current, Battery percentage and Temperature for 'n' number of batteries which are plugged in the charging station. This reduces the manual effort involved in individual monitoring of batteries. The outputs of the batteries are interfaced with the Micro controller. The data from the Micro controller are sent as a serial communication to LabVIEW.

KEY WORDS: BATTERY MANAGEMENT, BATTERY MONITORING SYSTEM, ELECTRIC VEHICLE, MICRO CONTROLLER, SERIAL COMMUNICATION, LABVIEW.

INTRODUCTION

Since the vehicles consume large amount of fossil fuels they are harmful to the environment, so it is very important to reduce the green house gases. The development in the electric vehicle innovations improves the quality of environment. Increase in the use of electric vehicles (EVs) provided a double alternative as to lower the gasoline strength consumption and greenhouse gasoline (GHG) emission which leads to reduce the climatic change and the bad environmental conditions. In order to obtain a sustainable and clean environment, the best option is to use the Electric Vehicles . One of the most promising ideas to achieve the concept of Electric Vehicle is the development of Battery Monitoring System (BMS). The battery is the essential factor of electric automobiles which represents a breakthrough towards sustainable mobility. Its miles now recounted as the era of preference for power storage in electric powered vehicles. With the improvement of electrical motors greater range of batteries is to be charged on the charging stations. Long charging time and absence of fast charging facilities lessen consumers' willingness of buying EVs remarkably.

EVs usually take hours of time for charging, that's a superb concern for most EV clients. The primary barrier to the vast use of electrical vehicle is the inconvenience inside the battery charging technique. The battery swapping technology will take away the wait time for charging, a promising technique to conquer the issue of lengthy length is charging. Besides, battery swapping stations (BSS) are potential to provide carrier to the electricity grid. As an instance, BSS have a better overall performance on smoothing the load profile than speedy charging stations (FCS) due to the flexible battery charging traits . Innovations in the battery technology are the key motivation for Hybrid Electric Vehicle. To extend the lifestyles of battery-based totally energy storage systems, a right battery monitoring system desires to be incorporated in order to ensure their reliability. Battery Management System is a smart element which functions to reveal the energy of a battery percent.

BMS computes the battery's ability and depreciation of battery while charging/discharging thus correct productiveness is acquired which presents the actual time statistics to the customers. This mitigates the feel of incorrect safety of the periodic battery. The insufficient capacity of the battery leads to the development of battery swapping technology. The drained battery is swapped with the charged battery. The drained batteries are charged in the charging station. The charging station contains 'n' number of batteries where the manual monitoring of the battery status is a tedious process which involves man power. Development of LabVIEW based battery monitoring system monitors the parameter of the batteries such as Temperature, Voltage, Current, State of Charge,

so that the individual monitoring of the battery can be done through the LabVIEW software which eliminates the man power. Based on research in the implementation of Hybrid Electric Vehicle, any battery it can be lead acid or Li-ion battery, needs to be examined a couple of times to test the battery potential, leakage resistance and the withstand ability of the battery. For these sort of system, a human cannot sit in front of the setup to document the Voltage, Current etc.., In order to reduce the complexity a LabVIEW based Graphical user Interface (GUI) can be used to automate the battery monitoring system. Each battery which needs to be charged or discharged has vast limits in the Lower Threshold Point (LTP) and Upper Threshold point (UTP). The battery charges and when it reaches the Upper threshold point, a relay is switched on automatically and begins to discharge.

This paper provides the methodology for monitoring various parameter of the battery such as Voltage, Current, Temperature, Charging status. LabVIEW based Battery Monitoring System is developed and implemented for the real time monitoring of the battery parameters. The prototype model is developed for examining two batteries for example, various parameters. The LabVIEW model is interfaced with the Arduino microcontroller and the results of the parameters of the battery are monitored. The remaining section of the paper is organized as below:

Section II discusses about the Methods and Materials. Section III highlights the results and discusses the findings of the proposed work.

MATERIAL AND METHOD

Proposed Methodology: Electric vehicles are considered as a promising solution for reducing the global CO_2 emission. However due to the inadequate capacity of the battery storage tanks, driving range and charging concerns are restricted. With the development of swappable batteries, the drained battery can be replaced by the charged battery. The drained batteries are collected to the charging station. The charging station contains 'n' number of batteries to be charged. The various parameters are to be checked in the charging station in order to get better reliability of the battery. Individual monitoring of these parameters is a time consuming process. In this proposed system, the various parameters such as battery Voltage, Current, Temperature, charging status are monitored in the LabVIEW for 'n' number of batteries. The voltage, current, temperatures are measured using suitable sensors. A Battery monitoring System front panel is developed in LabVIEW and the interface is made through the sensors to Arduino and then to the LabVIEW panel. A time delay is provided to display the real time status of the batteries. Simultaneously 16 batteries can be monitored through the proposed system via the interface.

Block Diagram: Fig. 1 displays the block diagram of the proposed system. The principle element in the block diagram is the controller. The micro controller called ARDUINO is used for efficient operation. The complete operation of the circuit is enhanced with the help of the microcontroller. The transformer is used to step down the supply voltage to the required voltage. The rectifier block converts the ac voltage from the transformer to dc voltage. The rectified dc output was filtered in order to remove the harmonics. The conduction is made in forward direction with the help of diode, so that it does not allow the reverse flow of current. The relay acts as a switch. The rectified dc voltage is given to the battery. The primary blocks are transformer, rectifier, filter, diode, batteries, voltage divider, LM35. The signal obtained from the primary blocks is given as an input to the microcontroller. With the help of these values the microcontroller can calculate the values of the required parameters such as voltage, current, temperature, charging status. The voltage is calculated with the help of voltage divider.

The supply to the ARDUINO micro controller is given via regulator. The temperature is sensed using LM35. The calculated parameters from the controller are displayed on the LCD. For monitoring parameters in the charging station with 'n' number of batteries, the microcontroller is interfaced with the LabVIEW. The front panel of the LabVIEW software is designed to show the current reading and status of all those parameters. The backend of the LabVIEW software is programmed accordingly. Two batteries are taken into account in the proposed

prototype. The natures of the batteries are based on their capacity and their life span. The new batteries get charged quickly than the used batteries, so the time interval of charging among the battery varies. Due to its varying nature individual monitoring of the battery is a tedious task.

Figure 1: Block diagram of the proposed system
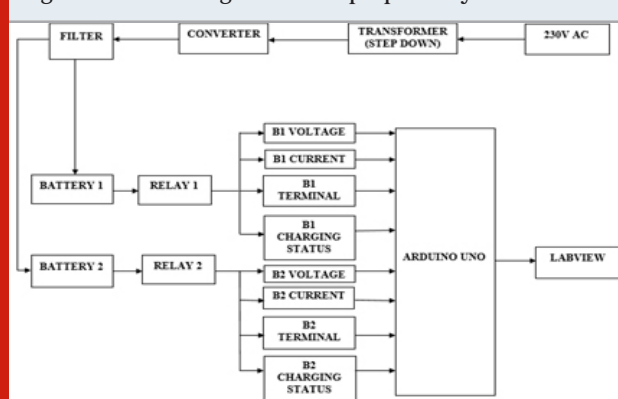
A. Measurement: Voltage: Voltage divide module was used. In voltage divider circuit two resistors are connected in series with the battery. Voltage is applied across the ends of the resistor. Voltage is split in opposition to the resistors according to the resistor ohmic values. Microcontroller work on 5 or three.3 volts, So their pins are also works corresponding to 5 volt based on TTL logic. Voltage greater than five volts ought to probably harm the pin or might also fry the microcontroller. Batteries typically are at 12 volts. Microcontroller cannot degree 12 volts at once. So the voltage divider concept is used to divide the voltage in half and at the same time to make sure that one half of the voltage can't boom 5 volts in any situation. This half voltage is feed to the microcontroller to measure the voltage.

Current: The precision current shunt resistor is used to measure the current. It is the most accurate linear method for measuring the current. By inserting a known shunt resistor in the current loop, the current flows through the shunt and generate a voltage drop which is relative to the value of the shunt resistor. The data acquisition circuit measures the differential voltage drop of the shunt resistor. Then the expected current is calculated.

Terminal Temperature: LM35 is used for measuring the terminal temperature of the battery.

State of Charge: State of charge is the level of charge of an electric battery relative to its capacity. SOC is generally used while discussing the current state of a battery in use. The depth of discharge is most often visible when discussing the lifetime of the battery after repetitive usage. The coulomb counting method also referred to as ampere hour counting and current integration is the most common approach for calculating the SOC. This technique employs battery current readings mathematically integrated over the utilization period. The coulomb counting approach then calculates the

remaining capacity certainly by means of accumulating the charge transferred in or out of the battery. The accuracy of this approach resorts primarily to a precise measurement of the battery current and accurate estimation of the initial SOC. By integrating the charging and discharging currents over the operating periods, the SOC of the battery can be calculated.

B. Microcontroller: Arduino UNO is used as a microcontroller. It is an open-source microcontroller which uses the Microchip ATmega328P and is developed by Arduino.cc. The board is prepared with sets of digital and analog input/output pins that may be interfaced to diverse expansion forums and other circuits. The platform utility of Arduino (IDE) is written in Java. Arduino is a exquisite device for growing interactive items, inputs are acquired from numerous switches or sensors and extensive kind of lighting, automobiles and other outputs are managed. Arduino projects are stand-alone or they may be connected to a laptop through the use of USB. The Arduino technology is a open source platform which comes with an hardware function that let the user to develop their personal package. The software of the Arduino is well-suited with all forms of operation structures like Linux, windows, and Macintosh, and so on. The Arduino language is merely a set of C or C++ functions.

C. LabVIEW and LIFA: LabVIEW is a system engineering software program for packages that require check, measurements and control with quick access to the hardware and data insights. LabVIEW is normally used for information acquirement, to manipulate instrument, and to automate the industries with the help of running operating (OSs) such as Microsoft windows of different diverse versions like Unix, Linux, macOS, and so on.., LabVIEW has such a flexible graphical user interface which is simple to program. It is also best for simulations, to present idea's, preferred programming or even for learning basic concepts for programming. It offers extra flexibility than preferred laboratory units because it is primarily based on software. LabVIEW Interface for Arduino (LIFA) Toolkit is a free download that lets the developers to gather statistics from the Arduino microcontroller and implement it in the LabVIEW Graphical Programming surroundings.

D. Software Design: The software design is included in the library of the LabVIEW with microcontroler and IDE. Fig.2. shows flowchart of software design.

Fig.2. Software Design of LabVIEW
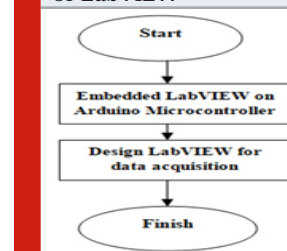
When the Battery Monitoring system is implemented in the personal computer, greater flexibility is achieved and the graphic tools offers the data visualiziation than microcontroller based systems. After the receipt of the valid data chain, Labview decodes the data that are transmitted. If the decoded data are recognised as the measured values, they are compared with corresponding maximum and minimum limits. The limits are set by the user or be deduced from the approximate battery model.

Flow Chart

Figure 3: Flowchart for the Battery Monitoring System
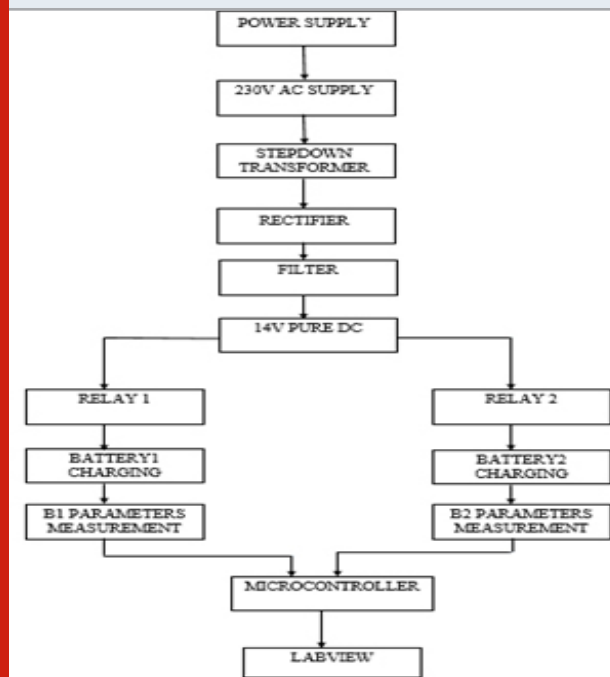
RESULTS AND DISCUSSION

The Battery Monitoring System was developed with the help of LabVIEW as an interface for Arduino UNO to display parameters. Thus the BMS can monitor the parameters such as Voltage, Current, Temperature and Charging Status. LabVIEW is user-pleasant software for graphical coding. It has a front panel for user interface and block diagram in which the complete code is developed. The fundamental GUI has a provision to set UTP and LTP points, voltage and current of the battery, whether it is charging or discharging. A manual switch is used to start the system.

Fig. 4 shows the analog values of the parameters of the Battery1 and Battery2. For monitoring more than two batteries, LCD display is not enough to visualize all the values consecutively. So a LabVIEW based GUI is developed. Fig. 5 shows the hardware description of the proposed system. After connecting setup to the load, the controller was programmed to calculate the battery parameters. The calculated parameters are displayed

in the LCD and the LabVIEW based GUI. Fig. 6 Shows the front panel design of the LabVIEW based Battery Monitoring System.

Figure 4: Results of the proposed system in LCD
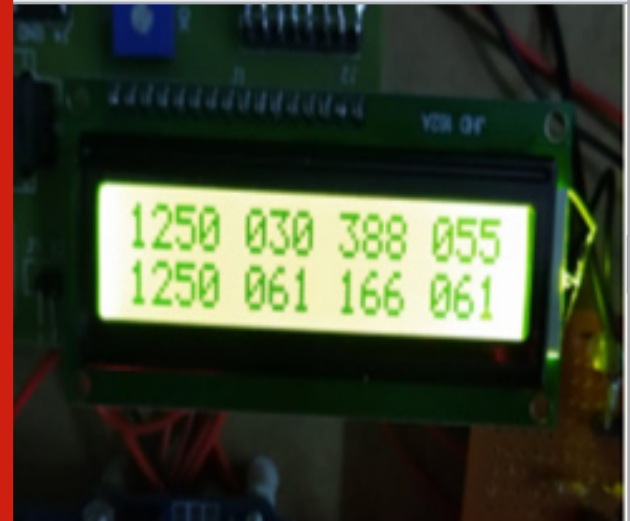
Figure 5: Hardware description of the proposed system
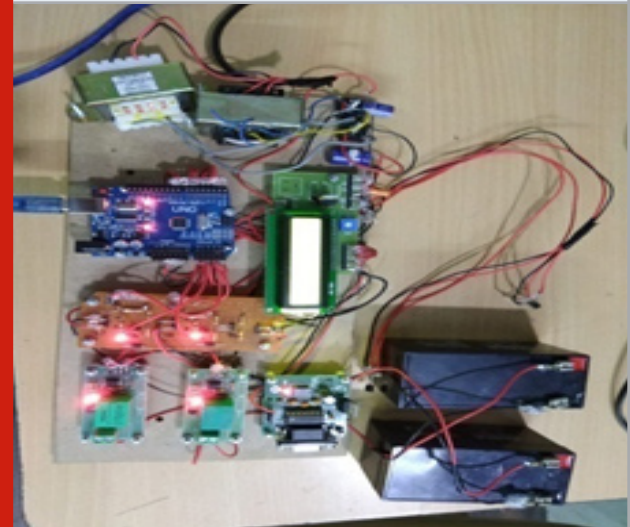
The voltage, Charge current, Temperature, State of charge values of the batteries 1 and 2 are displayed in the Front panel of the LabVIEW. Thus the Real time monitoring of the batteries helps to view the current status of various batteries, which provides the confidence that the batteries are reliable during an outage. Maintaining and tracking battery systems is important to maximize the performance and existence of substation, UPS, and different essential backup electricity systems.

The final GUI is made with all provisions to monitor the performance parameters of the batteries in the charging station. Fig. 6.shows the outline of the user interface panel, in which the above indications can be seen. Once all the connections with the source, including

the modules and the battery are made, then only the application panel with all values is executed.

Figure 6: Front panel of the LabVIEW based BMS
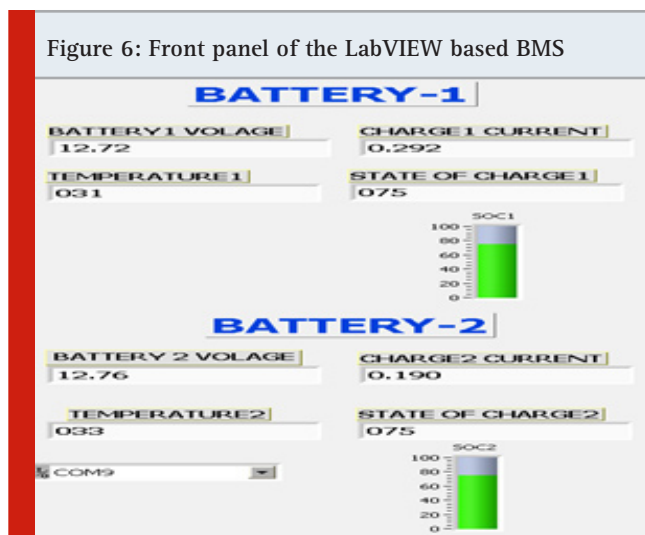
CONCLUSION

This paper has discussed the design and development of Battery Management System for Electric Vehicle and the battery parameters are displayed in LabVIEW based GUI. It can be observed that manual monitoring of the batteries individually in the charging station involves a lot of effort and time consuming. So that the development of the battery monitoring concept makes the task easier by observing all the parameters of the battery in the microcontroller and the appropriate code was developed in the LabVIEW software, So that the results are displayed are displayed in the front panel of the LabVIEW based GUI. The result shows the front panel of the LabVIEW with the appropriate values of the parameters of the battery. If the sensor board is prepared with the proper sensors for measuring voltage, current, temperature and SOC, clicking a battery with sensor board will not be difficult. Hence the proposed work is found to be useful for large systems.

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Smart Agri-Monitoring System using Cloud and Web Technology

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ABSTRACT

Agriculture is the most essential process for producing food,feeds and many other products.The present pollution and the industrial revolution which reduces cultivation in India.The farmers need a solution that provide effective monitoring and early prediction of diseases and its solution. This paper analysed the present scenario and provides an effective solution to the problems faced by the farmers by developing a CNN model for the prediction of disease and also uses a cloud database and web application for the continuous monitoring of the crop. This can be solved by the continuous monitoring of the crop conditions i.e., the temperature and humidity level, soil moisture level needed for the crops. This system uses various sensors for collecting this information about the crop in order to provide the nutrient requirement needed for the crops. All the collected data get stored in the cloud database which helps the farmers to identify what to cultivate next, what is the nutrient requirement for a particular crop according to the seasons in order to increase the crop yield. and the crops are monitored continuously using the web application. This system also deals with the prediction of the disease using the CNN model. The Cloud database upload the crop images in the storage part of the cloud and these images are compared with the trained model in order to predict the name of the disease and the fertilizer for the corresponding disease are informed to the farmers. Thus, the farmer will also have a complete control of their crops in the field globally with the help of the internet.

KEY WORDS: CNN MODEL, CLOUD DATABASE, DISEASE PREDICTION, RASPBERRY PI, WEB SERVICES.

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INTRODUCTION

Agriculture plays a main role in an Indian economy. It continues to be the stay of life for the majority of the Indian population. Due to the improper maintenance, conditions keep changing rapidly, farmers fall prey to the lack of knowledge that is required to estimate what kind of farm conditions, techniques and soil type is essential for growing a type of crop. Moreover, farmers over utilize a particular piece of land to such an extent that it leaves the land devoid of all minerals. Hence, it is important to be able to predict and forecast the performance of the crop for all kinds of environmental conditions. This proposed model provides a solution by building a hardware-based system which on deployment will estimate the amount of water present in the soil in real time, detect the humidity level and temperature of the environment. Monitoring environmental factors are not enough and complete solution to improve the yield of the crops. There are numbers of other aspects that affect the productivity to the huge level. These factors include an attack of insects and pests and are to be controlled by sprinkling the proper insecticide and pesticides for the crop. So, the farmers face several problems during the cultivation and harvesting stage of the crops.

This system provides the solution to all of these problems by collecting the data of the crops. The information about the crops are collected using the sensors i.e. Temperature and humidity sensor, moisture sensor which are all placed in the field. All the collected data get stored in the cloud database for monitoring the crops continuously. Using the web application, the farmers can able to know about their crops from anywhere. In order to prevent the crops from the pest or disease attack a model was developed to predict and classify the types of the pest in the crops. Initially the images of the leaves get captured using the webcam and the captured images are also stored in the database for the datasets. The pests in the leaf can be identified by giving the captured image as an input to the trained model. This model compares the input image with the datasets and predict whether the leaf get affected by pest or not. When the leaf was affected by pest the name of the pest is also informed to the farmers. This may help the farmers to give correct pesticides to their crops and also helps the farmers to take necessary actions by knowing about the present condition of the crops.

An IOT Based Smart Farming System developed an automated irrigation system and rooftop management system for the farmer on the basis of wireless sensor network (Manasa Sandeep et al, 2018). This system monitors the parameters of temperature, humidity, rainfall and moisture of the soil. An algorithm is used with threshold values of soil moisture for monitoring the moisture data continuously. Because this system starts or stops the irrigation based on the moisture content of soil. These sensors work on the change of impedance between two electrodes which are kept in the soil. Analog inputs are collected from the sensors; they are analyzed and activate the actuators. The data gathered by the sensors also sent to an android app via the Bluetooth module for monitoring the condition of the crops in the field.

Smart Farming System Using Data Mining represents an overview of recent smart farming software solutions (Priyanka et al, 2017). It works on the data mining techniques and the data obtained from satellite information, Internet, from soil testing report fed in the existing databases by using clustering algorithms for taking decisions based on the awareness of weather changes, by keeping track of crop growing stages, with proper water utilization, along with the decision of fertilizer to be used according to crop stage, as well as the pesticides are used to protect crops from pathogenic diseases and insect attack. This system is capable of increasing the yield of crop fields by managing the operations of farm.

A system of Smart Agriculture using Clustering and IOT (Agraj Aher et al, 2018) was taken as a measure to help in the increase of crop yield. This system monitors and alerts based on IOT with real time monitoring environmental parameters, which, is aimed at monitoring and managing the growth of crops in the farm. It includes data receiving devices, mobile inspection device, data acquisition units and data storage servers. So, this system can automatically collect environmental parameters such as air temperature, air humidity and soil moisture from the environment. It judges the parameters and gives a graphical reading for the users to understand the requirement of the parameters automatically. It also enables the farmers to control the different devices using the mobile application. The use of IOT in farming will help increase the crop yield as well as it provides beneficial aspects for the farmers.

Figure 1: Block Diagram for Real-time monitoring of crops
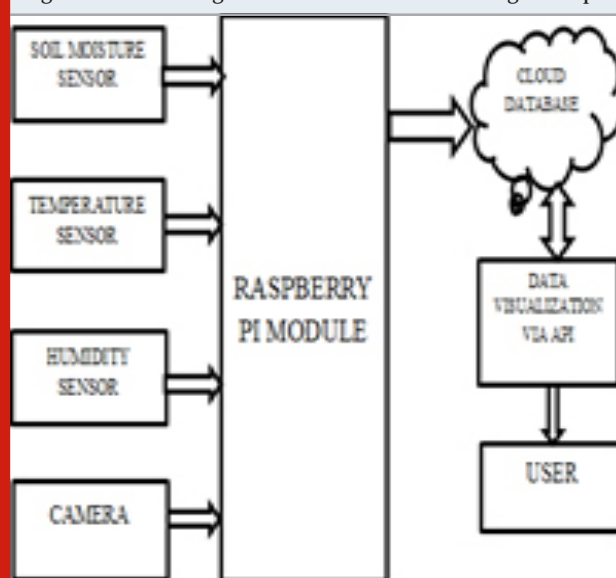
In the Soil Analysis and Prediction of Suitable Crop for Agriculture using Machine Learning, (Panchamurthi et al, 2019) the soil parameters and nutrients present in the soil like NPK are analyzed to determine the fertility level of that soil. Along with soil analysis it will also predict

the crops using machine learning. It compares the present data and existing data collected from the Department of Horticulture and agriculture according to the different parameters like pH, EC, moisture, temperature values. Farmers can test their soil multiple number of times to take necessary precaution to make a better yield during cultivation process. Reports are generated at the end so farmers will able to get the record of their crop fertility.

The highlighting features of Smart Agriculture using IoT and WSN based modern technologies (Nikesh et al, 2016) includes smart GPS based remote controlled robot to perform tasks like weeding, spraying, moisture sensing, bird and animal scaring, keeping vigilance, weather forecasting canal controlling in both automatic and manual modes and water management and all these data get stored and displayed in a mobile application. Based on certain criteria, the alert SMS and notifications are sent to the farmer. Smart warehouse management includes humidity maintenance, temperature maintenance and theft detection in the warehouse. All these operations can be controlled by an application which is connected to internet and these operations are performed by interfacing sensors, wireless fidelity etc. The sensors and micro controllers are successfully interfaced with raspberry pi and it proves that it is one of the solutions to field activities, irrigation problems, and storage problems using smart irrigation system, remote controlled robot and a smart warehouse management system.

In a Model for Smart Agriculture Using IOT, (Anusha et al,2019) the different sensors are sent in the field like temperature sensor, dampness sensor and stickiness sensor. The information gathered from these sensors are sent to the microcontroller. In control segment, this information is checked with the edge esteems. On the off chance that the information surpasses the edge esteem the ringer is exchanged ON. This caution is sent as a message to the rancher and the qualities are created in the page and the rancher gets the point by point depiction of the qualities. In manual mode, the client needs to switch ON/OFF the microcontroller by squeezing the catch in the Android Application created. This is finished with the assistance of WI-FI Module. In programmed mode, the microcontroller gets turned ON and OFF consequently if the esteem surpasses the edge point. Not long after the microcontroller is begun, naturally an alarm must be sent to the client. This is accomplished by making an impression on the website page through the WI-FI module and now parameters like the temperature, moistness and the dampness sensors demonstrates the edge esteem. The water level sensor is utilized just to show the dimension of water inside a tank or the water asset.

MATERIAL AND METHOD

The proposed system uses sensors for continuous monitoring of the crops. In the proposed system, various sensors like soil moisture sensor, DHT11sensors are used for monitoring the conditions of the crops and the data

are collected in real-time using the controller. All the collected data get stored in the cloud database in the xlxs format. The condition of the crops is monitored using the webcam which can be viewed by the farmer through the web server application (Figure 1). And the images of the crops are captured and are also stored in the cloud database. A model is created with the datasets of diseased leaves of the crops for predicting the pest occurring in the leaf of the plant. The stored image of the leaf in the cloud database is used as a test image for the created model. After undergoing comparison with the model which contains 10 classes of plant disease, the name of the pest in the plant is identified. An effective means of monitoring the condition of the crops and predicting the diseases provides a way of increasing the yield in the field by taking the immediate solution by the farmers.

The Figure 1. shows the framework used for the classification of plant diseases which consists of two main components namely image pre-processing and deep learning-based classification. The dataset stored in either local and global repositories contains a large number of images of both healthy and infected plant leaves. The images are taken using a standard digital camera or a webcam. Each image has three channels which are red (R), green (G), and blue (B). Neural networks contain multiple neurons arranged in layers and these neurons in the adjacent layers are connected to each other. These neurons learn how to convert inputs (pre-extracted and pre-processed features) into corresponding output (classes). A CNN is composed of three main layers which are convolutional layer, max pooling layer and fully connected layers. The convolutional and pooling layers act as feature extractors from the input plant images and the fully connected layer acts as a classifier. The essential purpose of convolutional layer is to extract features from each input image automatically. The dimensionality of the extracted features is then reduced by the pooling layer. At the end of the CNN model, the fully connected layer with a softmax activation function makes use of the learned high-level features to classify the input images into predefined classes.

Figure 2: Block diagram for Plant leaves Disease Prediction
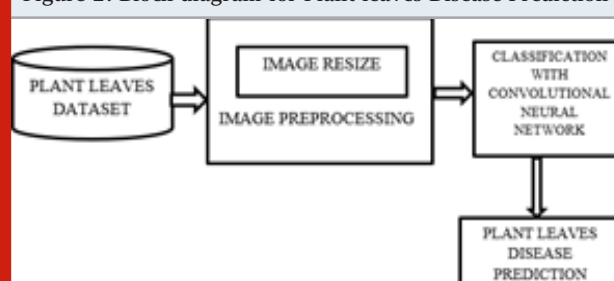
The layers used in the CNN Architecture which includes convolution layers and max pooling layers, etc (Figure 3). Convolution map: The convolution layer is an elementary unit in the CNN architecture of Neural Networks. The goal of convolution is to extract feature vectors from the input image. It consists of a set of learnable filters

and is applied to the raw pixel values of the image. These filters taking into account the red, green and blue colour channels in a sliding window fashion and it compute the dot product between the filter pixel and the input pixel. As a result, a 2-dimensional activation map of the filter called the feature map is obtained. Hence, the network learns filters (ie. edges, curves) will activate when they find these features in the input. The CNN learns the values of these filters during the training process. The Convolution operation is given in Equation 1. A convolution layer is configured by the number of convolution maps that contains Mi which represents the size of the filters that are often squared as $k_x * k_y$.

The feature map Mi is represented as follows:

$$M_i = b_i + \Sigma_k W_{ik} * X_k \qquad (1)$$

where * represents the convolution operator, bi is a bias term, Xk shows the kth input channel and Wik is the sub kernel of that channel. In other words, the convolution operation performed for each feature map is the sum of the bias term plus the application of k different 2D squared convolution features. In comparison with traditional image feature extraction that relies on crafted general feature extractors (SIFT, Gabor filter, etc), the power of CNN is noted in its ability to learn the weights and biases of these feature maps that leads to a task specific powerful feature extractors. Moreover, the rectified nonlinear activation function (ReLU) is performed after every convolution to introduce nonlinearity to the CNN. The ReLU is a very popular activation function which is defined as f(x) = max (0, x) where x is the input to a neuron.

Max–pooling map: In the CNN architecture, convolution layers are followed by sub-sampling layers. Each sub-sampling layer reduces the size of the convolution maps, and causes invariance to (low) rotations and translations which can appear in the input. A layer of max-pooling is a variant of such layer which shows the different benefits in its use. The output of max-pooling layer is obtained by the maximum activation value in the input layer over sub windows within each feature map. The max-pooling operation minimize the size of the feature map.

ReLU Layer: ReLU is abbreviated as Rectified Linear Unit for a non-linear operation. The output is $f(x) = $ max (0, x) which is used to introduce the non-linearity to CNN. The activation function is used for transforming the summed weighted inputs from the node into the activation of the node or it transforms the output for that input in any neural network. The activation Function in the rectified linear unit is a linear function which will directly output the input when it is positive and it will output zero when it is negative value. This activation function is used for many types of neural networks as it is easier to train and gives the better performance.

Flatten Layer: Flatten layer is responsible for converting the data from 3-D dimensional array into a 1-dimensional array for providing it as input to the next layer. It is used to flatten the output of the convolutional layers to form a single long feature vector. Finally, it is connected to the classification model, which is called as fully-connected layer.

Dense Layer: A dense layer is a regular layer of neurons in the Convolutional neural network. Each neuron get input from all the neurons in the previous layer which makes it as a densely connected. The layer has a weight matrix W, a bias vector b, and the activation Function of the previous layer a. Dense layers add an interesting non-linearity property so that they can model any mathematical function. However, they are still limited for the same input vector and as a result it always receives the same output vector. They can't detect repetition in time and produce different outputs on the same input. Dropout Layer: The fully connected layer occupies most of the parameters which makes most of the neurons to develop a co-dependency with each other during training process. This reduces the power of each neuron which causes over-fitting of training dataset. Regularization is an approach to prevent over-fitting. It reduces over-fitting by adding a penalty to the loss function. As a result, the model is trained such that it does not learn interdependent set of features weights. Dropout is a way of regularization in convolutional neural networks that reduces interdependent learning between the neurons.

Batch Normalisation: Batch normalization is a technique responsible for training deep neural networks which provides the standardized inputs to a layer for each mini- batch. This has the effect of stabilizing the learning process and dramatically reducing the number of training epochs required to train deep networks. To increase the stability of a neural network, batch normalization standardises the output of the last activation layer by subtracting the batch mean parameter value and dividing it by the batch standard deviation parameter value. But after this scale of activation outputs by some parameters which are initiated randomly, the weights in the next layer are no longer optimal. SGD (Stochastic gradient descent) undoes this normalization process to minimize the loss function. And batch normalization adds two trainable parameters to each layer. So, the normalized output obtained is multiplied by a standard deviation parameter commonly known as gamma and add a mean parameter which is commonly called as beta.

Softmax Function: A Softmax function is one of the types in squashing function. Squashing functions limits the output of the function in the range between 0 and 1. This allows the output to be interpreted as a probability making it as the final layer in neural network function. Similarly, softmax functions are multi-class sigmoids, so that it is used in determining probability of multiple classes. A softmax layer contain the same number of nodes as the output.

Padding and stride: Padding is a term that refers to the number of pixels added to an image in Convolutional Neural Network as it is being processed by the kernel of the CNN. For example, when the padding is set to zero in

a CNN, then every pixel value added will be zero. If the zero padding is set to one, there will be a pixel border added to the image with a zero-pixel value. Stride is the number of pixels shifted over the input matrix. When the stride is 1 then the filters shifts to 1 pixel at a time. When the stride is 2 then the filters shifts to 2 pixels at a time and so on.

The datasets include four classes of diseased Tomato leaf images namely

(1)   Tomato Yellow Leaf Curl Virus
(2)   Tomato Healthy
(3)   Tomato Early Blight
(4)   Tomato Late Blight
(5)   Tomato Bacterial Spot

The mechanical set up is designed in such a way that the camera captures the image of the crops (Figure 5,6) at the same it also records the real-time condition of the crop (Figure 4). It also updates the temperature level, humidity level and the moisture content level of the soil in the Cloud database (Figure 7).

Figure 3: Layers used in CNN Model

The real-time images of the plant leaves are used as input image for the prediction of disease in the crop using the image processing methods. The input image is processed with 11k rgb images of healthy and diseased crop leaves which is categorized into 5 different classes.The dataset used is recreated using offline augmentation from the original datasets. The dataset contain 4 different diseases normally occurs in the Tomato crop with more than 1500 images for each disease thus making a total diseased image of 6,600 images. This dataset also includes the healthy plant images for identify the healthy plant which also contain 1500 images. The total dataset is divided into 80/20 ratio of training and validation set.

Figure 4: Hardware setup for real-time monitoring

Figure 5,6: Input Images of Tomato Crop
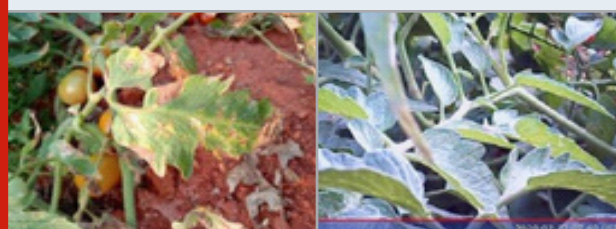
All the collected data get stored in the Firebase Cloud and the farmers can access the cloud with their particular account in order to view the present condition of the crops. The humidity level, temperature level and the moisture content in the soil are uploaded in the Database part of the Firebase Cloud (Figure 7). The image captured using the mechanical setup are uploaded in the storage part of the Firebase Cloud (Figure 8).

Figure 7: Block Diagram for Real-time monitoring of crops

Figure 8: Image uploaded in Firebase Storage
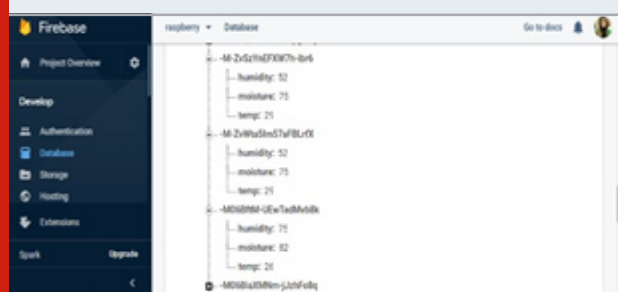
The Convolutional Neural Network (CNN) model Training and Validation Accuracy (Figure 9) and loss (Figure 10) levels are obtained during the training of datasets.

Figure 9,10: Training and Validation Accuracy and Loss Level
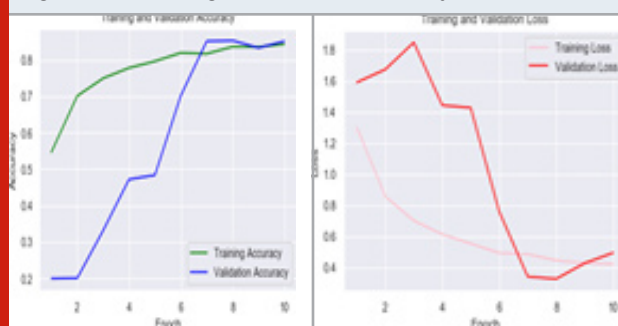
RESULTS AND DISCUSSION

When the various data from the agriculture land gets collected through the sensor (temperature and humidity sensor, moisture sensor) the system display the values in the raspberry pi terminal (Figure 11).

Figure 11: Sensor Data Result
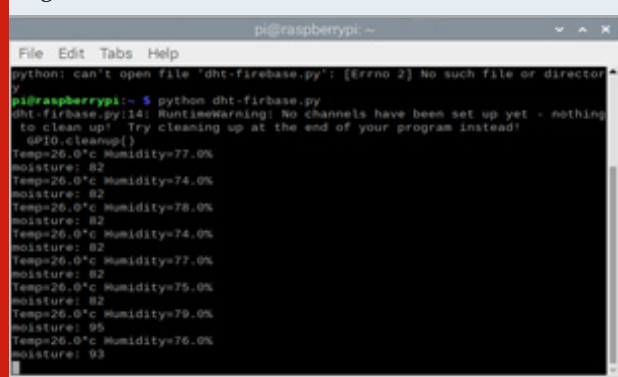
The Figure 12 represents the resultant spread sheet of various sensor data values. The real-time monitoring of crops is done using the web camera (Figure 13). The web camera is placed near the crops through which the farmers can monitor the current status of the crops in the website from anywhere with the help of respective IP

address allotted to the farmers, so they need not to go to their field for monitoring the crops. It saves the farmers time from spending in monitoring the crops.

Figure 12: Spreadsheet Result

Figure 13: Realtime monitoring of crops
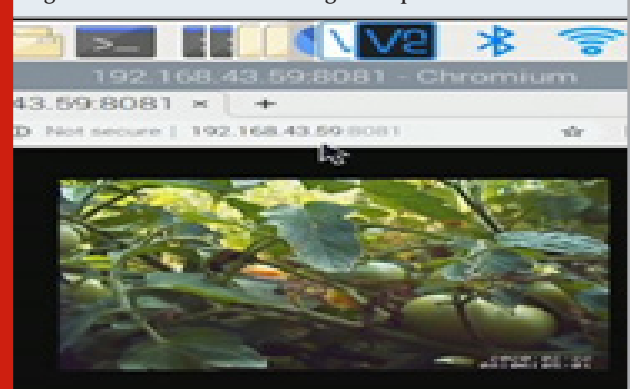
Figure 14: Prediction Result-1
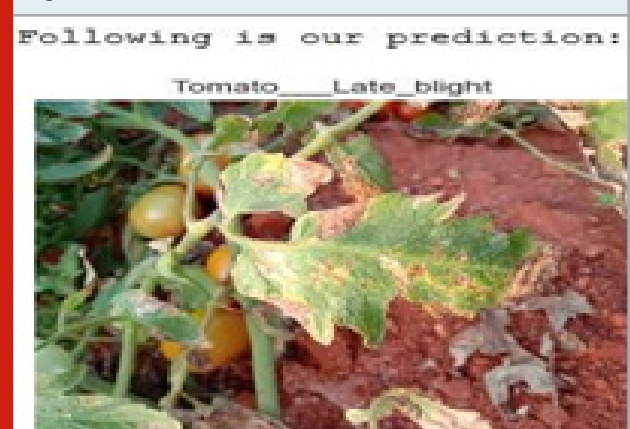
Figure 15: Prediction Result-2
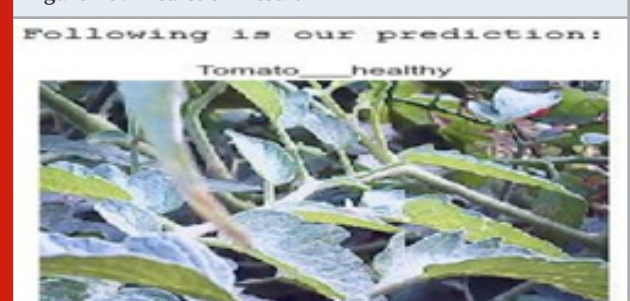
Based on the Figure 14 and 15 shows the diseased and helathy plants are predicted and corresponding fertilizers are provided which helps the farmers to provide the sufficient nutrition requirements for a crop in order to increase the crop yield.

CONCLUSION

Thus, the Agri-Monitoring system are designed to maintain crop nutrient condition in real-time. This is an essential requirement towards the agriculture sector to make an improvement in crop production with a reduction in the cost of fertilizer requirements which keeps the soil with health intact. As the data is collected over the years for crop details and soil conditions, this system provides datasets for best crop sequence, total crop production in the area of interest, next crop to be cultivated for better production, total fertilizer requirements, and other data of interest can be analysed from the crop data.The model Accuracy of 85% helps in the prediction of the disease in crops and provides the appropriate fertilizer requirement needed to cure the disease. The result showed that the proposed system performance level can be improved by Multi-expert models and also Android application can be created for the prediction of disease in the crops.

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A Comprehensive Survey on Intrusion Detection Mechanisms for IoT Based Smart Environments

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ABSTRACT

Rapid strides in IoT and networking technology result in an unprecedented increase in the number of unwanted or malicious network operations. Network Intrusion Detection System (NIDS) is a defense-in-depth feature that is designed to detect malignant behaviors. The protection of IoT has become a major challenge, and the risk of infested Internet connections no longer prevents the safety of IoT and threatens the entire Internet eco-machine which could make IoT systems the most vulnerable. Vectors of defense attacks in terms of sophistication and varied characteristics have evolved. It is therefore important to view strategies in the IoT context in order to recognize and prevent or distinguish novel attacks. At present, different classification methods address NIDSs, and each technique has its own drawbacks and merits. The program does not detect risks successfully in large voluminous data conditions and efficient tackling of high false warning rate and the low identification rate is the need of the hour. This study segregates the security exposure and challenges in IoT by assessing current defense methods. The primary center of this study is on network intrusion detection systems. The survey deals with both conventional and machine learning NIDS techniques and talks about future directions. This study is mainly focused on intrusion detection in the network of IoT by using the machine learning since machine learning has a great attainment in security. The study provides a complete audit of NIDSs deploying various factors of learning methods for IoT, differ from other best reviews which are targeting the conventional frameworks. A random forest algorithm based classification technique is proposed and has been found to offer 4% more accurate classification as compared to the existing techniques.

KEY WORDS: INTRUSION DETECTION SYSTEM (IDS), MACHINE LEARNING, NETWORK INTRUSION DETECTION SYSTEM (NIDS), INTERNET OF THINGS (IOT), DEEP LEARNING, RANDOM FOREST

ARTICLE INFORMATION

INTRODUCTION

In evolving industrial development, IoT contributes significantly. It is specified as the interconnection of computing devices embedded in each entity through the Internet which send and receive the data. Both temporal and spatial information is collected and analyzed for specific events using IoT sensors / devices. IoT entities or items have now become smarter and communication is efficient. In almost all sectors such as home, vocational training, amusement, energy distribution, banking, medical services, smart cities, tourism as well as transportation, IoT is often used. Technology sector, academia, and individuals have therefore tried to incorporate the flow of fast advertising with commitment to security. Any such circumstance could endanger IoT users and interact with the lively environment in effect.

For example, smart residences can be remotely controlled by hackers, and smart devices can be hacked and operated remotely to cause panic amongst people. The interoperability of all these devices exposes towards vulnerabilities including IoT device uncertainty, like full ecosystems such as websites, apps, social networks and databases, via managed smart devices, namely robot networks. Regarding this, in IoT-based systems which compromise a single device and/or communication channels, the aspect or complete Internetinfrastructure can be destroyed. It needs further attention for both the identification and mitigation of these assaults, and the detection and recovery of vulnerabilities of systems following the attacks.

Important Attacks In Network: The major attacks in the network are explained in this section. To identify these attacks various detection systems were constructed and implemented.

Spoofing attack: Spoofing is an attack if a malicious party interrogates another device or client on a network to launch attacks on network hosts to steal the data or avoid access controls. Many different kinds of spoofing methods like IP spoofing, ARP spoofing and DNS server spoofing can be used by malicious groups.

IP spoofing: One of the most widely used spoofing attacks is IP address spoofing. In this case, an attacker sends IP packets to disguising himself from a false origin address. DOS attacks use these IP spoofing to flood networks and computers that seem to be the same as valid IP addresses of source. Two aspects are possible to use IP spoofing assaults to overwhelm network targets. One approach is literally to overload a specified target from several spoofed addresses with packets. This approach works by send- ing more data directly to a user than they can manage. The other strategy was to spoof the IP address of the target and send pack- ets to many other receivers on the platform from that address. Once a packet is received by a device, it will immediately relay a packet in acknowledgment to the sender. Because the spoofed packets seem to be transferred from the target, all replies to the spoofed transmissions will be transmitted to the target.

ARP spoofing: Address Resolution Protocol is used to handle IP addresses to MAC addresses for data transmission. An unauthorized agent transfers duplicated ARP packets through a local network in order to connect the assailant's MAC address to a valid member's IP address. This form of spoofing assault results in information which is meant for the client's IP address looking sent to the assailant instead. Mischievous parties generally use ARP spoofing to obtain information, alter information-in-transit or block traffic on a Local network.

DNS server spoofing: The DNS is a framework which identifies user accounts with IP addresses. Systems that access the internet or other networks depend on the DNS to fix URLs, email accounts and some other sentient readable domains in their respective Ips. In a DNS server authentication assault, a mischievous party alters the DNS server to redirect a specific system name to a dynamic ip address. In certain cases, the new IP will be for a server which is effectively controlled by an assailant and incorporates viruses-infected files. DNS server malware assaults are used to spread viruses.

Eavesdropping: Eavesdropping is the unapproved real-time interference of a private communication. The words eavesdrop derives from the custom of standing under a house's eaves, listening to inside conversations. Eavesdropping is an assault on the network layer that mostly usually focuses on the capture and read of the data contents for any information from small parts of the network transmitted by other computers. This kind of network assault is typically one of the most efficient since it utilizes a lack of authentication services.

Denial of service: The Denial of Service (DOS) is an assault where the attacker makes the network busy by sending unwanted request from a device. In this type, attacker use single device to flood the targeted network. It is completely different from the Distributed Denial of Service assault where the DDOS attacks flood the targeted network by using multiple devices. These attacks are accomplished by flooding destination hosts or networks with delicately structured traffic. Conventional DOS assaults comprise the Smurf attack and the SYN flood attack. The assailant transfers ICMP packets with spoofed source IP addresses referring to the attacked network in the Smurf attack. The responses pro- vided multiple feedbacks for these broadcast packets to disable the host. Absolutely, a Smurf assault is defended easily against by having firewall solutions. The user to root attacks are most important attacks where the hacker starts off on the system with a usual user account and endeavors to misuse vulnerabilities in the system so that the hacker may gain super user authority e.g. Perl, xterm.

Probing: Probing is an assault in which the hacker attempts to scan a networking device or a machine which will decide the vulnerabilities that could later be

exploited so that they will pact the system. A Remote to Local attack is analogous to the user-to- root attack but is more cautious in its eventual aspiration. Such an attack is carried out when an assailant sends packets to the target host that are planned to confess vulnerabilities that could enable the assailant to accomplish a local user's authorities.

Various Network Intrusion Detection Systems: The network intrusion detection (NIDS) for IoT system can be deployed in two ways. One is by using some conventional techniques and another way is by using some learning techniques. The protection of IoT system becomes more significant because of its diversity. The IoT technologies are limited in computing power, battery life and communication throughput. Therefore, the deployment of present traditional detection systems is not possible. This section deals with the various NIDS with an exclusive target on the methodologies used for detection and evaluated attacks. This section also explains different architectures of NIDS.

SVELTE: Raza et al. [S. Raza et. al., 2013] designed and implemented first IDS (Intrusion detection system) for IoT called SVELTE which is a real time detection system. The detection technique used in this system was signature and anomaly based detection techniques. The attacks detected by using this system are routing attacks such as spoofing and sinkhole. It mainly consists of three modules: i) 6Mapper, ii) Intrusion detection component and iii) a mini firewall. The 6LoWPAN4 Mapper is designed for clustering information about the RPL5 network. The intrusion detection component is used to evaluate mapped data for encounter the intrusions. The mini firewall is designed and dispersed to offload nodes by filtering undesirable traffic before the traffic comes into the resource inhibit network. They implemented the SVELTE to detect sinkhole attacks in the Contiki OS. The true positive rate in a small-scale lossy network was 90%. In a lossless network configuration the true positive rate was nearly 100%. The IDS nodes transmit the data or information about the assaults through the network. The major drawback in this system is once the network is affected by the Denial of service attack it can't able to detect the DOS attack. This system works well only for detecting the routing attacks. The performance of the system is reduced when the network is affected by other types of attack.

Intrusion Detection for Internet of Things: Christian et al. designed an intrusion detection system to encounter the Sinkhole assaults on IoT network called INTI. This system [R. Stephen et. al., 2017] identifies the Sinkhole attacks by integrating three approaches such as watchdog, reputation and trust. INTI runs on four modules called cluster configuration, routing monitoring, attack detection and attack isolation. In this system the nodes are either fixed or mobile nodes. The behavior of doubtful nodes is detected by reputation and trust mechanisms. In the INTI system the attack detection rate is up to 92% if the nodes are in fixed configuration and the detection rate is nearly 75% if the nodes are mobile

in nature. The detection rate for SVELTE in fixed mode is about 90% and in mobile mode is 64%.In order to find the attacks in the wireless sensor network, [Ranjeeth et al., 2015] introduced an intrusion detection system. The LEACH protocol is used by the wireless sensor network. This system uses TETCOS NETSIM to detect and simulate sinkhole attacks.

Network Intrusion Detection System: Kasinathan et al., 2013 designed an IDS system to detect the DoS attack. The architecture of this system considers the centralized IDS probes instead of distributed IDS. The IDS probes detect the network in unscrupulous mode than transfer the information to the main NIDS. This system fits an assault signature to network traffic, and a notification will be sent to security manager. The security manager explores the IDS probe information with additional information collected from other ebbit managers. This system overcomes the limitations in SVELTE system because this system does not depend on the architecture of the network. The problem in this method was it can't monitor the large networks.

A reliable intrusion disclosure system was discussed in [Y. Fu et al., 2017]. He considered two necessary things called variety of IoT networks and IoT sensor and device resource limitations. Their approach was the first to benefit from automata theory to design and detect IoT network intrusions. They presented a standard definition of IoT system network traffic flows based on an extension of labeled changeover systems and then directly associated real-time activity flows to locate and address typical protocol libraries: jam assault, false assault and response assault. The recommended approach comprises of four subsystems named Event Monitor, Event Database, Event Analyzer, and Response Unit.

> Event Monitor collects and transmits network traffic information to digital files at IDS Event Analyzer. This component must be implemented in the PAN (Personal Area Network) coordinator or other gateways in the IOT monitor network traffic.
> Event Database implements three cloud-based databases i) Standard protocol library, ii) Abnormal activity library and iii) Normal action library.
> Event analyzer consists of three basic models. i) Network structure learning model, ii) Action flows abstraction model and iii) Intrusion detection model.
> To the management station the attack types are reported by the response unit.

Complex event processing IDS was designed as an intrusion detection system for IoT. The technology used in the [Jun et al., 2014] proposed system is Complex Event Processing (CEP). The CEP is a rapidly growing and reliable system for the real-time analysis and sorting of events. Big amounts of low latency messages are a good solution. Hence, this platform can be tailored to IoT's needs. The information is collected from IoT gadgets in

this system and the activities are retrieved from sensed data after detecting the security activities using Event Processing Repository (EPR) and CEP. The system is designed for any kind of attack detection but is not tested. Anomaly based IDS was introduced by[Pajouh et al., 2019].

They focused primarily on low frequency popular attacks called U2R and R2L assaults. NSL-KDD dataset is used to evaluate the system's performance. A two layer dimension reduction has been implemented to reduce the high dimensionality of the dataset. An unsupervised learning method called Principal Component Analysis is used to merge dataset features and to create new dataset. After the merging process the feature of the dataset which is used for detection process is reduced to 41. In second layer a supervised classification algorithm is used to analyze and classify the features in the dataset called Linear Discriminant Analysis. The speed of the intrusion detection was increased by using the classification method. The dimension of the dataset (NSL-KDD) is reduced as two dimensional dataset. The false positive detection rate is decreased due to this dimension reduction process. In the multilayer classification the TDTC (Two layer Dimension Reduction and Two tier Classification) uses K-Nearest Neighbour version of Naive Bayes and certainty factor to classify the inputs. Their work showed a 10-fold reduction in computing with faster detection and fewer requirements of resources. Of binary classification, they obtained a detection rate of about 84.86% with 4.86% of false alarm.

Conditional Variational Auto Encoder Based NIDS: For IoT the Lopez-Martin et al. designed an unsupervised anomaly NIDS. This [Lopez-Martin et. al., 2017] NIDS is based on Conditional Variational Auto encoder (CVAE). Due to its ability to perform feature reconstruction, their approach is special. Authors disclosed that feature retrieval was accurate at 99%. This characteristic also makes the proposed solution important to IoT systems, as it is much more delicate in connection issues and sensing inaccuracies affecting the data sent / received. Along with the intrusion feature this system uses intrusion class labels as inputs to detect intrusions. The key strength in their study is that the IDS-CAVE only carries out a single training step, to produce only one model based on the number of labels as in the VAE. A sophisticated NSL-KDD version was selected for ID-CVAE training and testing. Totally 116 features and 23 possible labels are available after reduction and classification process.

Experimentally they have demonstrated that their work is less complex than other unsupervised NIDS, with a higher accuracy of classification than popular algorithms, such as linear support vector and a multi-layer perceptron, etc. The researchers have 99%, 92%, and 71% accuracy when model restores explicit features which are missing with three, 11, and 70 values respectively.

Anomaly Based NIDS System: Bostani et al. designed a hybrid anomaly based Internet of Things IDS [Bostani

et al., 2017] with the specification based IDS. It helps for the detection of sinkhole and selective forwarding assaults in 6LowPAN networks, and can be developed into blackhole, rank and wormhole attacks. This IDS works exclusively in two phases: detection of router level parameters and detection of root level anomalies. During the first stage the routers evaluate the features of the network and host nodes locally. The results of the first phase would be sent to the root router for the second step, and removed from the routers for lower memory and CPU cycle consumption. The second step is to detect global intrusion, where anomaly-based evaluation is performed on incoming data packets for root nodes. This step provides clustering patterns for each router using the unattended Optimum Path Forest Algorithm (OPF). A final conclusion is made with a voting mechanism to identify susceptive behavior as an assault. Neither additional control messages are used nor a additional infrastructure used in the proposed system. This saves communication and framework costs compared to other IDSs. Authors have used their own simulation tool to analyze the technique proposed. The experimental result from the simulated scenarios have shown the probability of a true positive and a false positive rate is of 76.2% and 5.92% respectively when sinkhole and selective forwarding assaults have been conducted simultaneously.

NIDS Based on Deep Learning: The use of fog computing in IoT systems for detecting intrusions was recommended [A. Diro et. al., 2016]. Fog computing offers a smart data processing system at the intermediate level for fog layers (hubs, routers or doors) with the goal of improving efficiency and reducing the information transferred to the cloud. Such a technology allows decentralized attack detection that is more flexible, autonomous in detecting local attacks, automates the information learning to the sources and shared parameters with the neighbour. They suggested a deep learning method to identify the known and unknown intrusions. The distributed deep learning technique is based on distributing the data set to train that sub-dataset locally and quickly, rather than just sharing and coordinating the learning parameters with neighbours. They used NSL-KDD dataset for evaluation. As a result, they achieved multi-class detection comprising 4 labels (normal, DoS, Probe, R2L. U2R) to get a detection rate of 96.5 % and 2.57 % of deep-model false alarms about 93.66 % detection and 4.97 % false detection.

In [Hodo et al., 2016] a Multi-Layer Perceptron (MLP) which is a form of Artificial Neural Network (ANN) supervised in an off-line IoT IDS is suggested. Their analysis is based on traces of internet packets and aims to detect IoT network DoS and DDoS attacks.

The training dataset consisted of 2313 specimens, of which 496 verification samples were deployed and 496 test samples were used. The average rate of identification of attacks was 99.4 % with false positives of 0.6 %. These results ensure the network's good stability.

Mill and Inoue proposed a method of classifying network requests by using an effective SVM training system. In this [John Mill et. al., 2004] task, they use computational analysis to examine two factors affecting SVM output and demonstrate two new approaches. They devised a different method called ArraySVM from the Fuzzy SVM to overcome multi-class issue with other SVMs. The data set is split into segments and each segment (as in TreeSVM and ISVM) is trained by a classifier. Then these classifiers are placed in an array. To classify the variable the classifier with the highest margin is then used. The time required for training should be less than TreeSVM. As the issue size is kept small and only one pass is required through the training set. This method was tested with the KDD Cup data file. The algorithm is evaluated for training time, accuracy of the test set and number of total support vectors. The precision of the ArraySVM was about 90.78% and the training time was 45 secs. The other different methods of SVM were analyzed using the same KDD Cup data set. The precision of Incremental SVM was 80.5% and the training time was about 1115.19 secs.

The well-known techniques of machine learning were studied [35] by Ahmad et al. i.e. support vector machine and extreme learning machine. To test the intrusion identification system, the NSL and data mining datasets are taken. In their analysis results, the ELM was more accurate, in addition the SVM data set for the quarter was better. [M. Al-Qatf et al., 2017] introduced IDS with self taught learning (STL), an effective deep learning system for features and dimension. This is done by using the scant auto encoder system, which seems to be a good way to restructure an unsupervised new feature. The paper currently enhances the accuracy and faster training and test times of SVM categorization. In addition, it shows upright calculations in the classification of two and five categories. In this method, a higher precision value is reached as compared to other shallow classifications like Naive Bayesian and SVM.

[Thing et. al., 2017] conducted experiments with two or three hidden layers of Stacked Auto-Encoder (SAE), but doesn't provide any arguments for primary choice. SAE is a clustering algorithm made up of multiple layers of fuzzy auto encoders. Each layer's output provides the input to the next layer. Its hidden layers minimize the dimensionality of the feature and create new features. These new features are got to learn in the depths of the cascade to improve accuracy. The input and output layers of SAE are identical. Compared to J48 (a DT implementation), the proposed solution attained excellent results in accuracy (98.66 %). Over the 3-hidden-layer structure, the 2-hidden-layer structure had higher performance.

Different Learning Techniques For Feature Selection: This section is focused on different types of systems to detect intrusions and learning techniques to identify security threats with the evolution, complexity and heterogeneity of network attacks. Different learning techniques used

to design the IDS are exposed by various studies. The methods used in the IDS are k-means clustering, naive bayes, support vector machines, decision tree, artificial neural networks, fuzzy logic, genetic algorithm, stacked auto encoder. To improve the performance of the system these algorithms are deployed independently or in a combined manner. The main focus is on the use of smart IDS in IoT. The Back Propagation NN and SVM algorithms are used to analyze the suggested Davies – Bouldin Index feature recognition algorithm was proposed [Zhang et. al., 2004] for 5 classes. In this, 24 features of a single best set for 5 classes were selected The ACCs of the BP structure and SVM classifiers that use this set of features are 0.1017 and 0.056.

The choice of features is a primary problem in the pattern realization field. A hybrid subset selection approach called RICGA (ReliefF immune clonal genetic algorithm) established by combine ReliefF approach, immune clonal excerpt method and GA was proposed in [Y. Zhu et. al., 2005]. They first use ReliefF algorithm to cut unnecessary features, then use a revised genetic algorithm to eventually gain a subset of features. ReliefF approach is the development of relief where the Relief estimation approach which is only used to solve the problem of classification of two classes was first introduced by kira. The principal idea of the ReliefF algorithm was to check how good the characteristics distinguish between the instances close by each other, in other words, good features should close the same class samples and distinguish different class samples. To evaluate the accuracy of the system they used a NSL-KDD dataset.

The precision of the ReliefF-GA approach for classifying the small size feature subset i.e. 12 size feature subset is about 87.4% and the precision of the RICGA approach for the same size subset is 88.2%. The classifiers called Least Square SVM (LSSVM) and Ant Colony Optimization (ACO) which is provided in [45] was used for attribute selection method. The numbers of attributes picked were 9, 9, 11, and 14 for DoS, Probe, and U2R & R2L are respectively. The tests show the feature sorting method not only reduce the size of attributes but also improve the efficiency of classifier and make identification more efficient in terms of time. For the attacks DOS, Probe, U2R and R2L the results of the analysis is shown in terms of accuracy and detection time. The detection time for DOS, Probe are 0.031, 0.074 and U2R &R2L are 0.078 respectively.

In [K. M. Shazzad et. al., 2005], a hybrid Attribute Selection depend on GA, SVM, and Correlation (CFS) is proposed. The average DR and FPR using 12 selected optimal features are 99.56% and 37.5% respectively. The experiment shows that now the selected feature set's detection rate (DR) is lower than the set of full features and the average difference is about 0.83%. However, despite maintaining the DR and FPR within recommended range, there is a significant decrease in training and testing time.

For anomaly-related NIDS, SVM and Discriminant Analysis were fused to detect network assaults in [W. Wong et. al., 2006]. Nine parameters are retrieved and examined by SVM through the Discriminant Analysis. The True Positive rate (TPR), True Negative rate (TNR), False Positive rate (FPR), and False Negative rate (FNR) of proposed method are 90.07%, 99.58%, 0.42%, and 9.93% respectively. [Lee et al., 2006] employed Minimax Probability Machine utilizing Random Forests attribute selection (RF) for DoS assault only because other types of attacks have very less records and are not appropriate for experiments. RF features picked and listed by numerical values are thus selected to top 5 important aspects, revealing the detection rate (DR) as 99.84 percent and 0.1039 sec for mean computation time. The results of the experiment indicate that this method is preferable than preceding methods.

SVM algorithm with Radial Basis network function kernel utilizing Decision Based Correlation as attribute selection system is suggested in [F. J. Kuang et. al., 2014]. Top 20 attributes are chosen by determining each feature's shared knowledge and decision. The proposed system's ACC is 93.46%. A Genetic Fuzzy IDS Multi-Objective is proposed in [C. Tsang et. al., 2007]. It is used to search for near-optimal subset of features. The chosen subset of functions reduces computational effort and increases efficiency. The 27 attributes that show the suggested alternative will generate the minimum FAR (1.1 percent) and highest ACC 99.24 percent with a minimum set of features will be picked in the journal.

A technique called ACO-FS-SVM to scan network vulnerability is proposed by [Wang et al., 2015]. It integrates ACO with SVM and it utilizes ACO to recognize features through SVM weighting features. The results of the studies show that this technique will substantially decrease the number of parameters as 13 for Normal and limit the number of DoS, Probe, U2R and R2L as 10, 9, 11 and 13, with the DR as 95.13% and 94.09%, 94.46%, 94.56% and 95.68% respectively.

RESULTS AND DISCUSSION

In NIDS, the primary constraints are reliable, efficiency and successful. There is a scope to enrich identifying ACC with degree of precision to differentiate between standard and undesirable network traffic.It can be concluded from the literature survey that no individual machine learning strategy is completed and also that attack from network traffic can be identified with high ACC and low FAR. So it's not really a good solution to use a single classifier to create stable and effective NIDS. It is therefore necessary to model and incorporate more reliable optimization methodologies using multiple or combination or hybrid optimization algorithms. This technique will further improve the efficiency of NIDS.

The detection rate for all the different systems designed and implemented to detect the assaults in the network is demonstrated in Fig 1. From the Fig 1 it is concluded that the intrusion identification system called Multi layer

perceptron which is a form of deep learning approach and it has a detection rate of 99.4%. The accuracy of the various algorithms was shown in Fig.2.

Figure 1: Comparison chart for all IDSs
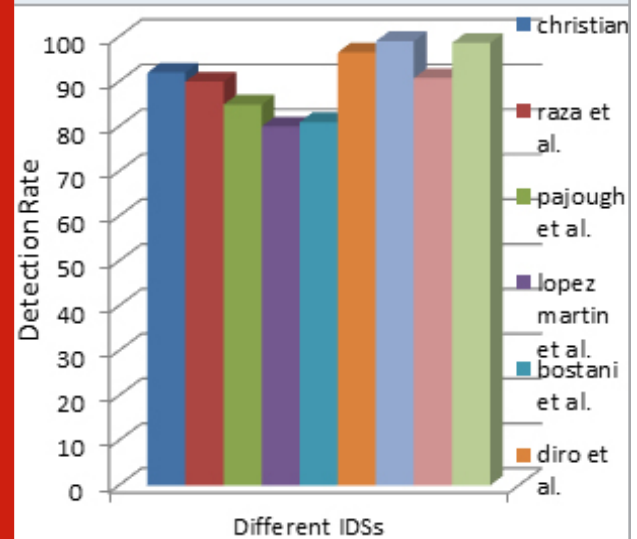
Figure 2: Accuracy of various algorithms
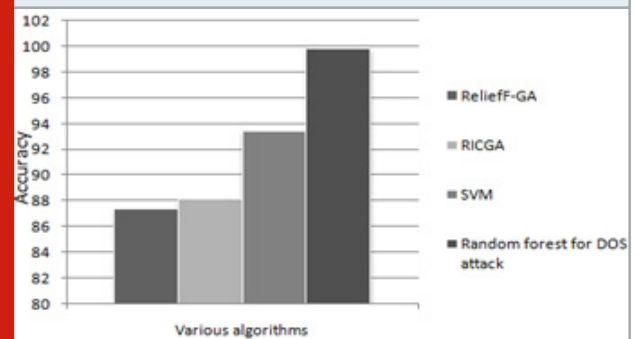
From the above Fig.2 it is concluded that the random forest algorithm has a greater accuracy than all the other algorithms. But now it is dedicatedly designed to identify the DOS attacks. In future, we are going to modify the Random forest algorithm slightly to identify all the other attacks. For evaluating this system we are going to form a database by monitoring the network behavior in real time.

CONCLUSION

For each person, IoTs have become pervasive. IoT is possible in smart cities, smart environment, smart metering, industrial control, etc. They are in every sector even in critical areas such as military, medical care and security of buildings. However, industries concentrate on innovating and producing more interconnected items without constantly verifying their quality and safety. NIDSs are one of the effective mechanisms to ensure the security of the IoT network. They help to identify network intrusions. They are being provided with learning strategies to enhance their performance.

The NIDS analysis is presented in this study. The research papers focused on the technique of machine learning that use the distribution of features to construct NIDS will generally be considered for this study.

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IoT based Safe Power Shutdown in Transformer with Prior Notification

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ABSTRACT

Transformer, a static electrical device transfers electrical energy between at least two circuits. A service or distribution transformer provides the final voltage transformation in the electric power distribution system by stepping down the voltage used in the distribution lines to the level as per the need of customer. Because of increased activity in the construction of power transmission facilities and installation of new technologies into the current power system, there is a need for raise in potential safety concerns. Hence, fingerprint sensor is used to provide safe shutdown mechanism in transformer. This system allows only the authorized personnel to operate on the transformer. The IoT and Smart Grid are of great importance in promoting and guiding development of information technology and economic. The fingerprint of the linemen is stored in the controller. The details of the consumers, employees and the grid are stored in a server, which is accessed using a user-friendly IoT application. The information about the power shutoff like location of grid, status of the grid, reason for power shutdown, off time and on time of power supply is notified to the consumer through text message. The proposed system enhances electrical safety by fast disconnection of the power supply in case of overloading in transformer has been designed with the goal to be integrated in smart environments for protecting the electrical equipment.

KEY WORDS: IOT, SMART GRID, ARDUINO.

INTRODUCTION

A transformer is a static electrical widget that moves electrical energy between at least two circuits. An appropriation transformer or administration transformer is a transformer that gives the last voltage change in the electric force dispersion framework, venturing down the voltage utilized in the dissemination lines to the level used by the customer. However if transformer fails, the damage would cost much greater than replacement of transformer. The capital required to replace this vital infrastructure represents a substantial financial burden . Inability to supplant old hardware speaks to a few dangers, principally quickening upkeep costs and expanding misfortune claims.

The additional costs may incorporate the loss of creation time, harmed believability, and administrative fines and common claims. The deficiency in talented laborers presents a possibly genuine increment in introduction to misfortune and risk. The high rate of accidents involving linemen while repairing the transmission and distribution lines to supply power in the transformer has become a serious concern for Electricity Board Limited. The linemen work on faulty transformer by manual shut down and

lock is used to secure the panel. Unknowingly, a stranger may operate the power supply and it may lead to severe damage or death of workers. In case of sudden power shut down, people may be affected from their routine works.

MATERIAL AND METHOD

Literature Survey: (Li Li, et al., 2011) 2 proposed a case study on the applications of Wi-Fi based wireless sensor network in IoT and SG.Wi-Fi based WSN has the highlights of high transfer speed and rate, non-line-transmission capacity, enormous scope information assortment and significant expense viable. The control of the grid data needs flawless correspondence lines and enough terminal data, and it can guarantee the security and soundness of information transmission, improve the dependability of information trade and give exact data so as to the clever application. (Chen,et al., 2012) proposed advanced sensing and communication technologies of IoT that can effectively avoid or reduce the damage of natural disasters to the transmission lines, improve the reliability of power transmission and reduce economic loss. (Hasan Farooq et al., 2012) proposed a case study which focuses on routing in SPG and WSN.

A new routing protocol HLR-AODV is proposed to provide energy efficient and reliable communication of smart meters with self healing characteristics. (Panth.D et al,. 2014) analyses how the transmission line towers fail during mandatory testing which leads massive damage to power system. (Fatima Alhebshi et al.,2018) explains that the transmission line in power grid is susceptible to many failures like blackout and short circuit etc. These failures were monitored by fixing some sensors to the grid lines and the data was collected using IoT. (Nur Asyik Hidayatullah et al., 2018) proposed Power Transmission and Distribution Monitoring using IoT for SG. The SG is a future modern power system that utilizes IoT to monitor, control and create various intelligent communications in the electrical system. SG is the integration of information technology, IoT, intelligent devices and advanced control method with the existing power system networks to enable power generation, transmission and distribution making it more robust, attractive, responsive and communicative.

Proposed Methodology: In case of failure of transformer, the lineman switches off the transformer manually and then a lock and key is used to secure the connection box. The consumers are not aware of the power shutdowns and sudden power failures. Hence, IoT is used for safe power shutdown in transformer. Figure 1 shows the block diagram of the proposed method for safe power shutdown in transformer.

In the proposed method, finger prints of the linemen will be stored in the server. Whenever there is a failure in the distribution transformer, the lineman will place his/her finger on the fingerprint sensor for authentication. The fingerprint is the input signal to the arduino where the fingerprint matching is done. Then the arduino will

operate a relay to cut the supply to the transformer. After the transformer has been repaired, the lineman will place his/her finger again on the fingerprint sensor to resume the power supply.

Table 1. Frequency Band with bandwidth
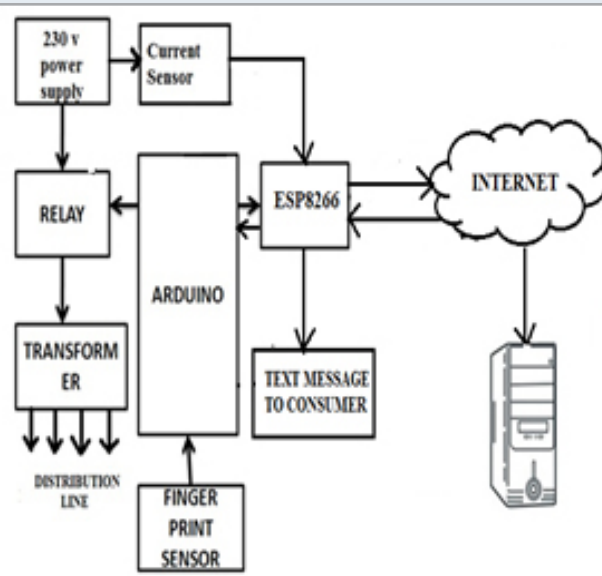
Arduino plays a major role in this project. It is the basic controller, where all the input signals are processed and appropriate output signal is generated. Fingerprint signal is the input signal to the arduino, whereas relay operating signal is output signal from the arduino. ESP8266 is connected to arduino to provide access to the server through internet.

RESULTS AND DISCUSSION

Consumer Details: In this page of the IoT application, PHP programming is developed to get consumer details. The EB operator can create or erase these details through online application. Figure 2 shows the consumer details list which is stored in the server.

Figure 2: Screen Display of Consumer Details

In this page the consumers connected to any particular grid is listed, for example as shown in the image 'Kongu EIE' is the name of the location where the grid is located, the consumer details connected to that grid are listed.

Many such consumers can be created. Here the name of the consumer, connection number, mobile number and the location of the consumer is stored. Figure 3 shows the image of the page where new consumer details can be entered.

Figure 3: Templates to Create New Consumer

Employee Details: In this page of the IoT application, PHP program is developed to collect the details of the employee. Figure 4 shows the image of the page which lists the employee details.

In this page, the details of the employees are shown. The ID number of the employee, name, post of the employee, current status of the employee, location of their work, contact number, etc are stored. Figure 5 shows the image of page where employee details can be entered.

Figure 4: Screen Display of Employees Details

This template is used to create new employees. These details can be accessed only by the electricity board official.

Grid Details: In this page of the IoT application, PHP program is developed to store the grid details in the server. Figure 6 shows the image of the page, which lists the grid details.

In this page the ID number of the transformer, the location name, the current status of the transformer, the reason for shutdown or failure, the time of power shutdown, the timing of power restoration and the name

of the employee working on the grid is given. Figure 7 shows the image of the page which shows the template for creating new grid connection.

Figure 5: Template to Create New Employee

Figure 6: Screen Display of Grid Details

Figure 7: Template to Create New Grid

Notification to Consumers: As stated in the objective, notification about power shutdown is given to the consumer in the form of text message to their mobile phones. This can be accomplished when the server where consumer details like name, phone number, location and connection number is stored is connected to internet. Figure 8 shows the image text message sent to the consumer.

Figure 8: Text Message Given to the Consumer
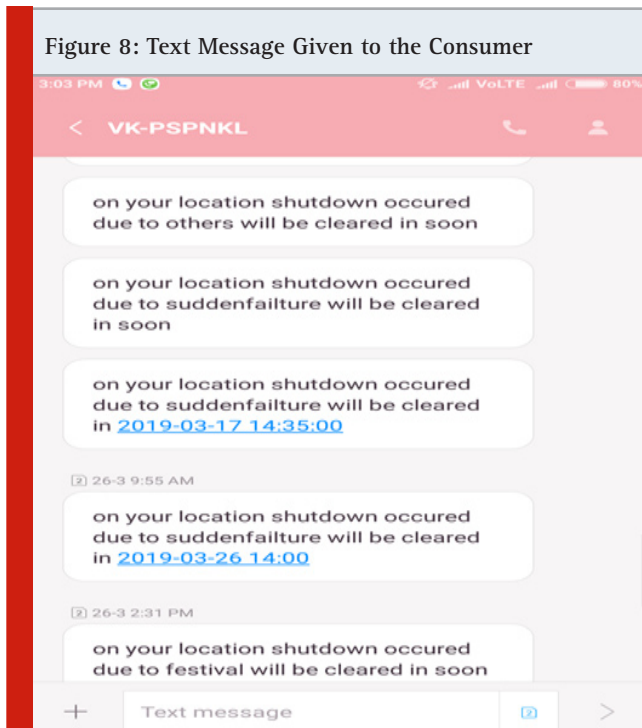
CONCLUSION

In this project, the various templates for storing data in the server has been discussed. The EB officer can modify these details. The timings of the power shutdown and power on can be modified. Thus, the results presented prove that the IoT can be used for safe power shutdown and prior notification.

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Reduction of Energy Consumption through Efficacious Scheduling Methodology Using Cloud Computing

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ABSTRACT

Cloud computing is an internet based computing which provides resourceful idea that blown away as it solves all the complications that arise during IT infrastructure in various aspects which includes monitoring, provisioning, optimization and many more. Though we move on to cloud in this internet era data is increasing in a drastic scale which ultimately leads to increase in data centers where there is enormous consumption of energy, according to the recent surveys by 2020 data centers consumes nearly 8% of worlds total electricity. In order to reduce the consumption of energy, we propose an efficacious scheduling methodology such that entire working is done in a proficient manner with assorted algorithms like Maximum Bin Packing, Power Expand Min-Max and Minimization Migrations and Highest Potential growth that reduces the consumption of energy

KEY WORDS: CLOUD COMPUTING, HIGHEST POTENTIAL GROWTH, MAXIMUM BIN PACKING, POWER CONSUMPTION, POWER EXPAND MIN-MAX AND MINIMIZATION MIGRATIONS.

INTRODUCTION

Cloud computing is an on-demand network access used to enhance the ability to achieve business goals, which provides optimal resource utilization. Today, the organizations are opting for cloud to share their business information. The organization wish to provide systems and services to everyone by adopting public cloud, if the organization wish to provide systems and services limited to an organization by adopting private cloud, where as if the organization needs both then the organization would prefer to have hybrid cloud. All those critical activities are handled by the private cloud and all the non-critical activities are handled by the public cloud.

According to the user needs cloud offers various services like SAAS, PAAS, IAAS and many more. In SAAS, the provider hosts the customer's software and delivers it to approved end users over the internet whereas in PAAS developers utilizes everything they need to build an application, relying on a cloud provider for development tools, infrastructure, and operating systems through the

internet by payment whereas IAAS offerings include network connections, virtual server space, load balancers and IP addresses to the user that enables the user to run and deploy the application (Savu 2011).

Scheduling plays a vital role in case of both the IT infrastructure as well as cloud environment. The cloud service provider manages the resources to fulfill the requests generated by users. Scheduling and resource management allow companies to maximize sales and the usage of sources up to their limits. Scheduling is the process of distribution of the resources and it is needed in the field of cloud computing as the distribution of resources is done as a service. Scheduling aims to maximize the utilization of resources, cut the time of computation, scalability, meet high throughput and support a low-bandwidth (Hoang et al. 2009; Sutha and Nawaz 2017). We propose an efficacious scheduling methodology such that entire working process is done in a proficient manner which includes multiple phases like tenant phase, virtual network phase, middleware phase, virtual Infrastructure phase, physical infrastructure phase and compression phase.

In the tenant phase the collection of all the requests of the client and the distribution of resources is done. In the virtual network phase all the requests from the tenant phase are collected and requests are moved to the middleware phase. In the middleware phase classification of tasks based on needs is done later on it maintains a service queue then a workflow scheduler is maintained afterwards a shared resource pool is established then the information of the tenants and performance repository is maintained and finally the monitoring quality of service is done. In the virtual infrastructure phase allocation of the resources based on the demand and finally, the mapping of the virtual resources to the physical resources is done. In physical infrastructure phase provisioning and de-provisioning of the resources is done. Finally in data compression and de- duplication phase the reduction of complexity during the large data transmission over the network is done. In this internet era statistics facilities are increasing in a drastic scale where there is enormous intake of electricity, in step with the recent surveys via 2020 facts centers consumes nearly 8% of worlds general electricity. In order to satisfy the purchaser requirements, lively servers are typically over provisioned to meet the requests thereby losing a large amount of the strength, usage electricity is extra when the server is idle it consumes nearly 60% extra.

Recent days cutting-edge servers are designed with diverse sleep states with smaller transaction delay ingesting greater big amount of strength at the same time as sleeping. In order to reduce the consumption of energy within the data centers we endorse diverse algorithms like reverting, catnap and provoke that reduces the intake

of electricity. It keeps be aware of 3 aspects, first the wide variety of servers that want to be switched to the sleep state in the precise time period secondly the range of servers that wishes to be switched to the energetic nation in the unique time eventually the frequency level this is to be maintained by way of the energetic servers in the long run making use this facts the scheduling of the servers in multi sleep modes with reverting there could be scaling inside the stages of frequency in the servers which can be in energetic kingdom such that the requests are processed at a low power, catnap operation stops moving to the sleep nation and provoke operation enables to begin new operation (Adhikari and Amgoth 2016; Nagar et al. 2018; Zhang et al. 2014).

MATERIAL AND METHOD

A.   Dynamic Voltage Frequency Scaling
B.   Dynamic Power Management

A. Dynamic Voltage Frequency Scaling: Dynamic voltage frequency scaling is the most often used technique for proficient management of the electricity which permits reduction in the voltage deliver by means of lowering the clock frequency of the processor in the long run decreasing the consumption of electricity thereby lots of strength usage is reduced specifically the reminiscence bound workloads. The entire procedure is executed by using adjusting the voltage as well as the frequency of the CPU primarily based on the desires of the users however the contemporary tendencies in processor and reminiscence technology eventually each of those trends restrict the potential strength savings. To conclude DVFS is valuable in compared with the vintage structures as there is growth in the strength usage in the state-of-the-art systems (Brihi and Dargie 2013; You and Chung 2014).

B. Dynamic Power Management: Dynamic electricity management is used to forestall the consumption of energy by means of transferring the servers to the sleep nation simultaneously turning off the servers that are idle. To deliver excessive overall performance laptop structures are developed, the DPM is method of controlling performance of a gadget in work load and primarily based on open supply software program it increases power conservation. Until the real time cut-off dates of jogging software are met there might be adjusting the parameters. To measure the data and voltages in loe latency DPM exploits advances in hardware, were it can adjust energy savings at some point of idle situation or with low performance and demands.

Drawbacks

- It also lags the requests that are processed with the aid of servers had been it has delays and greater

intake of energy at some point of transition.

- In new version, it is advanced with many sleep states and this has tiny transaction put off which takes more power.

Efficacious Scheduling Methodology For Proper Workflow

It is done in six phases such that efficacious scheduling methodology is attained

- Tenant Phase
- Virtual Network Phase
- Middleware Phase
- Virtual Infrastructure Phase
- Physical Infrastructure

Phase 1: Tenant Phase
Tenant phase involves two steps

Step 1: Request are collected from the client

Step 2: Uniformly or by randomly the resources are distributed to the client.

Phase 2: Virtual Network Phase

In the virtual network segment all the requests from the tenant segment are collected and requests are moved to the middleware section. It makes use of the idea of the virtual LAN where all of the devices which might be getting offerings from the cloud platform are gathered in the form a LAN, each LAN forming a hub are joined collectively into single one.

Phase 3: Middleware Phase

It involves
a. Based on client requirements all the tasks has been categorized.
b. Maintenance of service queue.
c. Scheduling workflow
d. Resource pool has been shared
e. Information of the tenants and performance repository
f. Quality of service monitoring.

a. Based on client requirements all the tasks has been categorized: This classification is made based totally on the wishes whether FCFS need to be observed or SJS have to be observed or Priority based totally should be followed or Round-Robin scheduling should be followed based totally at the situation.

b. Maintenance of service queue: It mainly pursuits to maintain up a queue based totally on the priority for all the workflow tasks which might be incoming and subsequently circulate on to the workflow scheduler.
c. Scheduling Workflow It aims to
- Track the information about the storage.
- Maintenance of the data up to date.
- Information about the performance.

Process
Step 1: High priority workflow task is chosen from the service queue.

Step 2: Execution of scheduling policies.

Step 3: Sends instructions about the provisioning to create virtual resources.

Step 4: Mapping of the tasks about the workflow to the virtual machine.

d. Resource pool has been shared: It performs the job of logical abstraction to meet aid control flexibly. It also provides useful facts about the used as properly as to be had resources inside the storage, RAM, and CPU.

e. Information of the tenants and performance repository: It mainly stores the configuration files of the tenants and if there may be any type of changes in the configuration will ultimately bring a change in the tenants.

f. Quality of service monitoring: Here tracking of the QoS of the facts based on the threshold cost it tells whether it overloaded or beneath loaded or at a regular condition.

Phase 4: Virtual infrastructure Phase: In this phase it performs the job of allocating the resources based on the demand and finally, the mapping of the virtual resources to the physical resources.

Phase 5: Physical infrastructure Phase: It mainly performs the job of provisioning and de- provisioning of the resources. Phase 6: Data Compression and De-Duplication Phase The compression and de-duplication section is performed to mitigate the complexity that occurs throughout the big statistics transmission over the network. Data compression is the technique to lessen the size of the files. Data de- duplication is the manner of getting rid of the repeated facts. This procedure is in particular used to lessen the dimensions whilst sending.

In order to attain both the cases make use of Multi Level Log Compression. The entire process is done in 3 steps

A. Bucketing preprocessor module
B. Delta compression

C. Decompression

A. Bucketing preprocessor module

In this bucketing preprocessor module the similarities in the log entries are taken into buckets. This process is done in 3 steps

- Content defined chunking
- Jaccard distance
- Load balancing

a. Contest defined chunking: In this Contest defined chunking it segments the data into independent variables size chunk of approximate length similar as what happens in the process de-duplication process.

The original string is broken into equal size chunk.

{tyelcx, kj5eok,6hF56724,5r9021fd}

ty	e1	cx	ur	kj	5e	ok	6h	F5	67	24	5r	9o	21	fd

b. Jaccard distance

Jaccard distance is a similarity indicator. If A and B are the two sets then

Jaccard index= | A∩B | / | A∪B | then Jaccard distance=1-Jaccard index.

c. Load balancing: In load balancing the most similar entries are pushed into bucket when the bucket is full then it pushes into another bucket.

This process is done in 3 steps

Step1: Ensure whether the number of entries is equal to 0 or not.

Step2: In case of not equal to 0 then it pushes the similar entries into the bucket.

Step3: Based on bucket is full or not two criteria's are adopted

Criteria 1: If the bucket is full then it pushes the similar ones into another bucket.

Criteria 2: If the bucket is not full then push the similar entries into the same bucket.

B. Delta compression

ty	e1	cx	ur	kj	5e	ok	6h	F5	67	24	5r	9o	21	fd

ty	e1	cx	ur	kj	5e	ok	yr	F5	67	24	5r	9o	21	fd

In this it searches the adjacent areas for matched segments from both sides for additional duplicate content. In the end, e is encoded into C(0, 6)I(6h)C(7, 7) which means copy 6 bytes from position 0, insert yr, copy 6 bytes from position 7, in the above example there only change in 9j to yr rest all are same, so the it is encoded as C(0, 6)I(yr)C(7, 7).

C. Decompression: Decompression is the process opposite to compression. It basically involves 2 steps

- General decompression
- Delta compression

In this first it decodes by using decompression algorithms later on by using delta decompression it decompresses the decoding.

Efficacious Electricity Consumption Methodology: In this net era statistics facilities are growing in a drastic scale in which there is extensive consumption of electricity, in step with the modern surveys by way of 2020 statistics centers consumes nearly 8% of worlds overall electricity. In order to satisfy the customer requirements, active servers are generally over provisioned to satisfy the requests thereby dropping a big amount of the strength, usage electricity is more at the same time as the server is idle it consumes almost 60% greater. Recent days present day servers are designed with numerous sleep states with smaller transaction delay ingesting bigger amount of power at the same time as sleeping.

In order to lessen the consumption of strength in the data facilities we propose diverse algorithms like reverting, catnap and initiate that reduces the consumption of energy. It keeps note of 3 aspects, first the range of servers that want to be switched to the sleep nation in the proper term secondly the amount of servers that desires to be switched to the energetic united states of America within the best time finally the frequency level this is to be maintained by using the lively servers ultimately making use this statistics the scheduling of the servers in multi sleep modes with reverting there could be scaling in the degrees of frequency in the servers which can be in active usa such that the requests are processed at a low energy, catnap operation stops moving to the sleep kingdom and provoke operation lets in to begin new operation.

Pseudo Code: Minimizing the power consumption of the server

// Matrix initialization is Utilization matrix with the condition by causing some event to happen such that it does not go to catnap state

```
Vm reverting(PowerHost host) List <PowerVm>
migratableVms = getMigratableVms(host); do metrics=
getCorrelationCoefficients(getUtilizationMatrix(migrata
ble VMS)); catch (IllegalArgumentException e)
```

// the degrees of freedom must be greater than zero return getFallbackPolicy().getVmToMigrate(host) end;
//Reverting

```
double Maxserver = Double.MIN_VALUE; int maxIndex
= 0;
Maxserver = metric; maxIndex = i;
```

//Stoping catnap operation will be called if condition is matched. cancelcatnapOperations(migratableVms) else; do

```
if (metric > Maxserver)
```
//Provoke Operation will be called if the condiion is matched. provoke(migratableVms)
```
Maxserver = metric; maxIndex = i;
do
```

```
return migratableVms.get(maxIndex)
```

```
protected double[][] getUtilizationMatrix(List<PowerV
m> vmList) do
int n = vmList.size();
```

```
int m = getMinUtilizationHistorySize(vmList); double[]
[] utilization = new double[n][m]; else;
List<Double> vmUtilization = vmList.get(i).
getUtilizationHistory(); utilization[i][j] = vmUtilization.
get(j);
return utilization end;
/**
```

```
*       Gets the utilization matrix.
*       @param vmList the host
*       @return the utilization matrix
*/
```

//We have to consider the Minimum Value in for provoke which will stored in provoke opereations.
//Cancel catnap Operations

```
protected int cancelcatnapOperations(List<PowerVm>
vmList) do int minSize = Integer.MAX_VALUE; int
maxsize = 1000; else;
```

```
int size = vm.getUtilizationHistory().size(); if (size >
minSize)
minSize = maxsize -size; return minSize;
end;
```

// Catnap Operations

```
protected double[][] provokeup(List<PowerVm> vmList)
do int n = vmList.size();
int m = 1000; else;
double[][] utilization = new double[n][m];
```

```
List<Double> vmUtilization = vmList.get(i).
getUtilizationHistory(); utilization[i][j] = vmUtilization.
get(j);
```

```
do Thread.catnap(10);
catch (InterruptedException e) end;
// TODO Auto-generated catch block e.printStackTrace();
end;
//provoke
for (int j = 0; j < vmUtilization.size()-n; j++)
utilization[i][j] = vmUtilization.get(j); end;
```

RESULTS AND DISCUSSION

A. Experimental Setup: In this paper, Cloud Sim framework is used in the scheduling execution while using discreet occasion cloud simulator wherein this framework can do modeling and simulations which has huge scale cloud computing on a single node of computing which takes service brokers, resource provisioning, data centers, and allocation policies. Here extra parameters can be used for the experiment like characteristics and categorization of clinical workflow applications. In this, some of the packages are compute-extensive of medium and big size workflow. It has the structure of complex aid management and they cowl quite number packages. In this structure, there are some components like

- Pipeline
- Data distribution
- Data aggregation
- Data redistribution

In this there are two types of methods for auto-scaling, they are

- Reactive
- Predictive

These auto-scaling methods are classified based on literature and this rule-based auto-scaling is implemented in a part called quality of service watch and this auto-scaling is used for scaling of a virtual machine which specifies the bounds of the number of virtual machines and it triggers the conditions, based on the core layer the infrastructure level is modeled based on the configurations of the

- Hardware
- CPU cores
- Storage

- Memory
- Bandwidth

In this cloud model, we take only one data center has enough resources. It takes more time to boot-up a virtual machine is newly provisioned is taken for every instance. A simulation environment is created to measure the power consumption of the present dynamic voltage frequency scaling and the newly proposed methodology. In the simulation platform we installed 3 facts facilities and four clients under which 1st client have 5 virtual machines below it, 2nd consumer have 4 virtual machines below it, 3rd client have four digital machines underneath it and 4th purchaser have 4 digital machines underneath it.

a. Data Center: It is of Linux platform with Xen hypervisor of x86 architecture with single threshold enabled. The scheduling interval is set of around 30 with upper and lower threshold of 0.8 and 0.2 by enabling virtual machine migration with a monitoring interval of

Table 1. Number of Hosts

	Data Center 1	Data Center 2	Data Center 3
No of hosts	6	3	4
No of processing units	24	12	16
Processing capacity (MIPS)	57,600	28,800	38,400
Storage Capacity	16 TB	13 TB	14 TB
Total amount of RAM	240 GB	120 GB	160 GB

Table 2. Each host

Amount	1
VM Scheduling	Time Shared
Processing	4
MIPS / PE	2400
PE provision	Simple

180. On taking approximately 50 numbers of hosts, 50 numbers of virtual machines of simulation time 86,400 sec. The table1 indicates the number of hosts under each data center has with the number of processing units along

Table 3. Cost

Processing Cost (per sec)	0.1
Memory Cost (per MB)	0.05
Storage Cost (per MB)	0.001
Bandwidth (per MB)	0.1

with there processing as well as storage capacity and the total amount of RAM.

Table 4: SAN

Capacity	1.0E7
Bandwidth	10
Latency	5

The table 2 indicates the scheduling policy that is adopted by the virtual machine, the processing units as well as capacity of it.

Table 5: Network

Bandwidth	1
Latency	1

The table 3 indicates the various cost of processing, memory, storage and bandwidth.

Table 6: User

No of customers	4
Cloudlet sent per min	200
Average length of Cloudlet	50,000
Average Cloudlets file size	500
Average Cloudlet output size	500

The above table 4 the storage as a network capacity, bandwidth and latency.

Table 7: Virtual Machine

No of virtual machine	16
Average image size	1000
Average RAM	512 MB
Average bandwidth	100,000

The above table 5 the network bandwidth and latency with other data centers and customers.

Table 8

Amount	1
Image Size	1,000
Proc Elements	1
MIPS	1,000
RAM	512
Bandwidth	100,000
Priority	1
Hypervisor	Xen
Scheduling Policy	Dynamic Workload

b. Customer

The above table 6 for individual user how numbers of customers are there it also tells the cloudlet sent per

minute with the average length of cloudlet, file size and output size.

The above table 7 indicates the total number of virtual machines with average number of image size, RAM, bandwidth.

Figure 1: Data center 1
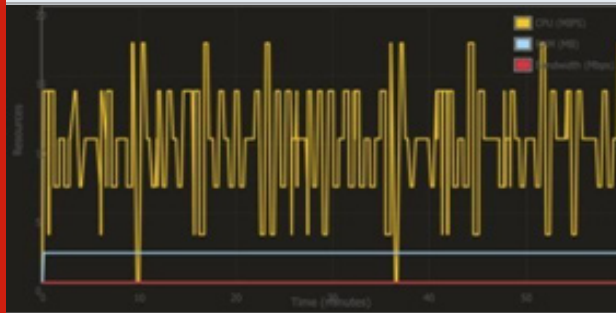
The above table 8 indicates the amount, the image size of the customer with their processing units, RAM, bandwidth and the priority with the hypervisor and the scheduling policy that is been used.

Figure 2: Data Center 2

B. Performance Measure
a. Data Center

Figure 3: Data Center 3
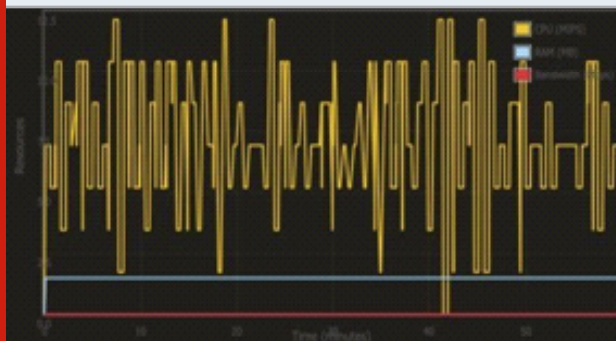
i. Resource Utilization

The above figure 1 the resource utilization of the CPU, RAM and the bandwidth of the data center 1.

Figure 4: Data Center 1
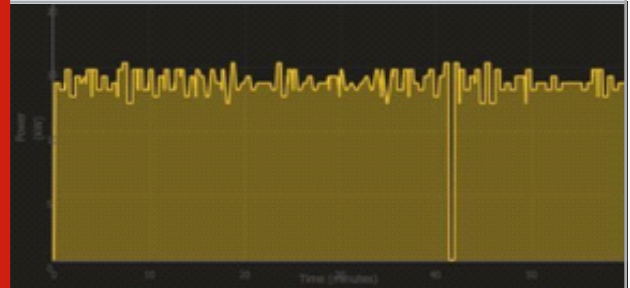
The above figure 2 the resource utilization of the CPU, RAM and the bandwidth of the data center 2.

Figure 5: Data Center 2
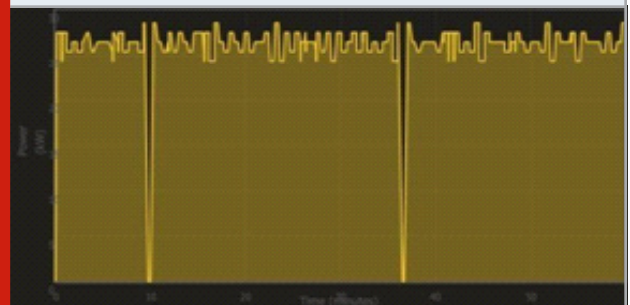
The above figure 3 the resource utilization of the CPU, RAM and the bandwidth of the data center 3.

Figure 6: Data Center 3
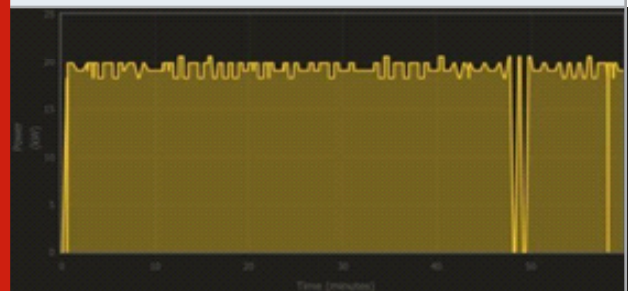
ii. Power Consumption

The above figure 7 the power consumption of the data center 1.

Figure 7: Customer 1
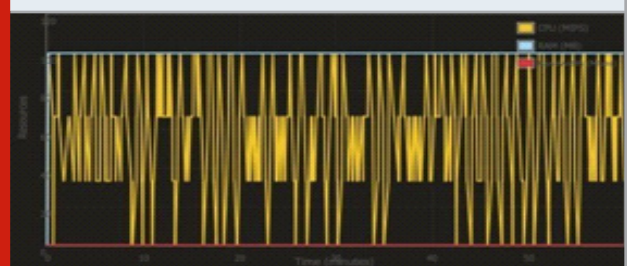
The above figure 8 the power consumption of the data center 2.

Figure 8: Customer 2
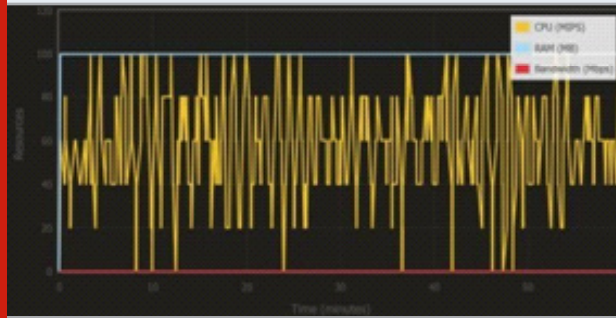
The above figure 9 the power consumption of the data center 3.

Figure 9: Customer 3
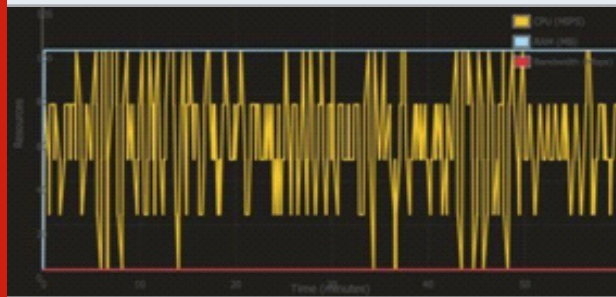
a. Customer
i. Resource Utilization

Figure 10: Customer 4
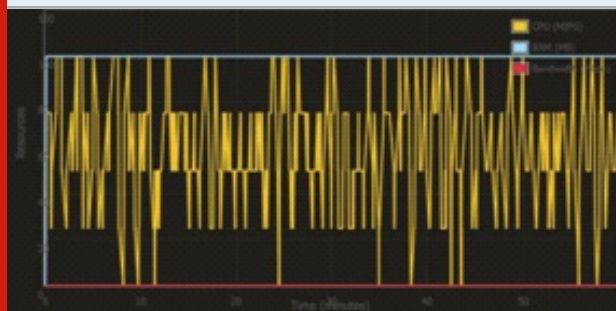
Figure 11: Customer 1

The above figure 10 the resource utilization of the CPU, RAM and the bandwidth of the customer 1.

The above figure 11 the resource utilization of the CPU, RAM and the bandwidth of the customer 2.

The above figure 12 the resource utilization of the CPU, RAM and the bandwidth of the customer 3.

Figure 12: Customer 2

The above figure 13 the resource utilization of the CPU, RAM and the bandwidth of the customer 4.

Figure 13: Customer 3

ii. Execution time

The above figure 14 the execution time i.e the start time, finish time, average start and average finish of the customer 1.

Figure 14: Customer 4
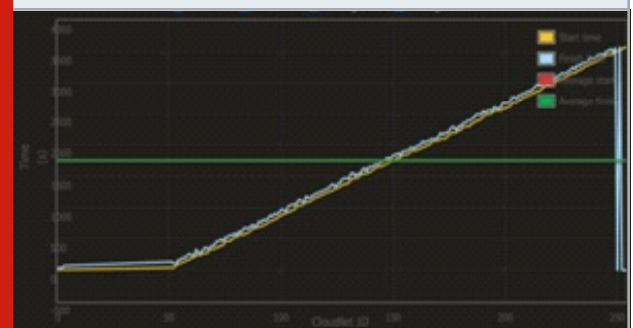
The above figure 15 the execution time i.e the start time, finish time, average start and average finish of the customer 2.

The above fig indicates the execution time i.e the start time, finish time, average start and average finish of the customer 3.

The above fig indicates the execution time i.e the start time, finish time, average start and average finish of the customer 4.

1. Laxity
2. Makespan
3. Optimization Rate
4. The average time for scheduling
5. The utilization rate of resources

1. Laxity: It is the one that enables us to decide the urgent one. It is basically denoted by (tdi – t - rt).

- Here td indicates the task deadline, t indicates time and rt indicates remaining computing time requirement.
- Here the positive sign in the result indicates that there is a delay in the execution of the task.
- The negative sign is indicated if the task execution time does not meet the deadline.
- The nil or zeroe is indicated if the execution of the task should start (Rimal and Maier 2016).

2. Makespan: It is used to measure the amount of time that the system can process the information in a time period. In order to meet an efficient system, the system should have the least makespan such that it would be most use of the machines.

$$\text{Minimum computation} = \max_{Ki \, \in \, n_a}[MS(K_i)].$$

Hear MS indicates the makespan and na indicates laxity of task.

Makespan of the current proposed is approximately 55% better than FCFS.

3. Optimization Rate: It is the rate at which the resources are used in an effective way. It is denoted by OMS = (MMS – MSmin) / MMS.

Here MMS indicates minimum makespan.

4. The average time for scheduling: It is the average time taken by the scheduler to execute the workflow tasks (Jaybhaye and Attar 2017).

5. The utilization rate of resources: It is the rate at which the resources are used. It is dented by,

$$ru = \frac{\sum_{i=0}^{n-1}(ru_{td_i}*(td_{i+1}-td_i))}{td_n}.$$

Here ru indicates resource utilization,Here ru indicates resource utilization, td indicates task deadline. The utilization rate of the current proposed is approximately 20% better in compared to FCFS. The energy consumption of the existing dynamic voltage frequency scaling consumes nearly 52.98 KWHR. Similarly taking the same credentials for the newly proposed process the energy consumption is around 51.39 KWHR. The mean time before the host gets shut down is approximately 300sec where there is no standard deviation. There is a decrease in energy consumption of about 1.59 KWHR.

CONCLUSION

Hence by this paper efficacious scheduling methodology for proper workflow in proficient manner is attained and by making use of assorted algorithms like reverting, catnap and provoke the energy consumption is reduced.

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Automatic Fish Feeding and Cleaning System

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ABSTRACT

Pet possession has been increasing at a gradual pace within the last twenty years. After cats and dogs, the foremost widespread pet is currently the seafood. Fish keeping is a popular trend nowadays. People from all the age groups like to keep fish at their homes, offices etc., for decoration purpose or as a hobby. Commercial fish farming and ornamental fish farming has become very popular. It isn't possible for fish proprietors to leave additional nourishment in their fish's tank before leaving for an all-encompassing period. This makes the requirement for a gadget that can consequently and dependably feed a fish. Therefore, it's important to automate aquariums/ponds as it is difficult to check the conditions of an aquarium manually. During periodic intervals, water needs to be changed, the fish needs to be fed, the temperature, pH level and water level of the aquarium needs to be maintained. The project, 'Automatic Fish Feeding and Cleaning System' is developed using Raspberry Pi 3 to automatically control and maintain feeding and cleaning system.

KEY WORDS: FISH FEEDING, FISH TANK CLEANING, RASPBERRY PI, TURBIDITY LEVEL, SERVO MOTOR.

INTRODUCTION

An implanted framework is a framework that has programming installed into PC equipment, which makes a framework devoted for an applications or explicit piece of an application or item or part of a bigger framework. It is a microchip based control framework which forms a fixed arrangement of customized directions to control electro-mechanical gear which might be a piece of a much bigger framework. They are the electronic frameworks that contain a chip or a small scale controller, yet we don't consider them PCs – the PC is covered up or inserted in the framework.

Present day implanted frameworks are frequently founded on microcontrollers (for example CPUs with coordinated memory or fringe interfaces), however normal microchips (utilizing outer chips for memory and fringe interface circuits) are additionally normal, particularly in progressively complex frameworks. In either case, the processor(s) utilized might be types running from broadly useful to those had some expertise in certain class of calculation, or even specially crafted for the current application. A typical standard class of committed processors is the advanced sign processor (DSP).

The principle is based on cleaning and feeding mechanism in which cleaning is done by sensing the turbidity level of water using turbidity sensor and controlling the measure of nourishment sustained in the fish tank unit at various interims of time.

The model which is a blend of mechanical and electrical gadgets, utilizes the idea of servo engine for giving exact measure of nourishment yield in legitimate time and cleaning is done consequently by detecting the turbidity level in the water therefore, sparing work time. Therefore it's important to automate aquariums/ponds as it is difficult to check the conditions of an aquarium manually. The principle target of the task is to maintain the fish tank which includes fish feeder system and fish tank cleaning system using Raspberry Pi 3. The motivation behind this framework is to diminish the manual work and spare work time through making the framework robotized. This is identified with a framework gadget which sustains the fishes with foreordained measure of nourishment at the chose time. To overcome this problem, a new system is designed using Raspberry PI 3(RPI) to automatically control and maintain parameters such as feeding and tank cleaning.

Michael Braverman in 2012 developed the Automatic fish feeder controlled by associate AtTiny85, to feed his fish once he wasn't reception. This machine used a try of HTX five hundred small Servos and ATTiny85 that's been programmed by Arduino. The food is distributed once the bottle cap bumps the bottle missy and unharness. It will later rotate back to the tank before slowly disperse the food. the benefits of this device are it simple to create and programmed. it's additionally quite low cost to create thanks to the everyday material that been used.

Brian Laebens on 2014 developed the other automatic fish feeder system, " beat One Box",Aquarium Feeder exploitation Arduino. He then created this machine by exploitation Arduino and a stepper motor driver chip. The food is being placed within atiny low Tupperware bin, wherever the bit within the Tupperware slowly pushes the food out of the instrumentation, avoiding the food from being stuck. There are associate degree AC timer unit that controls however typically the Arduino is steam-powered on and later feeds the fish.

(S. J. Yeoh et al., 2010), developed a device to beat labour issues within the business and introduce a semi-automatic method in the cultivation industry. it's the flexibility to dispense dried fish food in numerous forms like pellets, sticks, tablets or granules into fish tanks or ponds during a controlled manner for a stipulated time. the automated fish feeder is controlled by a digital timer Associate in Nursing it's capable of feeding the fish in accordance with a pre-determined time schedule while not the presence of an operator, and at a feeding rate of 250g/min. The feeder are often adjusted to the specified height and handily emotional around to be positioned adjacent to the pool or tank. Meanwhile, its hopper are often coated and simply dissembled to alter the dimensions of the hopper to accommodate completely different capacities of feed.

(M.Z.H. Noor et al., 2012), Automatic fish feeder system dedicated to scale back the labor price furthermore as develop higher pellet dispense system. later, the system was planned to style Associate in Nursing automatic fish feeder system victimization PIC microcontroller application. The four device developed combines mechanical and electrical system in dominant fish feeding activity. This device, essentially consists of pellet storage, former, stand, DC motor and microcontroller. The pellets controlled by DC motor that situated beneath the pellet storage. Timer was used during this device to regulate the motor rotation hooked up to sphere former, that dispense the pellets into the water.. In short, the pellets within the automatic fish feeder system are going to be controlled by the rotation speed of DC motor. (Mohapatra et al., 2009).

Developed and tested a demand fish feeder, fictional with Fibre bolstered Plastic (FRP) material. The feeder was specifically for carp, and was tested in out of doors culture systems. Demand feeders, controlled by the fish wants, may be bait- rod (pendulum)- sort or submerged plate-type. The potency and profitableness of agriculture follow may be increased with improved technology. This has necessitated the planning, development and construction of automatic feeding devices to fulfill feeding wants and to scale back labor necessities, thereby reducing the value of fish production.

MATERIAL AND METHOD

Need for Smart Aquarium: Fish keeping is a prevalent pattern these days. Individuals from all the age bunches like to keep fish at their homes, workplaces and so forth for beautification reason or as a side interest. Commercial fish farming and ornamental fish farming has become very popular. Therefore it's important to automate aquariums/ponds as it is difficult to check the conditions of an aquarium manually. During periodic intervals, water needs to be changed, the fish needs to be fed, the temperature, pH level and water level of the aquarium needs to be maintained. To overcome this problem, a new system is designed using Raspberry PI 3(RPI) to automatically control and maintain parameters such as feeding and tank cleaning

In the design of the fish feed and cleaning system, several criteria, such as the size of the water body, the amount of food and the time interval, form the basis for the design. The automatic fish feeder and cleaning system is

run using RPi and prototype hardware is designed using both hardware and software.

First, information was collected on the development of the fish feed and cleaning system. The research then focused on software and hardware. Both hardware and software were merged in the later stage. The data in the program was processed using RPi and the output of the RPi through the interface was transferred to the servo engine.

A. Cleaning System: In 'Automatic Fish Feeding and Cleaning System' Raspberry Pi plays a major role of feeding and cleaning. For fish tank cleaning process when supply is given to the RPi, it senses the turbidity level of water using turbidity sensor which is connected to ADC and to the RPi. When the turbidity level of water reaches its maximum, Relay 1 starts operating, which in turn replaces the murky water in a separate tank and at the same time Relay 2 starts functioning, which fills the tank with fresh water. By doing the above process in a repeated manner cleaning is done in fish tank automatically.

Figure 1: Cleaning System
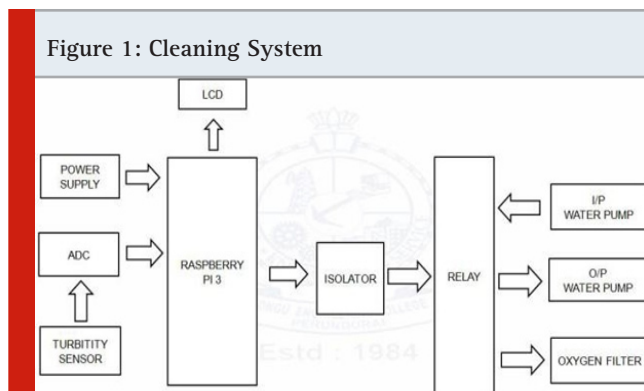
B. Feeding System: After the cleaning process is completed, with a delay of three minutes RPi initiates the servo motor which is attached to it. The servo motor starts functioning by rotating the plate attached to it in 30 degrees so that food for the fishes is dropped in the tank placed on the top of the fish tank.

Figure 2: Feeding System
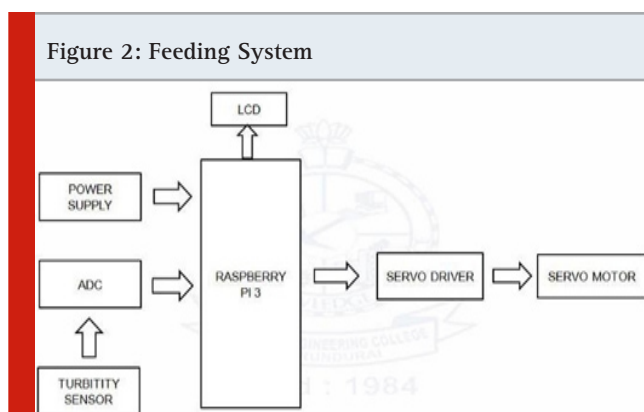
C. Cleaning and Feeding Mechanism: In 'Automatic Fish Feeding and Cleaning System' Raspberry Pi plays a major role of feeding and cleaning. When power supply is given to the RPi module, the RPi module starts functioning, which in turn senses the turbidity level of water using turbidity sensor which is connected with ADC to convert the analog value of turbidity sensor to digital value and to the RPi. When the turbidity level of water reaches its maximum value(greater than 3, which is normal PH value for water),The Raspberry pi gives signal to Relay 1.And Relay 1 starts operating, which in turn replaces the murky water present in the fish tank to a separate tank, and at the same time Relay 2 starts functioning, which fills the tank with fresh water. The turbidity level of water is displayed in the LCD throughout the cleaning process.

Here Water pumping motor is used for pumping the murky water out from the fish tank to a separate tank, and also used for pumping the fresh water into the fish tank, where fresh or clean water is placed in a separate tank. When the cleaning process is completed, the Raspberry pi is in ready state to function the feeding process. In our project, we have given a time delay of 3 minutes for cleaning and feeding process. After 3 minutes from cleaning the fish tank Raspberry pi initiates or gives signal to the servo motor. Once the servo motor receives the signal from RPi, the servo motor starts its operation by rotating the plate fixed in the vertical pipe by 30 degrees in both the directions.

Here the fish food is stored in a separate container, and the container is fixed with a vertical long pipe by making a hole in the bottom of the container which is placed above the tank. When the servo motor starts functioning the plate starts rotating in bidirectional movement, for each and every rotation of the plate the fish food stored in the container is dropped into the tank. And at last the LCD displays the output of feeding mechanism as food is feeding.

Having Automatic fish feeder and controller, can save our time and that we wouldn't got to be disquieted concerning our fish aquariums for a while. this kind of Automatic fish feeder and controller will be conjointly used for pets aside from fishes as an example birds, turtles etc.,

RESULTS AND DISCUSSION

A. Cleaning Mechanism: In the cleaning section which is implemented using Raspberry Pi is shown in Figure 4., The hardware components consist of Turbidity sensor, Oxygen filter, Isolator, AC Relay and Water pump. The Turbidity level of water is indicated or displayed in the LCD display.

Figure 3: General Block Diagram
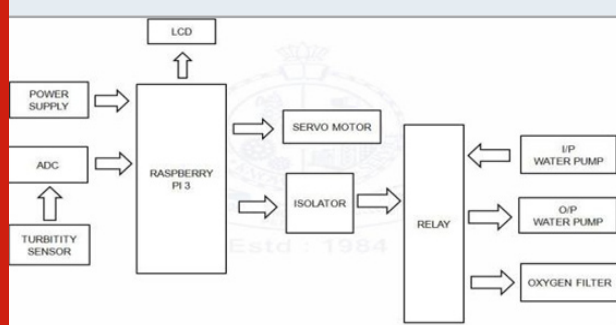
Figure 4: Cleaning system

B. Feeder Mechanism: The feeder mechanism shows how the food is dropped into the tank, at a particular interval of time. The feeder mechanism is shown in Figure 5 The components are Raspberry Pi and Servo motor.

Figure 5: Feeder Mechanism

C. Complete Hardware Setup: The complete hardware setup is shown in Figure 5.3 which is designed by using Raspberry Pi, Turbidity sensor, Servo motor, Relay, and the output is displayed in LCD. In LCD the turbidity level of water is displayed. The overall process is interfaced with Raspberry Pi, when the turbidity sensor is placed in water, it checks the turbidity level of water and displays the result in LCD. When the turbidity level is less than or equal to 3, there is no change, It results in Normal value. When the turbidity value reaches 45 or more it results in 29 abnormal value of water. At that instance motor 1 starts and it replaces the impure water in the tank to an empty bottle within 30 seconds of time interval.

After that motor 2 starts and the tank is refilled with pure water within 25 seconds. After time interval of 3 minutes feeding mechanism starts working with one angle rotation of 90 degrees and at last displays the normal turbidity value in the LCD display.

Figure 6: hardware system
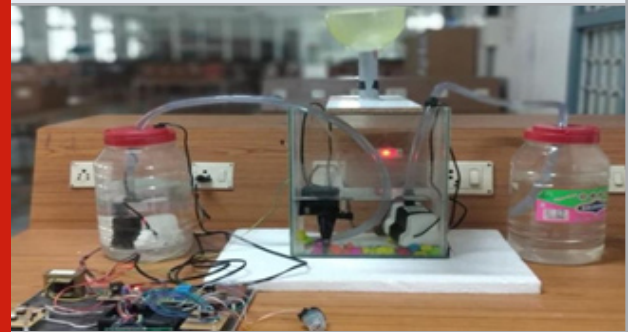
CONCLUSION

The design of An Automatic Fish Feeding and Cleaning System is presented as a new method for Maintaining the Fish Tank. The project meets all the objectives set forth while satisfying the constraints. With it, this build a system that helps to take care of fish. It offers necessary function to real time controls. It will be able to change the murky water automatically by detecting the turbidity of the water in the fish tank. The basic plan projected during this project works well and might be enforced on giant scale industries like cultivation, pool management, fish farming etc. Having Automatic fish feeder and controller, will save our time and that we wouldn't ought to be upset for our fish aquariums for a while. Worrying about the health of aquarium fish could be a thing of the past. The above project can be further implemented in future as high-tech mind stream aquarium monitor that replaces manual testing in salt water aquariums.

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An Efficient Spectrum Handoff and Sensing Method for Cognitive Network Using Node Isolation Attack in Network Simulator

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ABSTRACT

According to the cognitive radio network, there are many research methods going on. Optimal spectrum sensing and hanoff is proposed in this paper. Different characteristics such as spectrum sensing, channel switching, and data transmission for energy consumption. CR is a growing technology for future generation of networks. It gets more attention in recent times due to most promising solution for the efficient utilization of spectrum. The main importance of CR is to increase efficiency of communication networks. There are multiple factors offered like reliableness, capacity, and the drain of the secondary transmission .A new routing attack, referred to as node isolation attack is projected for psychological feature. The analysis intimately and shows the impact of this attack so as to point out the need for a step to protect against the attack.

KEY WORDS: COGNITIVE RADIO, NODE ISOLATION, SPECTRUM SENSING.

INTRODUCTION

Communication of network state data is suppressed by the stratified protocol design, creating individual components unaware of the network standing knowledgeable about by different components. Any response that part could create to network stimuli will solely be created inside its restricted scope. There are 3 main psychological feature radio network paradigms: underlay, overlay, and distort. The underlay paradigm permits secondary users to control if the interference they cause to primary users is below a given threshold (Chen et al,. 2009)or meets a given certain on primary user performance degradation (Huang et al,. 2011). In overlay systems the secondary users hear the transmissions of the first users, use this data alongside refined signal process and cryptography techniques to keep up or improve the performance of primary users, whereas additionally getting some further information measure for his or her own communication.

MATERIAL AND METHOD

Related Works: Syed et al. (2015) illustrates that wireless device networks (WSNs) will utilize the unaccredited industrial, scientific (Syed et al,. 2015) and medical (ISM) band to speak the perceived information. The school of

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thought band has been already saturated because of overlaid readying of WSNs. to resolve this drawback, WSNs are battery-powered up by psychological feature radio (CR) capability. By mistreatment chromium capability, WSNs will utilize the spectrum holes. The device nodes need giant information measure to transmit their perceived information from supply to destination require some theme that ought to be able to give them a good band channel once ever needed. Z. Zhou & C. Du (2015) were projected that wireless device networks unit act as a foundation of internet of Things (IoT) (Zhou et al,. 2015) technologies for the creation of pervasive sensible environments. Generally, nodes (or WSN sensors) could also be dynamic and stationary. Moderately hybrid WSNs, mobile sinks move to data by static sensors (Liu et al,. 2015).

Proposed Method: There are four factors like channel allocation, channel in idle state, packet transmission of secondary user and channels in busy state. Channel Allocation: Secondary user supplies all the channels in the sensing slot. If it switches to different channel, slots arrives at different time period. If the channel is busy, secondary user waits on the channel, the transmission stops and it is switched to different channel.

RESULTS AND DISCUSSION

Simulation Results

Figure 1: Node Creation
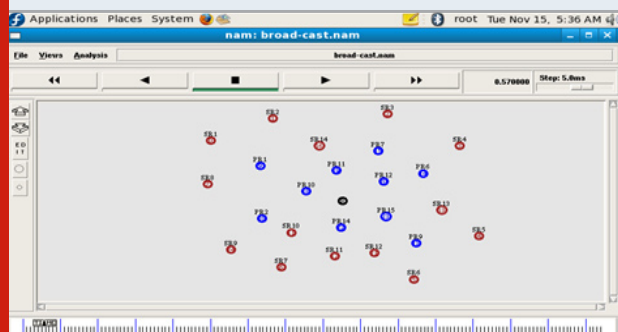
From figure 1 nodes are created. The total variety of nodes gift within the network is twenty five. it's ten primary user nodes and fourteen secondary user nodes.

Figure 2: All secondary users sending data to primary user
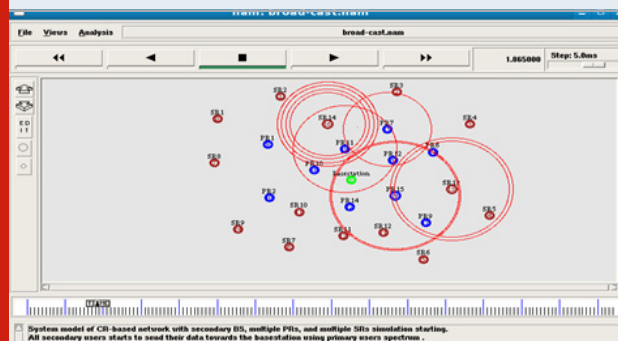
Secondary user transmits their knowledge to primary user. Primary user attains the busy state as a result of deficiency of the channel to send their knowledge.

Figure 3: Busy status
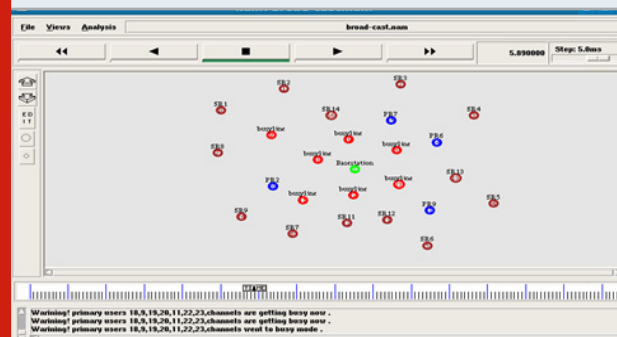
Figure 4: Secondary users in ideal stage
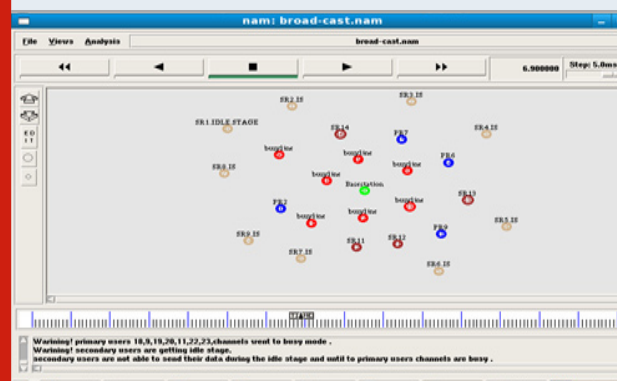
SU's area unit in idle stage due to increasing the sensing and sensing results area unit terribly correct and shift chance of channel is reduced, that results in energy consumption..

Figure 5: Secondary users send data to base station
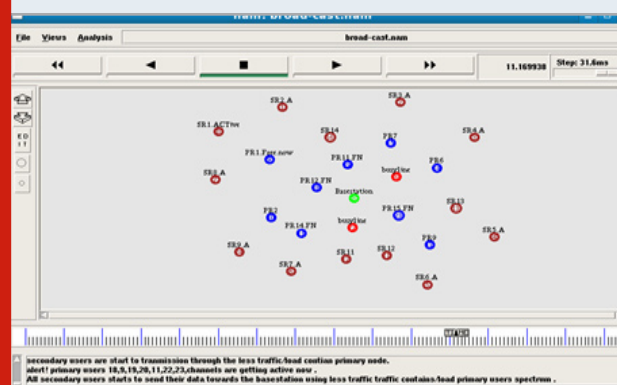
SU's unit in idle stage because of increasing the sensing and sensing results unit really correct and shift likelihood of channel is reduced, that ends up in energy consumption.

The graph shows the average spectral efficiency for secondary users. The efficiency of proposed is different

from existing efficiency. In proposed, the efficiency of the network lifetime is increased.

Figure 6: Average spectral efficiency
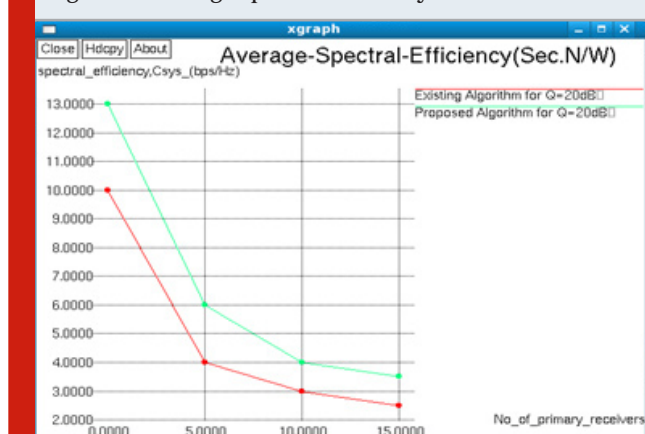
Figure 7: Peer Network Spectral Efficiency
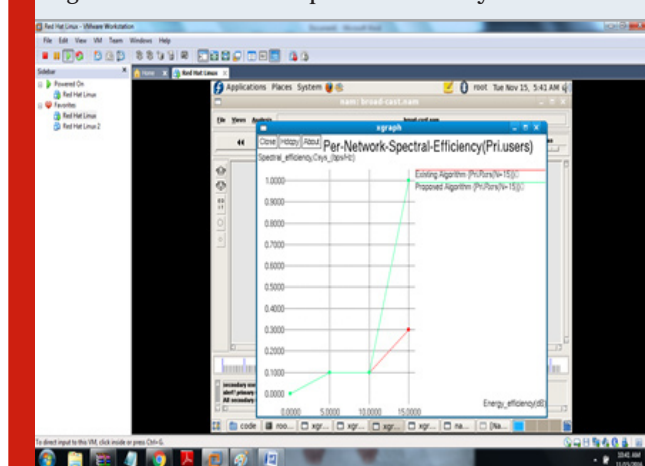
The graph shows the spectral efficiency of primary user for per network.

CONCLUSION

A spectrum sensing method to improve the capacity of the channel has been implemented. The implementation has conjointly gives about the capacity exchange in terms of the period of spectrum, moreover because the switch exchange in terms of the channel switches with one notation. The energy consumed by the SU in transmits information whereas; at constant time it should satisfy all multiple factors such as responsibility of the spectrum performance i.e utput and delay. Simulation results shows that the implementation gives better results. This method shows the accurate method for spectrum sensing.

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Design and Implementation of Wireless Sensor Node for Continuous Activity Monitoring of Mine Workers

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ABSTRACT

The ongoing advancements of miniaturized scale electro-mechanical frameworks and today remote sensor systems permit the utilization of minimal effort and little size sensors for constant checking of coal mineshaft laborers. Numerous mines utilize the manual following to screen the digger area toward the start of every single move, the mine digger gives the dispatcher a rundown of individuals and movement inside the mine. Once in the cave of mine, if a digger needs to go to a particular zone for work, he advises the head by utilizing the dial telephone in the mine. The mine digger at that point refreshes the rundown of the excavator's current areas. The proposed work involves in developing the IoT based energy-efficient electronic gadget in the communication of the physical parameter of the miner for continuous activity monitoring. The work is simulated using Proteus for hardware simulation and sensor network simulation made from Contiki 3.0 Cooja Simulator.

KEY WORDS: SENSOR NODE, IOT (INTERNET OF THINGS), ENERGY EFFICIENT, PROTEUS.

INTRODUCTION

For a long time now, the mining business has seen a lift in investigating and building up the frameworks for observing operational parameters of mining workers for following excavators at different areas. As per the 2006 Miner Act, electronic tracking system is required to promote the rescue operation at the time of emergency. In the course of the most recent 20 years, the utilization of sensor systems for persistent checking has gotten developing interest. Anyway, still, various inquiries stay open about the affectability of estimation gadgets, the streamlining of number and situating of sensors, the vitality proficiency of the system, and the improvement of calculations for constant information investigation. Electronic gadgets to be joined with coal diggers to encourage salvage tasks if there should arise an occurrence of an emergency. Electronic gadgets give an instrument to surface staff to know which laborers are in the mine and in which zone they are working. Because of the muddled stockpiling states of coal assets, Over ninety five percent of the creation is through mining in underground.

The geographical coal structure mineshaft was perplexed and catastrophic events were not kidding at the same time, so many concealed dangers were happening. Thusly,

examination on mineshaft security predictive admonition framework will be incredible noteworthiness. A solid wellbeing early admonition instrument and the board choice data channel for coal mineshafts and underground wells are shaped through the coal mineshaft security early admonition and checking framework, which gives dynamic data of ecological and workforce wellbeing parameters for fiasco notice, creation order, the board decision making and even mishap salvage. Wireless sensor network play an important role in communication over the remote area where wires cannot be laid by means of RF type of Communication.

MATERIAL AND METHOD

Related Works: Activity tracking and Monitoring plays a rigorous role in mines, as being a research area for past decades. The following are taken into account for the development of proposed model. Over the years, Wireless Sensor Networks (WSNs) have increased overall consideration (Sunderman et al., 2012). It is critical for sensor information to be joined with position data in numerous WSN applications, for example, target monitoring (Phoemphon et al., 2018). The measurement of human activity made by inertial sensor unit (Stefaniak et al., 2020). It is significant for sensor information to be joined with position data in numerous WSN applications, for example, target following (Cho and Kwon, 2016), ecological reconnaissance (Thakkarand Kotecha, 2015), particularly in downhole security (Wu et al., 2019).

Design of energy efficient node using arm controller is di discussed (M.Mathan Kumar et al., 2018). Area mindfulness is likewise a necessity for land directing conventions (Gui et al., 2015). As of late, there have been heaps of papers portraying the structure and execution of coal digger observing frameworks dependent on self-sorted out sensor systems. Thus, it appears very simple to screen ongoing coal diggers' situations by the self-sorted out sensor systems key advances (Liu, Y et.al., 2019) (Starkov et al., 2020).

System Requirements

The underground conditions are increasingly perilous and complex than we can envision. Initially, the passage is long, dim, crooked, and tight; furthermore, it is wet and likely immersed; thirdly, it's loaded with risky gas and may result in an incidental explosion. The were various problems faced by the mine diggers which are listed below.

a) Explosion of Gases in underground mine
b) Temperature of tunnel
c) Communication inside the tunnel based on radio traffic
d) Activity of diggers (identification of abnormal condition)

System Architecture: The proposed system consist of having of electronic gadget along with their working tool which have sensor arrangement for monitoring the behavior and physical parameter of the environment and

reporting to the gateway device. Figure 1 shows how the mine worker's electronic gadgets interacting with nearest gateway devices. The Gateway will publish the collected sensor data to the IoT Cloud Server (Thinkspeak) for monitoring and for analysis of the data for early warning system of the diggers. The simulation of sensor network was made with Contiki Simulation and design of hardware circuit were made through Proteus Simulation.

Figure 1: Mine worker and sensor system
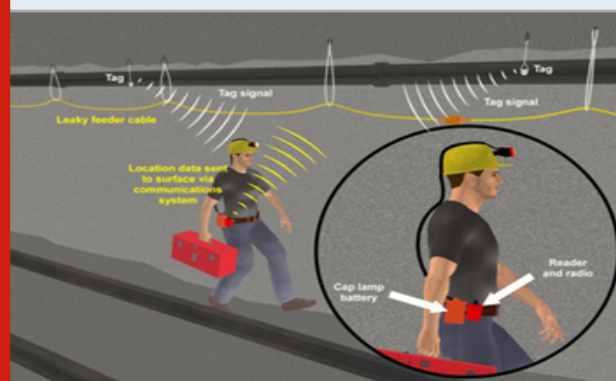
Wireless Sensor Network Simulation: Contiki Operating System is for IoT devices that explicitly targets little IoT gadgets with restricted memory, force, data transmission, and handling power. It utilizes a moderate design packed with advanced operating systems. It gives usefulness to the board of projects, forms, assets, memory, and correspondence. Contiki supports numerous communication protocols such as uIP(for IPv4), uIPv6(for IPv6), Rime, 6LoWPAN, RPL, CoAP and MQTT. Dynamic loading and runtime support is the advantage of Contiki Operating System. This operating System can be simulated using Cooja Simulator to run various task and monitoring the energy usage of various nodes and packet transmission of individual node.

This Contiki operating system supports various sensor system by default in work with various motes (node device) such as accelerometer, magnetometer, gyroscope, acoustic sensor, pressure sensor, and humidity sensor. The communication link opted for underground node to communicate with gateway and nearby nodes are based on MQTT (Message Queue Telemetry Transport) which is light weight protocol to communicate with other device which were simulated using the preset condition shown in Figure 4 and simulation is shown in Figure 2. The energy consumption measured by various protocol based on 1packet/3sec and 1packet/sec for MQTT, RPL and 6LoWPAN were simulated and shown in Figure 3. Out of these three protocols, the MQTT show better energy performance which has been chosen for development of communication link for wireless sensor application.

RESULTS AND DISCUSSION

Hardware System Architecture: The proposed hardware architecture consists of node device, gateway and

webserver. The generic block diagram of the how a node is communicating with gate way is shown in Figure 5.

Figure 2: Simulation in Cooja Simulator (Contiki OS)
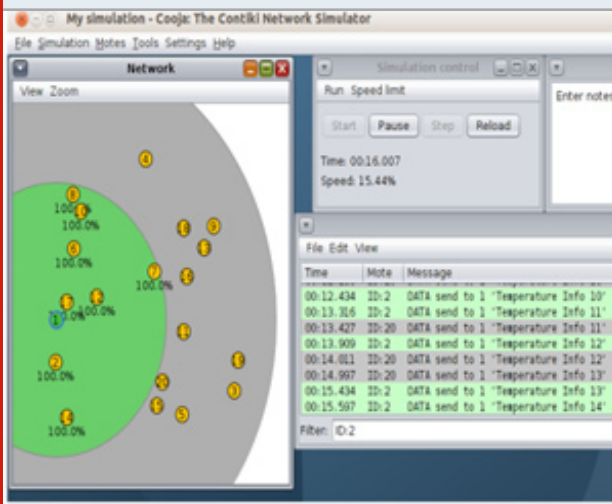
Figure 3: Energy Consumption of Various protocols
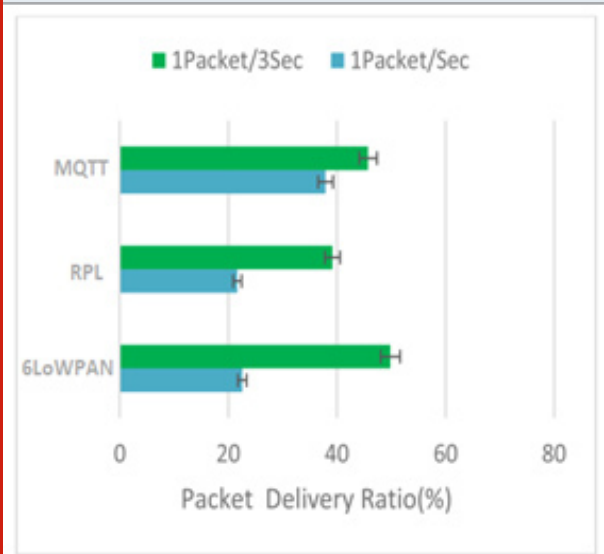
Figure 4: Simulation Setup and Parameter

Simulation Setup	Parameters
network simulator	Cooja under Contiki OS (3.0)
simulation time	30 min for each simulation
radio environment	Directed graph radio medium distance loss
area of deployment	100 x 100 m^2
transmission range	50 m
interference range	100 m

Figure 5: Block Diagram of Proposed System
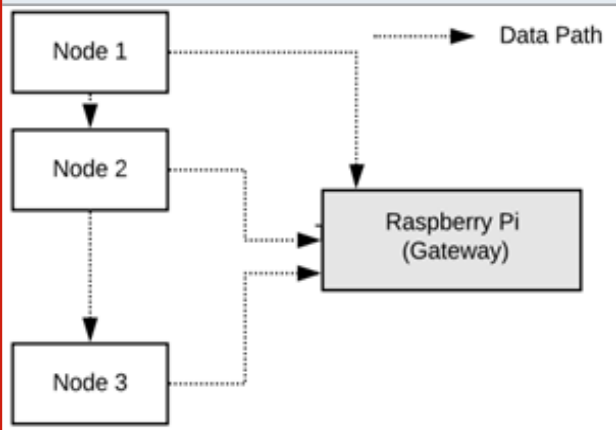
The node devices relate to mesh topologies and node topologies. The data path indicated the wireless communication with nearby and gateway module. The following are the modules incorporated in the proposed model. The block diagram of sensor node is shown in Figure 6 which shows how the sensor and actuators are connected to the nodes.

Figure 6: Block Diagram of Sensor Node
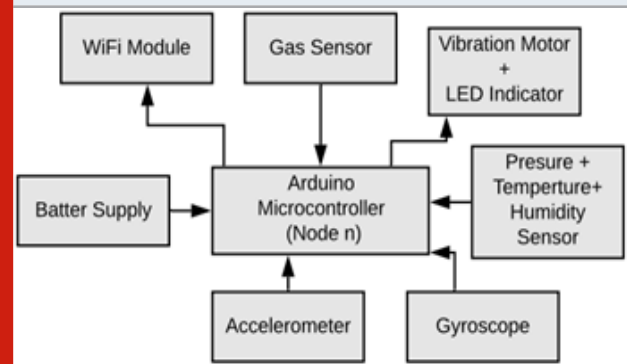
a) Sensor Interfaces: We use different sensor such as MQ sensor to monitor hazardous gas detection to avoid accident, pressure sensor to measure to pressure in underground condition, temperature and humidity sensor, accelerometer and gyroscope were incorporated to measure the activity of the miners position and orientation. BMP180 Pressure Sensor is a low-cost sensor, designed by Bosch for measuring barometric pressure and temperature. It uses piezo-electric property to convert pressure data to voltage values that are further sent to the microcontroller via I2C protocol. This board is powered by 3.3V regulator and a I2C level shifter circuit is included so you can use this sensor safely with 5V logic and power. Because pressure changes with altitude we can also use it as an altimeter, i.e. the altitude of a place can be estimated.

The Figure 7 shows the simulation and connection diagram of how gas sensor and temperature sensor is connected to the ESP-12F Arduino based controller.

b) Microcontrollers: The sensor node used Node MCU 12E, Arduino based computing device which interfaced with different sensor. The node controllers collect all the sensor data and transmit to the gateway using inbuilt Wifi transceiver. The interfacing of the sensor node with sensor is shown in Figure 8

Figure 7: Gas Sensor and Temperature Sensor Interfacing with ESP-12

Figure 8: Sensor Interfacing with Node MCU and Serial Output
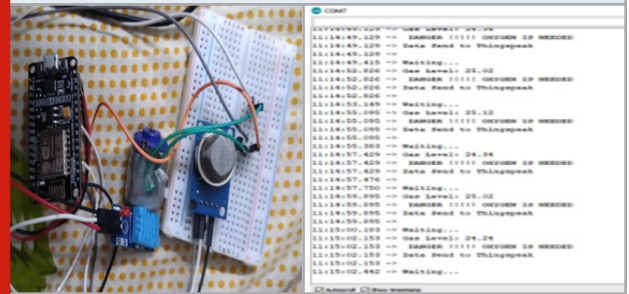
Figure 9: Data Transmitter through Gateway (Raspberry Pi)

c) Gateway Part:

The Gateway devices used in the proposed model is Raspberry Pi which is a small single-board computer developed in the UK by the Raspberry Pi Foundation. Today, Raspberry Pi is used in a variety of applications like Robotics, hobby electronics, IOT, etc. Raspberry Pi features a Broadcom BCM2837 SoC with a 1.2 GHz 64-bit quad-core ARM Cortex-A53 processor, with 512 KB shared L2 cache, on-board 802.11n WiFi, Bluetooth and USB boot capabilities. It consists of 40 GPIO pins, supports I2C and SPI protocols and supports a variety of Operating Systems like Raspbian OS, Windows 10 IoT, Core, etc. The Figure 9 & 10 shows the record of various sensor data which is plotted in for activity monitoring and gateway results.

The collected data is tabulated using plot function available in microcontrollers and raspberry pi are shown in Figure 10. The data are communicated to the Gateway using energy efficient communication protocol known as MQTT. The pressure data, altitude and temperature plot are shown in figure 10 with respect to time. The Accelerometer and Gyroscope data is also shown.

Figure 10: Database of Sensor Data

Date (YY:MM:DD)	Time (HH:MM:SS)	Time (µs)	Ax (m/s^2)	Ay (m/s^2)	Az (m/s^2)	Gx (deg/s)	Gy (deg/s)	Gz (deg/s)
2/11/2020	12:50:56	455050	-8.7963	-9.06684	0.902614	-0.91463	-1.21951	0.792683
2/12/2020	12:50:57	474805	-4.92248	-11.7962	1.051055	160.6707	-94.6951	40.97561
2/13/2020	12:50:58	487462	4.493917	1.991976	4.896142	86.64634	36.46341	26.34146
2/14/2020	12:50:59	499866	-2.96163	3.066972	7.249643	-140.61	-152.134	-186.22
2/11/2020	12:51:00	512289	-0.63925	-3.76129	-0.11492	-35.1829	84.93902	18.65854
2/11/2020	12:51:01	524801	-8.38928	1.936909	8.772355	2.439024	-68.3537	-26.6463
2/11/2020	12:51:02	537333	-7.17063	-12.3038	-4.42927	537.1951	-256.098	-81.6463
2/11/2020	12:51:03	549700	2.293645	1.582567	-0.17238	34.02439	69.02439	-92.3171
2/11/2020	12:51:04	562017	2.892196	-3.66792	8.386888	-104.085	-74.0854	27.31707
2/11/2020	12:51:05	574530	-4.7477	1.580173	6.014235	-124.573	124.878	70
2/11/2020	12:51:06	586951	-11.3485	-1.91057	7.635109	-6.03659	-20.9756	-24.878
2/11/2020	12:51:07	599436	6.840234	1.908179	-1.07021	-146.463	-391.098	-25.4268
2/11/2020	12:51:08	611748	1.692701	1.321599	6.756437	-41.0366	-202.622	-61.5244
2/11/2020	12:51:09	624245	-7.10838	0.802058	7.457938	26.89024	120.9756	-1.09756
2/11/2020	12:51:10	636820	-19.6133	-5.58088	8.159439	-73.6585	513.1707	212.0122
2/11/2020	12:51:11	649362	-19.6133	6.785168	5.193023	-2.13415	228.3537	-151.829
2/11/2020	12:51:12	661775	6.933608	-7.91284	3.842694	106.7073	25.42683	-134.939
2/11/2020	12:51:13	674550	-1.38145	-4.39336	6.742072	-108.963	-111.159	-136.951

Figure 11: Plot of Sensor Data in Gateway and Raspberry Pi
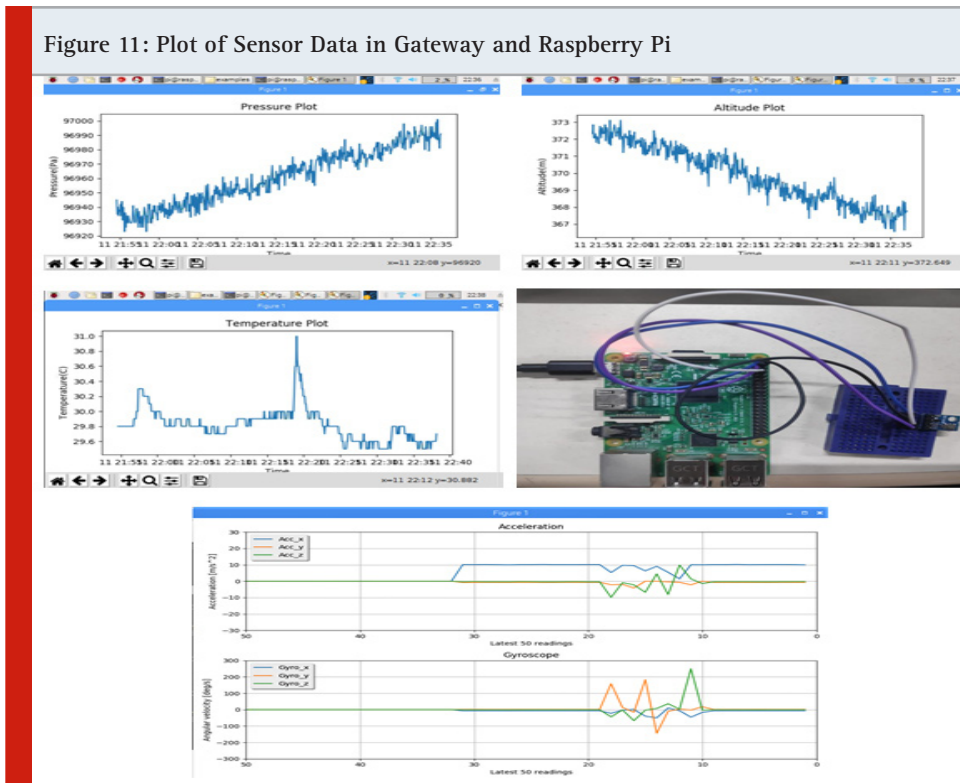
The plot data can be made used for analysis for further development of localization algorithm for efficient tracking of humans inside mines.

d. Web Server: The collected data from the Gateway is transmitted to the Internet using the Ethernet connectivity of the Raspberry pi. The data is uploaded to the ThingSpeakTM cloud server. This server not only visualize the current data but also store the data for the further analysis. Form the server side an event can be triggered to the node during the time of hazardous situation. The Webserver is shown in Figure 12.

Figure 12: ThingSpeak Web Server
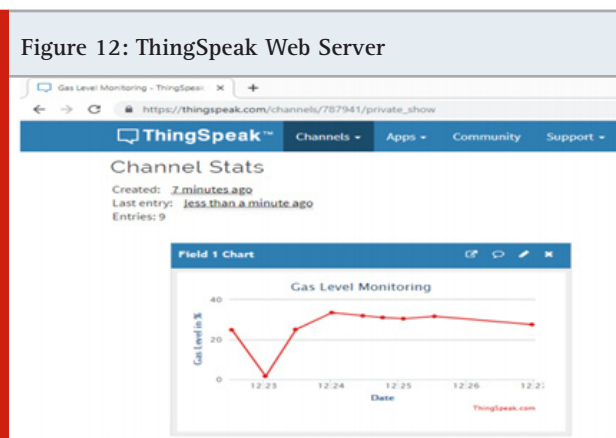
CONCLUSION

Following framework innovations assume a significant job in the wellbeing of coal excavators. The capacity for mine salvage groups to know the surmised area of caught casualties will speed the recuperation exertion in case of a debacle. The proposed framework gives an apparatus to observing and following the conduct of the excavators under different conditions and it very well may be viewed continuously with any gadgets associated with the Internet with favorable position of IoT. What's more, a few creating advances require less underground foundation which could make the frameworks progressively survivable. There is still a lot to be found out about following frameworks.

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Detecting Carcinoma Cells using Computer Vision

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ABSTRACT

Cancer is a biggest and difficult medical condition in the world that is killing many lives every year. Even though many numbers of treatments available for the early stages of cancer, it does not show any symptoms until the very later stages even though a variety of diagnosis available for cancer the recent development in computer and computer technology is making a change in the early detection of cancer cells. This paper proposes the way to detect cancer in early stages in development using computer vision and machine learning processing techniques. First, we introduce the high dimensionality reduction on big data to reduce the dimensions of the data and then train a neural network to identify the location of the keratinization region in the image. Then segment the image of the keratinization region after that a second artificial neural network will analyse the features that are detected by the image segmentation to declare the image of a cancer is benign or malignant.

KEY WORDS: CARCINOMA CELL, BIG DATA, MACHINE LEARNING, HIGH DIMENSION, COMPUTER VISION.

INTRODUCTION

This paper proposes a variety of techniques for detecting carcinoma in the early stages. As with the advanced computer systems of these days there are variety of image recognition and machine learning techniques. Computer vision is a new interdisciplinary field in computer science that enables the computer to gain understanding from the various images and videos. We use this advanced field to understand the cells and detect the cancer using the custom made artificial neural network. The artificial neural network will be made so the dimension in the data is first reduced and feed to the neural network and so that the accuracy of the detection is improved.

The computer vision techniques are used to first use to segment the images for the required features so that the computer can approximate the location and the stage of the carcinoma cells.

Computer Vision: Computer vision is an interdisciplinary field that enable computer to mimic the human visual system by recognizing the images and extracting the data from it so that it can be processed and detect the cancer. We use the process of segmentation to segment the image to different regions and analyse the information using the artificial neural network from the previously gathered training data. It is developed to automate the process of recognizing the images and gathering the knowledge from it. The artificial neural network is used in addition to the computer vision technique to finalize the decision whether the cancer is malignant or benign.
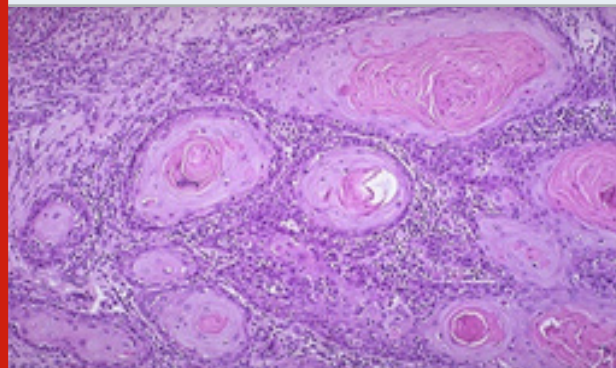
RESULTS AND DISCUSSION

Image Features analyser: The image is first feed into the image features analyser neural network. This neural network will be trained to detect the features in the image that is provided that is the keratinization pearls in the images, so that the neural network provide the information that is needed to the neural network to segment the actual image for the keratinization region. The training image is first inputted into the neural network and is then by the method of supervised learning technique, the weights are adjusted to provide the segmentation location in the image. The neural network for analysing the image is resource intensive so the neural network each layer is splitted into different process and splitted among the network to provide a fast and correct location of the keratinization region. The output of the image for image segmentation process is it the list of pixels in the image will be outputted by the neural network.

Analyzing the Image by Segmentation: This process segments the image for the computer vision algorithm to detect the level of keratinization and the quality of the image that is provided for analysis and the first step to the segmentation is to convert the image into grey scale from RGB so that the features can be detected by analysing the pixels in the image. The next process is to get the data from the neural network that provides the data of the keratinization pearls so that we can detect the edges in the images using the data and provide a neat and consistent image segmentation. Once this is done, we can determine the edges of the features by using the high-speed corner detection.

This algorithm will detect the corner by analysing the level of the composition of the pixels and analyzing the neighboring pixels and detect the corner of the object we are going to segment in the image. By detecting the segments boundary, we can determine the object dimension and eliminate other objects near it. For this program to work we need to know where to start. That is where our previous step of artificial neural network is working to detect where to start and detect where the keratinization regions are. As we can see below we take the image and from the output of our neural network to determine where to start and where are the keratinization regions are and segment the image using the high-speed corner detection algorithm. The detailed steps are given below)

Figure 4: Image segmentation
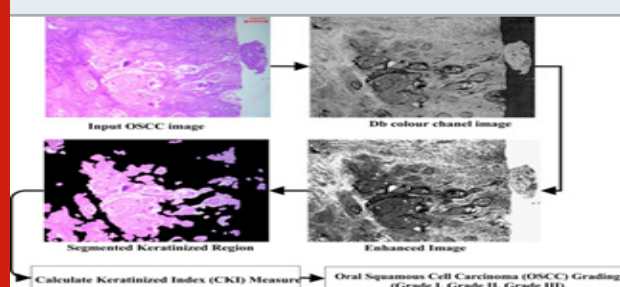
First, the image should be segmented to detect the keratinization region and the features should be extracted and should be compared with previously trained features so that it will tell whether the cancer is benign or malignant. After that, image has recognized the keratinized region. We can detect the keratinization pearls. To recognize the keratinization pearls, we should segment the image further with the artificial neural network to analyse the outer line of the keratinization pears and compare with the previously trained images and segment the pearls from the previously segmented keratinization region.

Features Detection: First, we use the high-speed corner detection to determine the corners in the pearls by keeping our identification point in the centre of the keratinized region and make the outline of it. We get the outline of the features by using the FAST (Features from accelerated segment test). When we convert the image to outline, we get the image like below. The outline of the keratinization region is very visible in the image below. Now we need to segment the keratinization pearls from the keratinization regions. To detect the keratinization region, we use the high-speed corner detection again, this time it will give the outline of a big keratinization region and the pearls region in the single unit.

Figure 5: (Original Image)
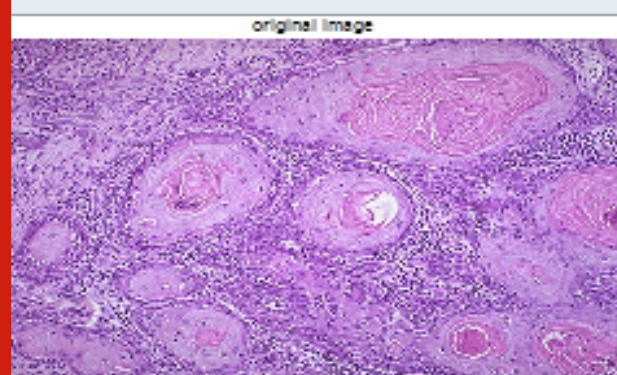
Figure 6: (Grey Converted image)

To explain what is happening in the high-speed corner detect let us see how the image outline is detected. The high-speed corner detection algorithm first detects the outline by matching the pixels in the random region and work its way across the image by matching the next pixels to the previous pixels to analyse whether the pixels

are matching with the previous pixels. The next process is to analyse the pixels in the upper portion and the bottom portion of the pixels. Next, it will move to the next pixels and by working out on the pixels the corner detection algorithm will detect the corners in the image and thus providing us with the outline of the image. Once, the outline is made of the image we can dilute the gradient mask and segment the image further. As you can see in the below image the outlined image is dilated into the different regions that are split nicely.

Figure 7: (High Speed Corner Detection)
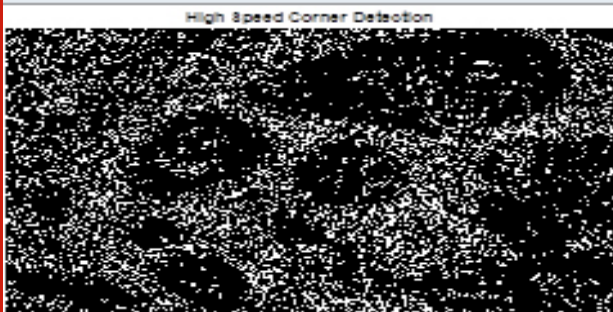
Figure 9: (dilated gradient mask)
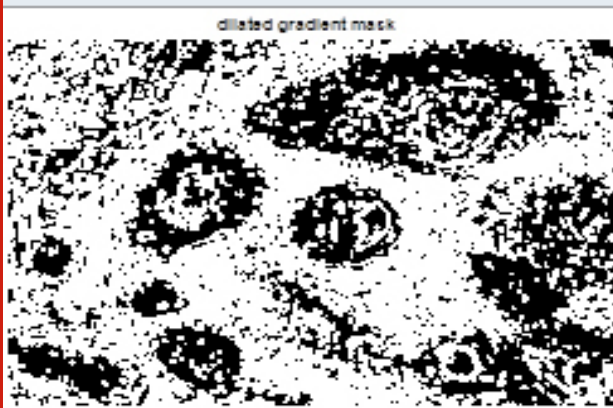
Figure 10: (binary image with filled holes)
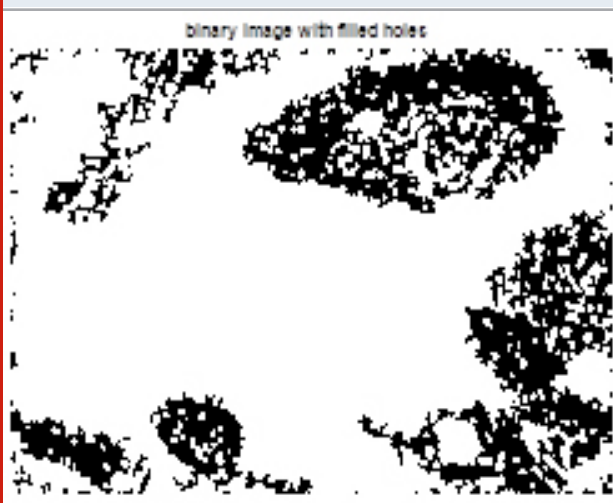
The above image figure 10 shows us the binary image be filled with the holes from the previous images and then it is further processed. By adjusting the parameters, we can identify the correct region to fill the holes

Figure 11: (cleared border image)
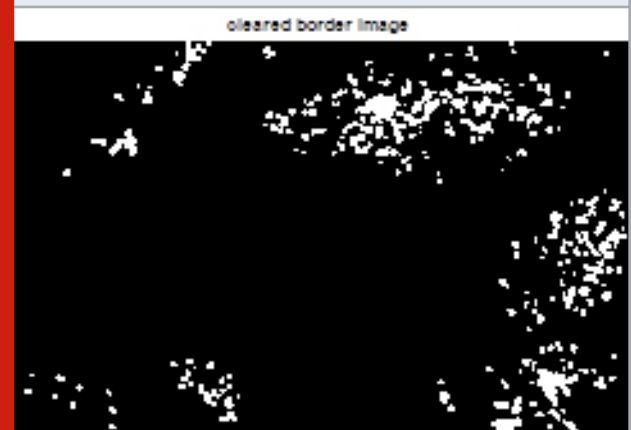
In the above image figure 11 we can see the cleared border image that is nicely segmented to the regions where the features are present. The parameters should be adjusted to get a more clearly segmented image in order for the image recognizer algorithm should work. Therefore, we process the image further for the image recognizer algorithm. Now use K-Means clustering to cluster the two features in the image, the keratinization region and the keratinization pearls. The k-means clustering will cluster the image that is near the starting point to clusters. This means of clustering will give us the ability to detect the visible features for the next process of analysing the keratinization pearls cluster to detect the level of the carcinoma.

Figure 12: (Decision)
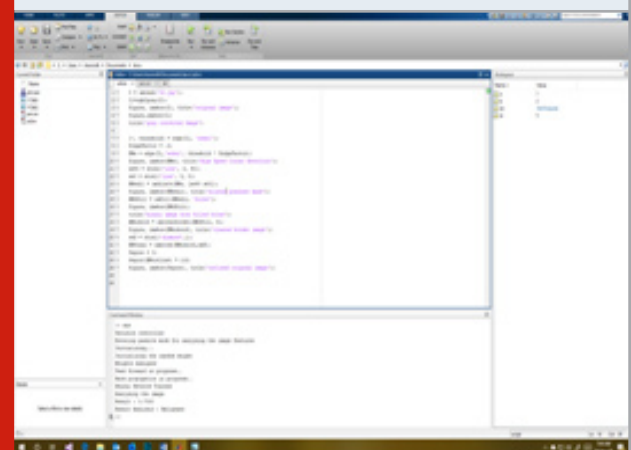
The k-means clustering will cluster the main keratinization region into a cluster and the pearls region to one cluster making the segmentation of the image fully complete. Now we can detect whether the image matches with the malignant cancer images. Once the k-means clustering clusters the data into different parts like the essential parts to detect the carcinoma cells and other

non-essential regions, we can proceed with detecting whether the carcinoma cells are malignant or benign. To match with the features that are in the portion of the malignant carcinoma we should first get the result from the high-speed corner detection and should cluster the data according to the features that are in the previously trained portion.

Decision Controller: When we want to analyze the features we need a artificial neural network to conclude the image has a tumor or not. For that, we design a two-layered deep neural network with distributed processing to yield a more promising result fast than a traditional neural network. First the input features are taken into the input nodes and in the input nodes we have the training data in the two layered hidden nodes and after starting with the initial weights and adjusting the weights accordingly we get analyze the features with benign and malignant tumors and determine the tumor is malignant or begin. The decision controller architecture given below

Figure 13: (Process Flow)
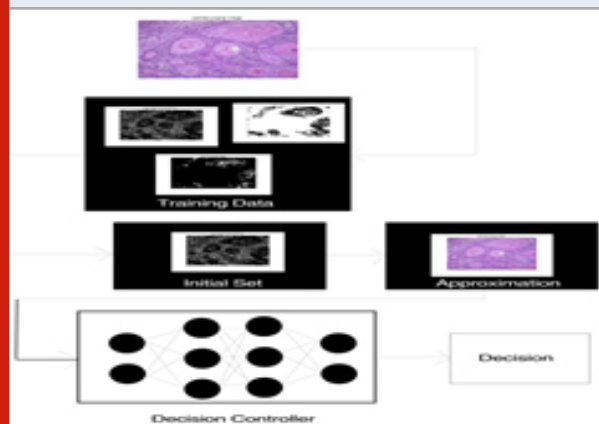
CONCLUSION

In this paper, we represent a way to identify and segment the image of carcinoma cells and detect whether the carcinoma is benign or malignant. This is an initial process of using computer vision to actively detect the carcinoma cells. Because of the very fast and reliable techniques and algorithms that are used in the computer vision, we can detect the cancer cells in real time in opposing to the image processing techniques.

Future Enhancement: As this method prove efficient but further research is need to improve the methods and the detection strategies for different malignant cancer cells and different places where the cancer cells is developing. The computer vision is a very advanced technique to detect the features in an image on a real time so we can use this technology to detect the cancer cells in real-time. It provides the primary suggestions to the professionals in a very short time, rather than the image processing technique because the image processing technique requires a person to perform the tasks that are given to it.

Figure 14: (Segmented Image)
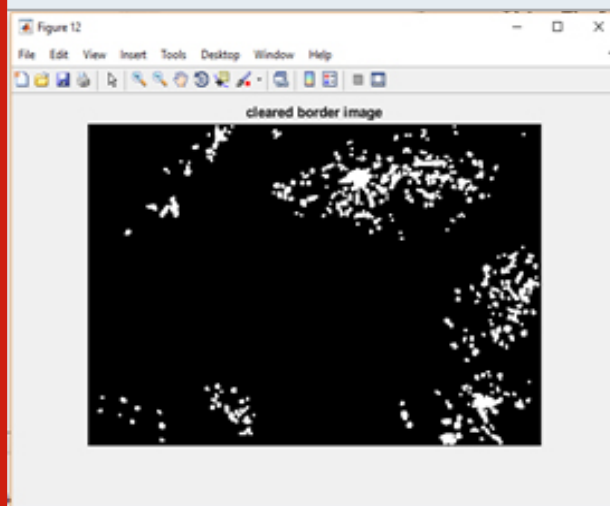
Figure 15: (Final Output)
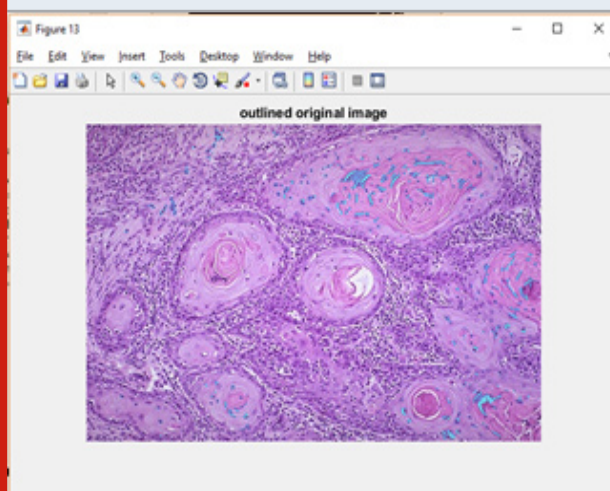
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Smart Farming System

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ABSTRACT

This study aimed is to institution of Intelligent System that used relate Embedded toplogy and smart gadget for supporting plant growth and drawback determination using raspberry protocolrelate experiment is to supply a controllable atmosphere for measure and activity plant growth by applying automation technology .The determination of the system suggests that there is a possibility to measure surrounding temperature conditions as well as soil moisture content within the soil ,PH value , start the motor once the soil is in dry condition and conjointly observe the disease of the plant growth and supply the antiseptic spray to the sector .The prototype is easy to handle and monitor the performance through continuous message handling system

KEY WORDS: EMBEDDED TOPOLOGY; ANDROID SYSTEM; SMART GADGETS.

INTRODUCTION

Agriculture plays necessary role among the event of agricultural country like Republic of land. problems regarding Agriculture unit of measurement usually preventive the event of the country. the only real answer this recoil is sensible agriculture by modernizing this ancient that} throughout that of agriculture. that the projected methodology aims at creating agriculture wise victimization automation and Iota technologies with the service of Raspberry pi. net of Things (Iot) permits varied applications crop growth observation and choice, irrigation call support, etc. A Raspberry Pi primarily based completely automatic irrigation IOT system is projected

to modernization and improves productivity of the crop. the foremost aim of this work to crop development at low amount water consumption, so on the proper track water out there to the plants at the specified time, for that purpose most of the farmers waste ton time among the fields. an inexpensive management of water must be compelled to be developed that the system circuit quality to be reduced. The projected system developed on the data sent from the sensors and estimate the number of water required. A2 sensors sq. live accustomed get the data to bottom station the standing and then the temperature of the soil, the status, the temperature,

pH scale value of the soil, animal detections system that the observe plant leaf diseases detections and provide antiseptic spray. The projected systems supported these values and calculate the water amount among the tank for irrigation is would really like.Farming is reworking into a essential developing space for the duration of the

world on account of increasing people. vital take a look at in commercial enterprise section is to support ranch potency and nature of cultivating whereas not nonstop manual recognition to satisfy the developing interest for nourishment. other than increasing people, the worldwide environmental modification is moreover an enormous worry in farmland. the purpose of this examination work is to propose an inexpensive cultivating methodology bolstered web of Things (Iot) to influence the unfriendly things. The reasonable cultivating is embraced which give high precision crop the board, grouping of supportive data and programmed cultivating method.

This work presents partner degree astute farming field recognition framework that screens soil wetness and temperature. At the point when process the apparent data it makes important move bolstered these qualities while not human intercession. Here temperature and wet of the dirt square measure estimated and these apparent qualities square measure hang on .With the presence of web of Things (Iot) and industrialization, the occasion of information Technology (IT) has diode to various examinations not exclusively in exchange anyway also in horticulture. Particularly, Iota innovation will defeat separation and spot imperatives of wired correspondence frameworks utilized in existing homesteads, and may expect rural IT improvement from robotization of farming data grouping. In this paper, reasonable homestead framework exploitation correspondence modules together with the wired correspondence arrange utilized in the current ranch was made. Furthermore, the framework executes the recognition and the board correspondence system, in this manner upgrading the opportunity of improvement of rural Iot

MATERIAL AND METHOD

Related Work: This investigation has focused on the use of current innovation to help oversee cultivating, which suggests ranch overseeing computerization in shifted ways that ManakantIntarakamhaeng examined the model of ranch the executive's computerization innovation with RFID, Result; the reception of RFID, or radio-recurrence recognizable proof of items and plants were with progress independently known and recorded precisely. To improve antiquated ways, there have been a few frameworks created exploitation cutting edge innovations that encourage curtailing crop squanders, stopping unreasonable and rare watering to crops and accordingly increment the harvest yield. One such technique is trickle water system that is wont to spare each water and compost. Crude dribble water system has been utilized since before period. During this strategy water and compost inside the kind of water beads square measure dribbled on to the premise of the plants sporadically.

The search for water application shifts in step with the yield kind. At the point when put beside antiquated strategy it utilizes 30-half less water. The contrary system is pot water system that is extra proper for territories having insufficient rainfall . Agriculture assumes

significant job inside the economy of the nation. Indian populace relies upon agribusiness for their sustenance. Since the commitment of agribusiness we tend to square quantify in desire to broaden crop efficiency with conservative and successful water utilization. In agribusiness water system is that the essential issue on the grounds that the storm rainfalls square measure flighty and uncertain. Agribusiness inside the substance of water lack has been a tremendous test. There exists a prerequisite for specialized data to make water system frameworks extra efficient.

These zone units a few techniques that are utilized around now to improve water system framework, decline crop wastage and increment crop efficiency. During this work the framework is created abuse sensors to watch crop-field and change water system framework. The framework is tried and gave shrewd outcomes. The remote transmission of gadget information from field to the arranger, putting away it during a data, predominant field from versatile application and water system the executives territory unit worked OK. The water utilization is ninetieth extra practical than elective the other old and other stylish water system procedures.

Concept Diagram

System Overview: Appeared in figure 1, the segments of the keen cultivating framework on Raspberry Pi Model-B+ are illustrated. The framework can tell the flow soil dampness content in the dirt and everyday most noteworthy/least temperature, mugginess, and check the water level in the tank utilizing ultrasonic sensor, PH estimation of the dirt and watch the plant leaf malady recognition and furthermore it give disinfectant shower ,private if creature crossed in the field. The client can informed the message by utilizing the entire sensor and it transmitted by GSM module

Methodology

Raspberry Pil: Raspberry Pi might be a little measured single board pc that can do the entire employment that a middle microcomputer will like unfurl sheets, information preparing, Internet, Programming, Games and so forth. It contain 1GB RAM, 2 USB, ARM V8 Processor Associate in tending a LAN port, HDMI and RCA ports for show,3.5mm Audio jack, Coyote State card space (bootable), General reason I/O pins, runs on 5v

Soil Moisture Sensor Module: The dirt wet detecting component has 2 tests that is embedded into the dirt. The tests square measure won't to go current through the dirt. The wet soil has less obstruction and along these lines goes extra current through the dirt while the dry soils has high opposition and pass less present through the dirt. The opposition costs to assist analyst with working the dirt wet.

Temperature Sensor Module: The DHT11 temperature and dampness finder is utilized. the whole amount of water fume in air is laid out as a live of dampness.Proportion

is determined because of once there's an alteration in temperature, proportion conjointly changed. The temperature and mugginess changes happen previously and when water system. The amount of water beads in air is duplicated when water system. This causes decline in temperature that progressively will expand the proportion of the earth. The temperature and mugginess perusing are typically advised to the client all together that the client might have the option to perceive the area conditions from wherever. The temperature and mugginess locator can even be utilized in unpracticed homes.DHT11 temperature and moistness identifier is appeared in Fig.2.3

Figure 2.3: DHT 11(Temperature Sensor)
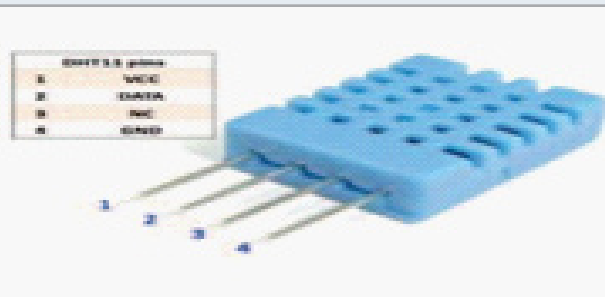
Relay: A hand-off is interface point electrically worked switch. Transfers region measure utilized any place it's important to deal with a circuit by a different low-power signal. A hand-off with mark in activity attributes and typically various in activities curls territory measure wont to make sure about electrical circuits from over-burden. As appeared in higher than figure raspberry pi is associated with the gadgets by means of hand-off. Here transfer will be worked as change to on or off the gadgets

Figure 2.4: Relay

An immediate association between the Raspberry Pi was precluded, inferable from its electrical potential varieties, which is 3.3 volts for the Raspberry Pi and five volts for them. Bi-directional Logic Level gadget should be be well-known the Raspberry Pi and 5 volts for them . Bi- directional Logic

Software: A researched during this investigation Programming of a correspondence between a server and a shopper comprised of 2 perspectives. The Raspberry Pi would check whether there was any associated

buyer, assuming this is the case, a shared information transmission would be finished. By doing this, Associate in nursing application would send the data by means of Socket bearing on data science Address and Port in Transport Layer abuse TCP convention. Thus, the layer wise control has the best control over system. Hence TCP is going to convert the layer by layer following the performance of the system control hence have the maximum monitoring the performance. The raspberry pi system was having the good nature of controlling the aspects and managing the device performance.

Figure 3: Shows the connection of the circuit
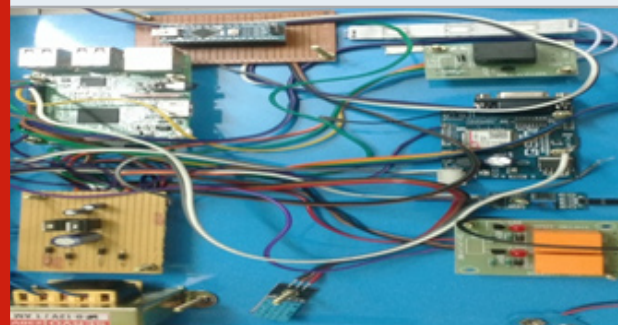
The parameters has to be incorporated in better way to give the inference. In this paper soil moisture, pH value which has good control on the proper channeling of the device. Thus, making all possible necessity thing to get through the actual rating of the system. The decision making and parameter cut-off setting is very Important criteria in deciding the actual performance. Hence one has to build the concept in proper way the decision making of the values are very important. The monitoring system continuously the data so that it's easy to get information. Thus, the smart farming system helps to get ideal results needed to drive the system. Thus, results show all displayed parameters have been observed continuously.

Figure 4: A block diagram of proposed system
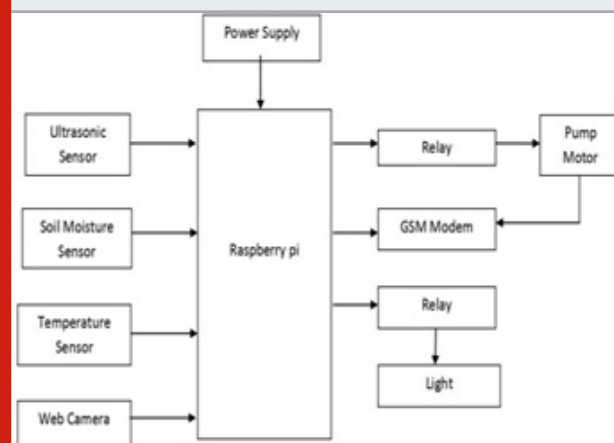
Python writing is available in limited version for raspberry pi.Python without filtering is not helpful for the performance.The GPIO pins make suitable sign

indication. Just in the event of top quality data, a "High" sign would be sent to GPIO pin seventeen and accordingly the ventilator would eradicate the inside air (Fan out on). Just in the event of hot temperature, a "High" sign would be sent to GPIO pin twenty seven and in this manner the ventilator would work precisely (Fan in on. inside the occasion of radiance change, the data would be sent to GPIO pin twenty two and electrical lights would be opened. minimally, working of adornments likely could be adjusted by the client as referenced in Fig. four communicating the stream outline of the Python programming in Raspberry Pi.

Another fundamental factor is that this reasonable Phone works with the golem OS. Created applications square measure on the golem bundle usage the Java language and interfaced with the Raspberry Pi through the remote system. This may take the value from the filter shows like temperature, moistness, light, nephrotoxic gases, and so on. It's prepared to the executives fans and lights, and might be followed by means of the net whenever.

RESULTS AND DISCUSSION

Right now, model created has LED to an endeavor inside the environment and atmosphere of a homestead, exploitation the default plan warnings by means of good Phones.

Mobile Application: The versatile application is created in humanoid. The portable application assists with viewing and the board the circle from wherever. The portable application utilizes PHP content to bring data. In data all the gadget data territory unit keeps. The humanoid brings the data and record it in JSON arrangement to be shown in humanoid gadget. The interface for the machine is implied in a very implies that permits each the viewing and the executives of field from the gadget. The net affiliation should be given to watch and the executives the circle The versatile application created is demonstrated in Fig. 5.1

Figure 5.2: self- image through the camera

Figure 5.1: IP Scanner
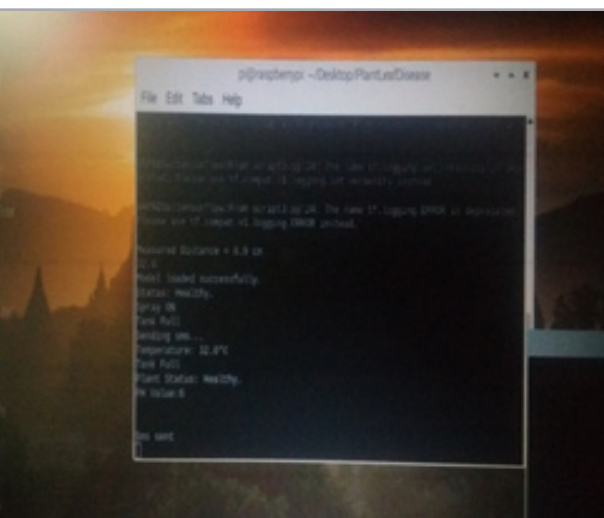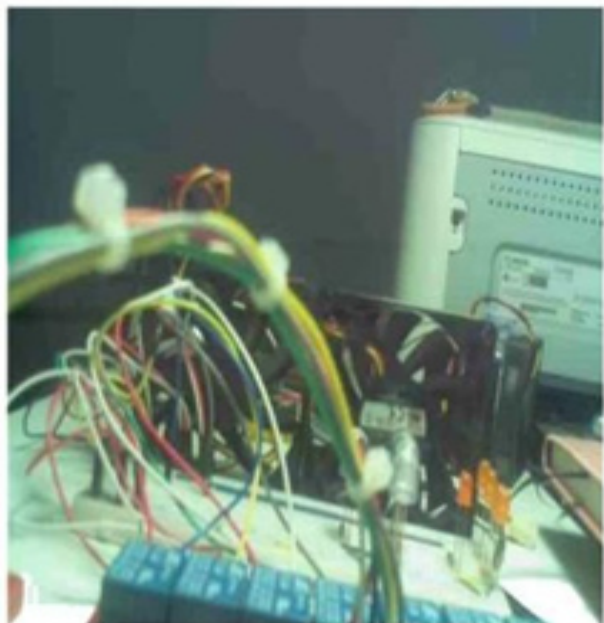
CONCLUSION

The savvy water system framework is right and worth powerful for advance water assets for agrarian creation. The framework would supply criticism framework which can screen and dealing with all the exercises of plant development and water system framework with proficiency. On the off chance that downpour firearm detecting component might be extra so once it downpours there won't be floods. Downpour water yield might be done and this reaped water might be wont to inundate fields. We can to grasp more water quality sensors that affect the yields. the most reason for the framework is to forestall the waste water and spare many water for group of people yet to come .By hurt cutting edge innovation if the plant happening unwellness we can build up through our advanced cell . It's amazingly supportive for group of people yet to come.

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CSRR Based Low Profile Antenna for Wireless-5 and Wireless-6 Devices

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ABSTRACT

In this paper, design and analysis of a low-profile patch antenna that supports both fifth and sixth generation wireless LAN devices is proposed. Fifth generation Wi-Fi (wireless-5) conforms to IEEE 802.11ac and sixth generation Wi-Fi or wireless-6 devices conforms to IEEE 802.11ax standards defined for indoor WLAN. OFDM channel allocation scheme is used in wireless-5 standard and OFDMA for wireless-6 devices. In the proposed antenna design, a circular ring is etched on the surface of the radiating layer and a rectangular CSRR on the ground plane. The antenna is fabricated on a FR-4 epoxy substrate material and has an overall dimension of 37x30.9x1.2mm. The proposed design achieves a return loss of -35dB and gain of 3.5dBi. The proposed antenna resonates at 2.4GHz, 3.6GHz, 5.4GHz, 6.4GHz, 7GHz

KEY WORDS: WIRELESS5, WIRELESS6, CIRCULAR RING SLOTS, COMPLIMENTARY SPLIT RING RESONATOR (CSRR), MICROSTRIP ANTENNAS, MULTIBAND .

INTRODUCTION

All unlicensed fifth generation or IEEE 802.11ac WLAN devices operates in 2.4GHz and 5GHz frequency bands. The Federal Communication Commission (FCC) has recently approved the use of 6GHz wireless band for sixth generation WLAN devices [11]. It further mentioned the sub-classification of this 6GHz band as follows:

i.   5.925-6.425GHz (Standard Power level)
ii.   6.425-6.525GHz (Low Power level)
iii.   6.525-6.875GHz (Standard Power level)
iv.   6.875-7.125GHz (Low Power level)

WiFi 6 or sixth generation WiFi introduces key 5G technologies such as Multi-user MIMO, orthogonal frequency division multiple access (OFDMA) and 1024 QAM technique. Multi-user MIMO technology helps to increases the number of concurrent users four times that of Wi-Fi 5 devices and makes Wi-Fi 6 suitable for enterprise networks requiring stable connections across of lots of locations. Uplink and downlink OFDMA based transmission protocol reduces network latency from 30ms to 10ms and enables Wi-Fi 6 devices to provide an immersive virtual reality experience. Moreover, use of higher order 1024 QAM coding technique substantially increases the data rate or throughput by 25 percent in Wi-Fi 6 access points and devices and could support stable 4k video streaming. Wi-Fi 6 also helps to reduce power consumption in battery powered devices, access points, and gateways and could serve as versatile platform for Internet of Things (IoT) applications. Wi-Fi 6 network devices demands compact and low profile antennas for seamless integration and multiband resonance to support Wi-Fi 5 standard as well.

Microstrip antenna is widely preferred for portable and compact wireless devices because of lightweight, low profile, low cost and easier fabrication. Defected Ground Structure (DGS) is one of the strategies used in antenna design to achieve operation at multiple frequencies. DGS is any imperfection carved in the ground plane of the microstrip can offer ascent to expanding the powerful capacitance and inductance. DGS have the attributes of stop band moderate wave impact and high impedance. DGS are fundamentally utilized as a part of microstrip Antenna plan for various applications, for example multiband operation, radio transmission and reception apparatus, cross polarization lessening, shared coupling diminishment in Antenna clusters, symphonies concealment and so on.

MATERIAL AND METHOD

Some prominent work done in the field of multiband antennas are outlined below: (Takuichi Hirano and Junichi Takada et al,. 2016) presented a dualband microstrip antenna for 2.45GHz and 5.5GHz frequency bands. The antenna is made on a FR4 substrate with an inverted F-shaped patch on the top layer and half copper-cladded ground at the bottom side. Two vias are used to connect the radiating and ground layer to provide better matching characteristics. The fractional bandwidth of the antenna is 4.7% at 2.45GHz and 9% at 5.5GHz. The gain and radiation efficiencies of the antenna are 1.07dBi and 92% at 2.45GHz and 3.36% and 88% at 5.5GHz respectively. (Vipul sharma et al. 2018) investigated a Split Ring Resonator (SRR) based fractal antenna for multiband resonance. It uses a ring slotted circular radiating patch with small SRR connected at its periphery. The addition of SRR to the ring slotted circular patch results in a fractal structure and provide better matching characteristics and offers wider bandwidth. The dimension of the antenna is 45mm x 45mmx1.6mm and is fabricated on a FR4 substrate. The antenna resonates at 5.0GHz, 6.8GHz, 7.5GHz and 8.5GHz.

The bandwidth of the antenna at 8.5GHz band increases from 200MHz to 350MHz with the use of edge coupled SRRs. (Ashok kumar et al. 2018) proposed a low profile circular patch monopole antenna with parasitic stubs for resonating at 2.5GHz, 4.5GHz, 5.7GHz, and 7.7GHz frequency bands. The antenna design consists of a line-fed circular patch for the radiating layer and two inverted L-shaped and one double T-shaped parasitic stub in the ground layer. The inclusion of parasitic stubs induces multiple resonances. The impedance bandwidths for the four resonant bands are 290MHz (2.36–2.65GHz), 540MHz (4.28–4.82 GHz), 530 MHz(5.47–6.0 GHz), and 780 MHz (7.28–8.06 GHz). (Abhishek K. Saroj et al. 2017) investigated a penta band antenna resonating at 1.074GHz, 3.119GHz, 4.089GHz, 5.683GHz and 6.514GHz. The antenna comprises of a square patch at the centre with dimension 18x8mm2 and four rectangular shaped patches with dimension 10mmx12mm placed at the four corners. The overall dimension of the antenna is 50mm x 45mm x 1.6mm.

Proposed Antenna Geometry: The proposed design consists of an inset fed rectangular patch antenna with FR-4 glass epoxy substrate having a tangent loss of 0.02 and permittivity of 4.4. The dimension of the substrate is 30.92mm in width and 37mm in length and 1.6mm thickness. Figure 1 shows the basic structure of the patch antenna and its various parameters marked with labels.

Figure 1: Structure of Microstrip antenna
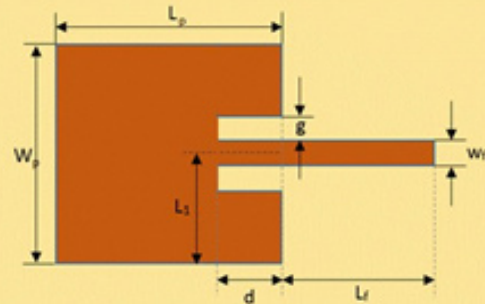
The following equations are used to compute the width and length of the patch for 6GHz.

The width of the patch is computed using the expressions given below:

$$W = \frac{1}{2 f_r \sqrt{\mu_0 \varepsilon_0}} \sqrt{\frac{2}{\varepsilon_r + 1}} = \frac{c}{2 f_r} \sqrt{\frac{2}{\varepsilon_r + 1}} \quad (3.1)$$

The actual length of the patch is computed using the relation

$$L = \frac{c}{2 f_r \sqrt{\varepsilon_{reff}} \sqrt{\mu_0 \varepsilon_0}} - 2\Delta L \quad (3.2)$$

$$\Delta L / t = 0.412 \left[\frac{\left(\varepsilon_r^{eff} + 0.3\right)\left(\frac{W}{t} + 0.264\right)}{\left(\varepsilon_r^{eff} - 0.258\right)\left(\frac{W}{t} + 0.8\right)} \right] \quad (3.3)$$

The conductance value of the slot in terms of guide wavelength and width of the patch is given by

$$G_1 = \begin{cases} \frac{1}{90}\left(\frac{W}{\lambda_0}\right)^2 \\ \frac{1}{120}\left(\frac{W}{\lambda_0}\right) \end{cases} \quad (3.4)$$

The dimensional parameters of the antenna for 6GHz band patch antenna obtained using the standard design equations are given in table 1.

Since the current is low at the ends of a half-wavelength patch and increases in magnitude towards the centre, the input impedance reduces if the patch is fed closer to the centre. One method of doing this is by using an inset feed (a distance d from the end) as shown in Figure1.

Table 1. Dimensional parameters of patch antenna			
Sl. No.	Parameters	Description	Values
1.	LS	Length of substrate	30.92mm
2.	WS	Width of substrate	37mm
3.	LP	Length of patch	17.399mm
4.	WP	Width of patch	22.821mm
5.	LF	Length of feed line	6.76mm
6.	WF	Width of feed line	2.8mm
7.	d	Length of inset cut	3mm
8.	g	Width of inset cut	0.5mm

Complementary Symmetry Split Ring Resonator: A Complementary Symmetry Split Ring Resonator (CSRR) is also a resonant structure obtained by etching split ring shaped slots on a conducting surface. The name complementary comes from the fact that CSRR behavior exactly complementary to the metallic strip structures used in SRR and the apertures or slots behave as perfect magnetic conductors. Circular or rectangular CSRR can also be used to attain miniaturization of microstrip components.

Figure 2: SRR and CSRR
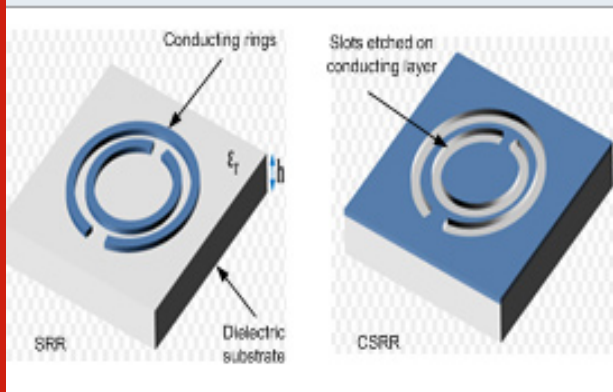
Figure 4.6 shows the difference between split ring resonator and complementary symmetry split ring resonators. A SRR is created by metallic rings formed on a dielectric substrate whereas CSRR is created by etching ring shaped slots on a conducting layer grown over a dielectric substrate. The electrical equivalent circuit of the CSRR is represented in figure 4.7 and it is seen to be complementary to that of SRR equivalent circuit. It is in analogy with Babinet principle which states that CSRR is just a dual of the SRR. So the design equations of SRR and CSRR are identical.

The average loop length of a rectangular SRR is given by equation (3.4).

$$L_t = 2(A + B) - g - 4 \times w \tag{3.5}$$

The resonant frequency of the rectangular SRR is

135

given by equation 3.5.

$$f_1 = \frac{c}{2L_1\sqrt{\varepsilon_e}} \tag{3.6}$$

Figure 3: Equivalent circuit model of CSRR
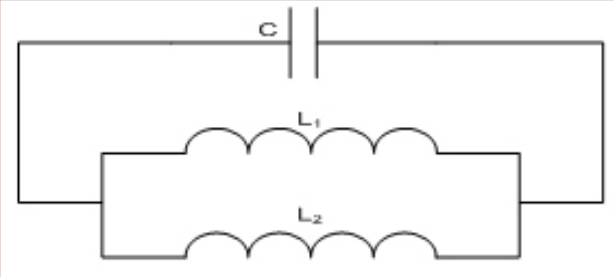
In order to obtain multiband operation, a rectangular CSRR and a circular ring is etched on the on the ground layer and top layer of the rectangular patch antenna respectively. Figure 4 shows the dimensional parameters of the CSSR and circular ring shaped slot created on the patch antenna.

Figure 4: Dimensional parameters of CSRR
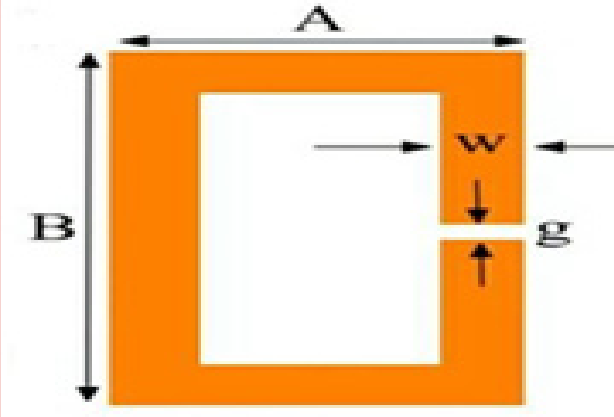
Figure 5 shows the circular ring shaped slot etched on the radiating layer of the patch antenna. Slot parameters are varied in order to obtain targeted resonant frequency. The inner and outer radius of the slot is kept at 5mm and 6mm respectively. Table 2 shows dimensional parameters of the CSRR and circular slot.

Figure 5: Circle ring slot
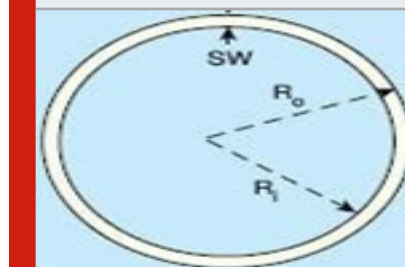
Figure 6: Fabricated Ring slot antenna
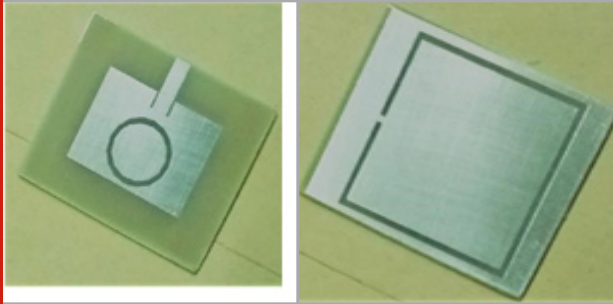
Table 2. Dimensional parameters of CSRR and ring slot

PARAMETERS	VALUES
A	27 mm
B	28 mm
W	1 mm
G	1 mm
Ro	5 mm
R1	6 mm
SW	1 mm

Figure 6 shows radiating layer and ground layer of the fabricated ring slot antenna on a FR4 substrate.

RESULTS AND DISCUSSION

The proposed antenna structure is designed and simulated using FEKO software tool. FEKO is a comprehensive software tool for electromagnetic field analysis of 3D structures. It offers multiple state-of-the-art numerical methods for the solution of Maxwell's equations, enabling its users to solve a wide range of electromagnetic problems encountered in various industries

a. Return loss and VSWR: Figure 7 shows the return loss of the proposed antenna with circular ring slot on top layer and full metallic ground at the bottom layer. Without CSRR, the antenna resonates at 3.6GHz, 6GHz and 8GHz.

Figure7: Return loss of ring slot antenna without CSRR.
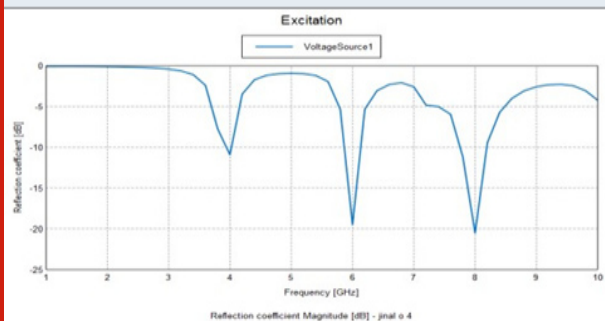
Figure 8: VSWR of ring slot antenna without CSRR
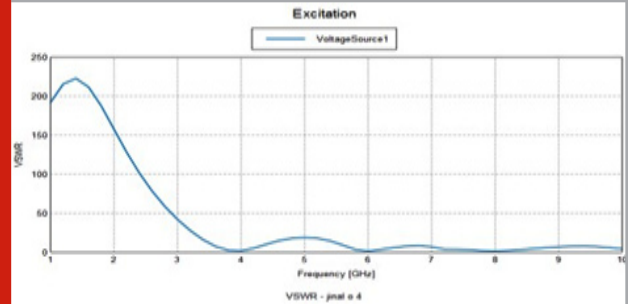
The addition of CSRR on the ground layer produces additional resonant frequencies at 2.4GHz and 5GHz. The return loss and VSWR of the ring slot antenna with CSRR and circular ring is shown in figure 9 and 10 respectively.

Figure 9: S11 with CSRR and Ring slot
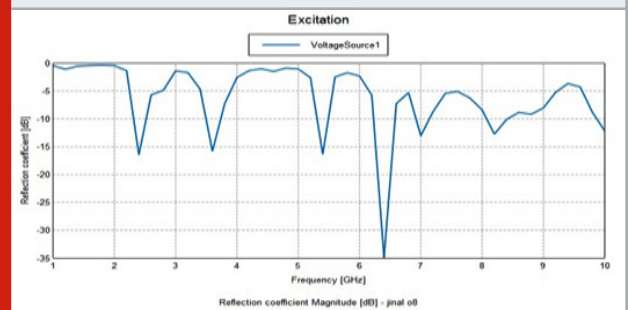
Figure 10: VSWR with CSRR and Ring slot
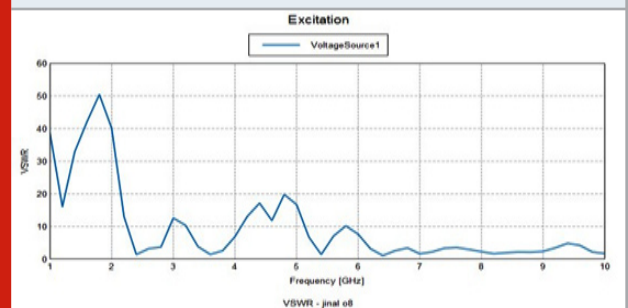
Table 3. Performance parameters of proposed antenna

Sl. No.	Resonant Frequency	Impedance Bandwidth	Return loss	VSWR
1	2.4GHz	220.7MHz	-16.5dB	1.35
2	3.6GHz	245.2MHz	-15.2dB	1.42
3	5.4GHz	196.2MHz	-16.0dB	1.37
4	6.4GHz	351.1MHz	-35.0dB	1.04
5	7GHz	233.1MHz	-12.5dB	1.62
6	8.2GHz	331.1MHz	-12.2dB	1.65

The final structure with ring slot and CSRR resonates at six different frequencies with impedance bandwidth given in Table 3.

b. Radiation Pattern: Radiation pattern is the graphical representation, which shows the directive nature of the antenna in both elevation and azimuth plane. It is a plot of the power radiated from an antenna per unit angle and gives the intensity of radiation from the antenna. To understand the radiation characteristics of an antenna, it is required to plot the radiation pattern in elevation plane for phi=90degree and phi=0degree.

Figure 11: Radiation pattern of CSRR and Ring slot antenna at 2.4GHz.
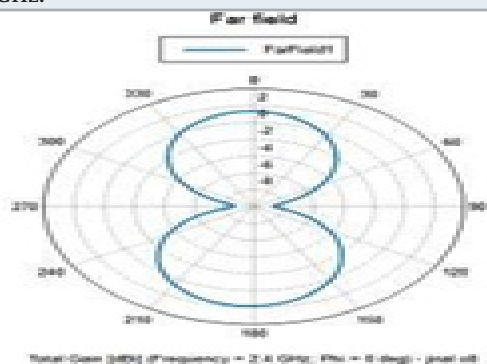
Figure 12: Radiation pattern of CSRR and Ring slot antenna at 3.6GHz.
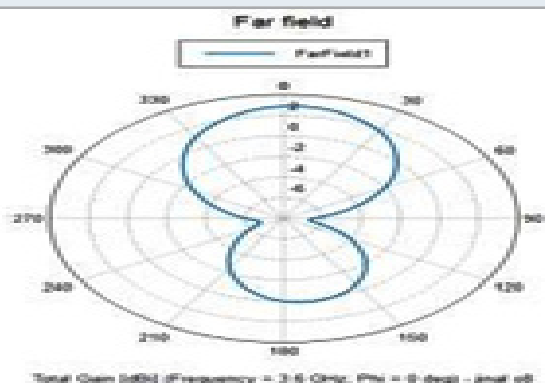
Figure 13. Radiation pattern of CSRR and Ring slot antenna at 5.4GHz
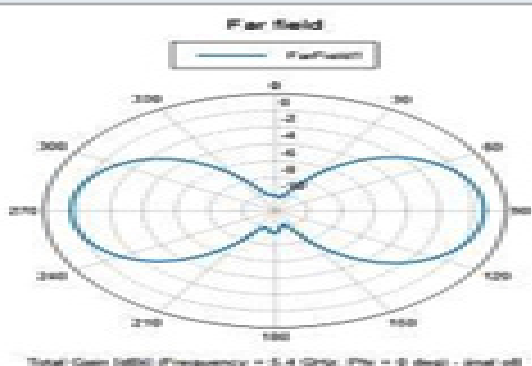
Figure 14: Radiation pattern of CSRR and Ring slot antenna at 6.4GHz.
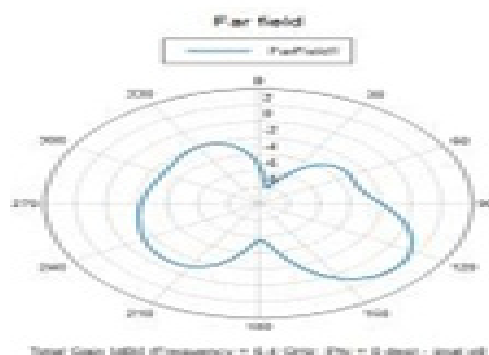
Figure 15: Radiation pattern of CSRR and Ring slot antenna at 7GHz
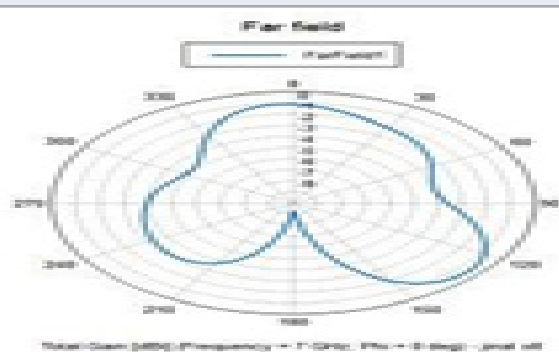
Figure 16: Radiation pattern of CSRR and ring slot antenna at 8.2GHz
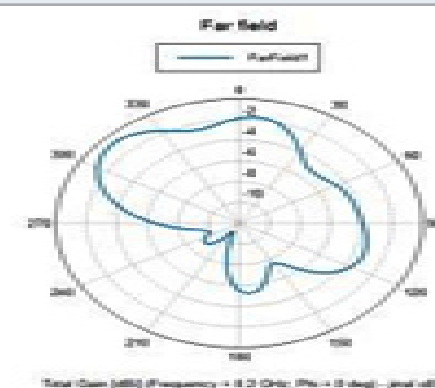
Figure 11 through 16 shows the two-dimensional radiation pattern of the proposed antenna at different operating frequencies.

CONCLUSION

The proposed antenna with circular ring slot on its patch and single rectangular complimentary split ring resonator on its ground plane has been designed, analysed and

fabricated. The parameters of the proposed antenna shows that its multiband characteristics is suitable for applications such as Bluetooth, 5th generation and 6th generation wireless LAN, Wi-MAX and X-band space communications. The resonant frequencies are 2.4GHz, 3.6GHz, 5.4GHz, 6.4GHz, 7GHz and 8.2GHz and covers wireless5 and wireless6 WLAN requirements.

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Smart Pill Box using IoT and Cloud

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ABSTRACT

This paper focuses on to provide smart service and aid to elderly patients or patients who generally have a problem with adhereing to medications for a prolonged period of time. In this proposed work, there are three systems. Firstly, Reminder System which helps the patient to take the required medications on time. The patient gets a text SMS on a mobile device 15 minutes prior to medication time. If the box is opened, the caretaker gets a text message on this phone. This helps the patient to take medications reqularly and conveniently. Secondly, Medication Monitoring System which provides the caretaker and the doctor with data and logs about the patient's medications. The data is retrieved from sensors in the Pill Box and stored on the cloud. The caretaker or the doctor can retrieve this data to see if the patient is actually taking his medications on time. And lastly, Medication Inventory System which helps the patient to keep a track of his supply of medicines. The patient gets an SMS on phone when the Smart Pill Box has a low supply of medications and may run out of medicines soon. This helps the patients to purchase medications before they run out, so that they do not miss any dosage.The work was implemented using IoT and cloud technologies. The results have proved that the system's performance is reliable.

KEY WORDS: MEDICATION MONITORING SYSTEM, SENSORS, CLOUD, IOT.

INTRODUCTION

Most of the technology we use today is based on convenience, for example, vehicles for the easy mode of transportation, bullet train for quicker and faster traveling, mobiles for communication, gathering information and these devices still keep on advancing a step further for much better user experiences. Convenience is another phrase for 'time saver', and into the day's world which is developing and moving ahead at a very fast pace, each and every second has value. Smaller conveniences at home would be desirable because they will allow us to save time and monitor the patient both at the same time.

There are several medicine dispensing systems used in hospitals but the idea of getting a medicine dispensing box at home will take the comfort the patients to a whole new level. Smart Pill Box assures the patient to take their pills on time as well as gives them the authority to control their inventory. In case a patient forgets to take his/her medication the cloud based connectivity can help the patients to retrieve their information and statistics in a proper form. The hospital which is associated with

the patient can also send immediate supplies as they would be aware that the inventory is getting depleted. Moreover, the doctors would know if the patient is being administered medicines on time and this would in turn help the patients to be healthy.

The health sector is expanding every day and now people are busy with their scheduled life. At this stage everything that reduces concern about something can be regarded as a boon and the Smart Pill Box plays along exactly the same lines. Patients who have already been discharged from the hospitals still need the same amount of care as they needed when they were admitted. The Smart Pill Box can reduce the concern of the immediate family members to great extent.

MATERIAL AND METHOD

Literature review: (Shinde et al,. 2017; Jayakumar et al,. 2015) in his work proposed a smart pillbox with remind and consumption function, which is used to give alert the user to take pills at a particular time and the pills required to take at that time comes out to the user to avoid confusion among medicines.Smart pill box can reduce elderly family member's responsibility towards giving the correct and timely consumption of medicines. This system gets the feedback about pills from the user and send purchase order to medical shop.

(Naga et al,. 2018; Jayakumar et al,. 2015)in her paper proposed a smart med box on which there will be a display which notifies the people about the medicine. Along with this we can alert them with an alarm and light indications. So that even if the person is sleeping or busy with some work the alarm helps in alerting him to confirm that the person has taken that medicine or not. There is a button at the opening end of the pill box, so when the person tries to open the box the button is pressed and the alarm will be off only if the buzzer is pressed.The design proposed by (Aakash et al 2015; Jayakumar et al,. 2017help the patients to take the required medicine in the right proportion at the right time. The basic ideology is integrating the principle of Alarm clock with Light based slot sensing on a normal pill box. An alternate to the light based sensing method using capacitive fields is also employed.

To make it more state-of-the- art, it is inbuilt with a GSM module for alerting the patient and also the chemist at the needed instant.) (Sanjay et al,. 2017;Jayakumar et al,. 2018)paper proposes a Smart medicine box for those users who regularly take medicines and the prescription of their medicine is very long as it is hard to remember to patients and also for their care giver. These problems persist in hospitals & people around us who have such kind of diseases and thus based on these two problems a smart medicine box is proposed which solve these problems by Setting up time table of prescribed medicines through push buttons as given in prescription.

(Wu et ala,. 2015; Jayakumaret al,. 2019) proposed pill box, where the camera is placed in inner side of the box to detect the matrix barcode and the medicine bag. A hardware module above the box was used to provide pill reminding and alarm functions. After visiting a doctor and returning home, a patient need only scans the matrix barcode using the camera of the pillbox, and all medicine related information will be loaded into the pill box. After the matrix barcode is scanned, the patient places the medicine bags in the pill box without dispensing the medicine in to the cell.

(Huang et al,. 2014; Lokeshkumar et al,.2019) proposed the smart pill box in 2012. The purpose of this system was to develop a medication device that increased medication compliance, monitored medication taking behavior,and communicated with pharmacists.The device consists of 28 chambers that are placed in seven columns made up of four rows. Each column represents each day of a week. The 4 rows represent four distinct dosage times in a day. The LED light located behind each chamber provides the light source for the patients. The light also used as the indication for the ambient light sensor which is used to detect the light when the pills are removed from the chamber.

(Abbey et al,. 2012; Jafar et al,. 2019) proposed a system where the infrared sensors are fixed at the entering where the patients take the medicine package.The detection of medicine taken will be delivered to the back-end control system and record to SQL server via the wireless serial port. The time to take the medicine package away will be recorded. The motor controls the spring which is used to put the medicine packages shown as figure. A base board is installed under the spring. As the motor rotates, the packages will be pushed forward. A package drops to the entrance when it moves out of the range of the board.

Proposed System
The smart bill box consists of three parts:
- Reminder System
- Patient Monitoring System
- Inventory System

Reminder System: The reminder system in the Smart Pill Box uses a messging API to send text messages to the patient and the caretaker. The patient gets a message on the mobile 15 minutes prior to the time when the medicine is supposed to be taken. After getting the SMS, the patient can open the Smart Pill Box and take the medications.

Figure 1: Flow Chart of Reminder System
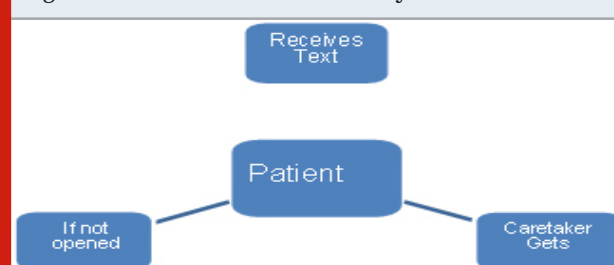
When the patient takes the medication and the box is opened, an SMS alert is sent to the caretaker stating that the patient has taken the medication. So, if the caretaker has not received any notification, he/she can call the patient and remind him to take the medications.

Patient Monitoring System: This section allows the caretaker and the doctor to keep track of if the patient is really taking the medication. IR module is used to get data if the Smart Pill Box was opened.

Figure 2.2. Flow Chart of Patient Monitoring System

Then this data is Uploaded on the Cloud. The cloud service used here is IoT Makers. It fetches data from the device in real-time and updates on the cloud.
IR Sensor Module

The IR sensor module is attached to the Smart Pill Box. This sensor provides data if the box was opened or not along with a time-stamp. This data, along with the time-stamp is uploaded on the cloud. The IR sensor data is also used to send an SMS alert to the caretaker if the box was opened.

ESP8266 Wi-Fi Module: This is the mode of internet connectivity to achieve functions related to the cloud. An active Wi-Fi internet connection is required to send data to the Cloud and update. The ESP8266 connects to a Wi-Fi network and provides internet connectivity.

IoT Makers Cloud: This is an IoT based platform for uploading real-time sensor data to the cloud. The data is uploaded along with a time-stamp. The data includes if the box was opened. And the time at which the box was opened. This allowes the caretaker and the doctor to keep track of the medications of the patient.

Inventory System: This system is used to keep a track of the medicine supply, so that medicine dosages are not missed when the Smart Pill Box runs out of medicine. This uses an Ultrasonic Sensor to detect the level of medicine in the box. This data is uploaded live on the cloud. The caretaker and the doctor can check it on the Web Page in real- time to get an idea about when the box may run out of pills.

This system also sends an SMS alert on the Mobile Phone of the patient when the box runs out of medicine. When the sensor senses a critically low level of medicine present

in the box, it alerts the GSM module, and an SMS alert is sent to the patient. This allows the patient to restock the supply of medicines before they run out. And this in-turn allows the patient to never skip medicines due to unavailability of medicine supply.

Figure 2.3: Flow Chart of Inventory System
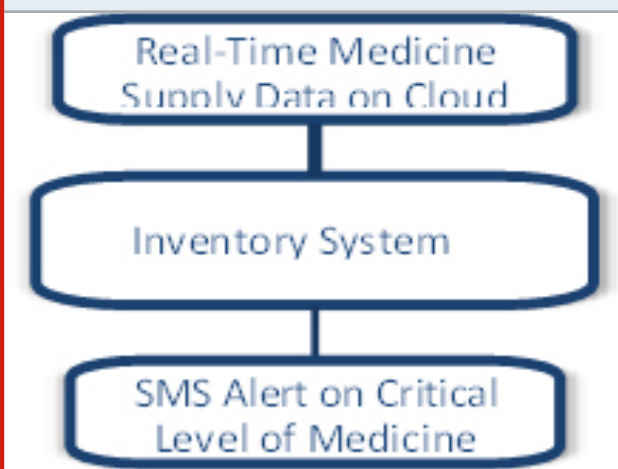
RESULTS AND DISCUSSION

Implementation
The implementationinvolves various sensors and devices namely:
- Arduino UNO
- IR Sensor Module
- Ultrasonic Sensor
- Wi-Fi ESP8266 Module
- Arduino SIM800C GSM Module
- Medicine Board

Arduino Uno: It is an open-source based micro-controller developed by Arduino.cc i.e., it can be configured by the user according to the application, based on Atmega328. It is introduced to minimize the effort on the input side and maximize the output. Microcontrollers are an important part of electronic and automation industry, which are widely used in the embedded system to make the user's task much easier and time-saving.

Figure: Arduino UNO
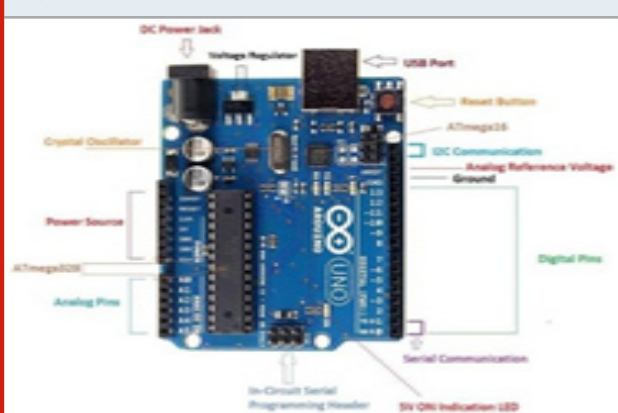
IR Sensor Module: There are three basic components in an IR sensor module. They are: the IR transmitter, the IR receiver and the LM385 OpAmp amplifier. The basic function of using an IR sensor module is to sense obstacles using the transmitter and the receiver.

Figure 3.5. IR Sensor Module (Image and PIN Configurtion)
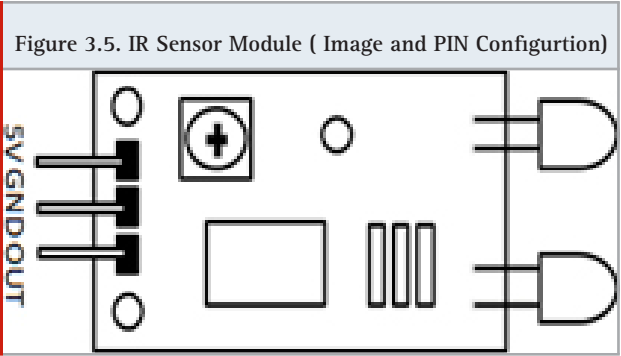
The transmitter in the IR sensor module transmits light in the range of infrared frequency. This light bounces back when it hits an obstacle. This light is then received on the receiver. This allows the module to detect any obstacles that may be present. After an obstacle is encountered, the amplifier can change the voltage in the I/O pins as low or high. When no obstacle is present, low signal is sent to I/O. When an obstacle is present, high signal is sent to the I/O.

Ultrasonic Sensor: Ultrasonic sensors mainly are used for object detection. In this model, we have used it for two different purposes, the first one for obstacle avoidance and secondly for Urine level detection. The used ultrasonic module has a range of 2cm to 450cm, has a resolution of 0.3cm, the effectual angle of <15 degree and quiescent current in it is <2mA.

Figure 3.6: Ultrasonic Module

It has an operating voltage level of +5V. It consists of a transmitter, a receiver and control circuit. The transmitter transmits eight 40kHz ultrasonic waves by triggering IO for at least 10us high-level signal. If there is an object in the path of waves then it will bounce back to the module and is received by the receiver. Traveled distance by waves can be calculated by considering the traveling time of waves and the known speed of sound.

Wi-Fi ESP8266 Module: The Wi-Fi ESP8266 module is used to connect the Smart Pill Box to the internet. This

connects to the internet through a Wi-FI network.

Table 3.4. Ultrasonic Sensor PIN Configuration

Pin Number	Pin Name	Description
1	Vcc	Vcc is used to provide 5V power to the sensor.
2	Trigger	Transmits eight 40kHz ultrasonic waves by triggering IO for at least 10us high-level signal
3	Echo	Echo pin is an Output pin.
4	Ground	This pin is used to connect to Ground.

Figure 3.7: ESP 8266 PIN Configuration
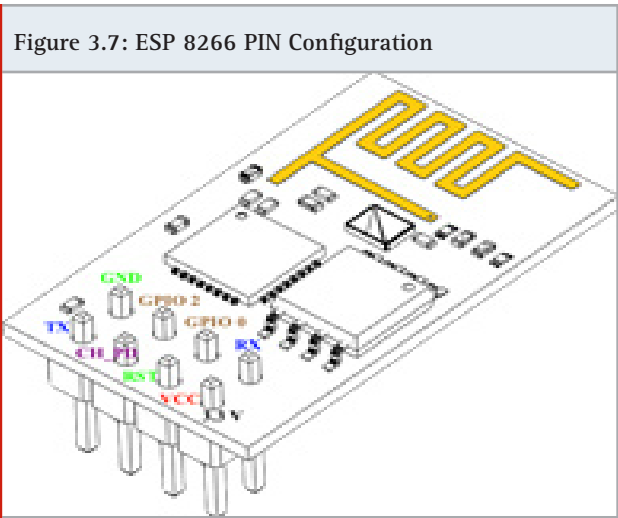
- VCC, Voltage (+3.3 V; can handle up to 3.6 V)
- GND, Ground (0 V)
- RX, Receive data bit X
- TX, Transmit data bit X
- CH_PD, Chip power-down
- RST, Reset
- GPIO 0
- GPIO 2

The ESP8266 is paired with the Arduino to help the microcontroller connect to the internet. This internet connectivity is essential to achieve cloud functionality. SIM800C GSM Module

Figure 3.8: GSM Module SIM800C
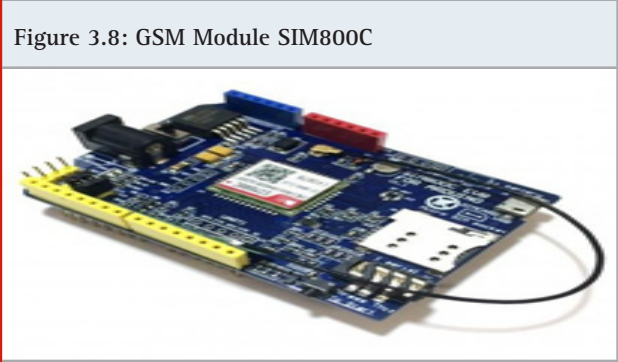
The SIM800C GSM module is paired with the Arduino to implement GSM connectivity. The GSM module allows the Smart Pill Box to send SMS alerts to mobile devices for better connectivity. This module is used to send alerts to the caretaker when the box is opened. This is also used to send urgent alert when the level of medicine in the box is critically low.

Figure 5.1: IR Sensor Module
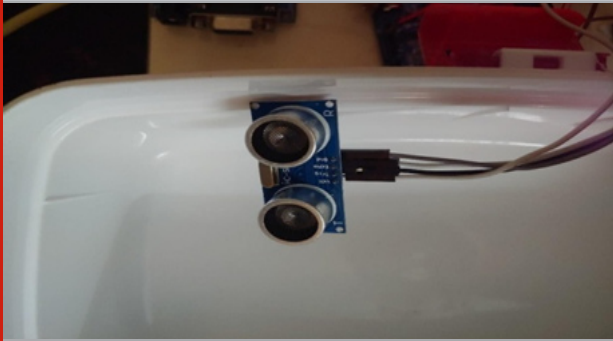
Figure 5.2: Ultrasonic Sensor
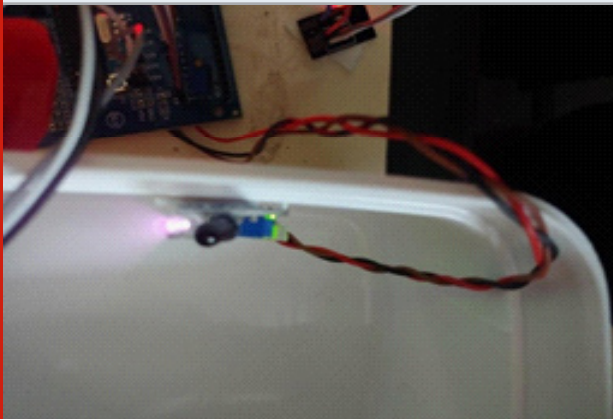
Figure 5.3: Arduino Uno in I/O Mode
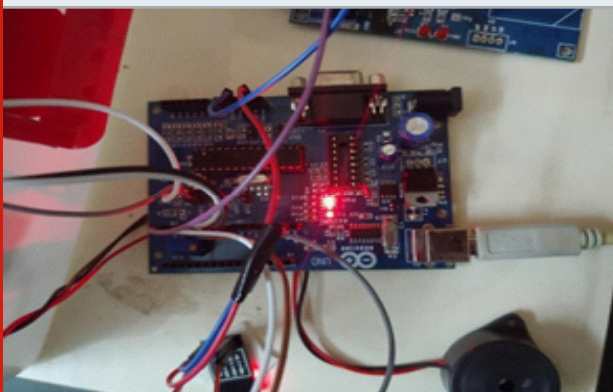
Reminder System: The reminder system in the Smart Pill Box uses a messging API to send text messages to the patient and the caretaker. The patient gets a message on the mobile 15 minutes prior to the time when the medicine is supposed to be taken. After getting the SMS, the patient can open the Smart Pill Box and take

the medications. (fig 5.4) When the patient takes the medication and the box is opened, an SMS alert is sent to the caretaker stating that the patient has taken the medication. So, if the caretaker has not received any notification, he/she can call the patient and remind him to take the medications.

Figure 5.4: GSM SIM800C Module
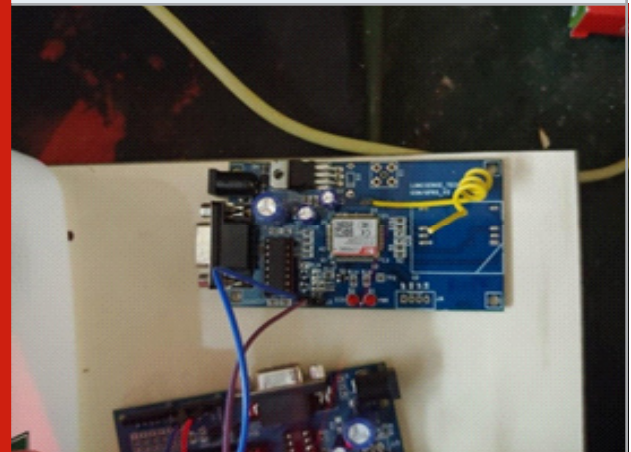
Patient Monitoring System: This section allows the caretaker and the doctor to keep track of if the patient is really taking the medication. IR module (fig 5.1) is used to get data if the Smart Pill Box was opened. Then this data is Uploaded on the Cloud. The cloud service used here is IoT Makers. It fetches data from the device in real-time and updates on the cloud.The IR sensor module is attached to the Smart Pill Box. This sensor provides data if the box was opened or not along with a time-stamp. This data, along with the time-stamp is uploaded on the cloud. The IR sensor data is also used to send an SMS alert to the caretaker if the box was opened.The ESP8266 is used for internet connectivity to achieve functions related to the cloud. An active Wi-Fi interne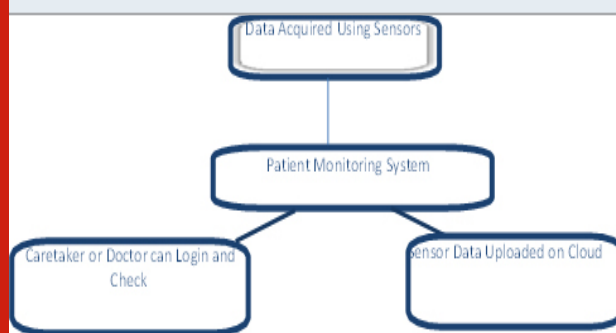t connection is required to send data to the Cloud and update. The ESP8266 connects to a Wi-Fi network and provides internet connectivity. IoT Makers is used to store real-time data on the cloud. The data is uploaded along with a time-stamp. The data includes if the box was opened. And the time at which the box was opened. This allowes the caretaker and the doctor to keep track of the medications of the patient

Inventory System: This system is used to keep a track of the medicine supply, so that medicine dosages are not missed when the Smart Pill Box runs out of medicine. This uses an Ultrasonic Sensor(fig 5.2) to detect the level of medicine in the box. This data is uploaded live on the cloud. The caretaker and the doctor can check it on the Web Page in real-time to get an idea about when the box may run out of pills.It also sends an SMS alert on the Mobile Phone of the patient when the box runs out of medicine. When the sensor senses a critically low level of medicine present in the box, it alerts the GSM module(fig 5.3), and an SMS alert is sent to the patient. This allows the patient to restock the supply of medicines before they run out. And this in-turn allows the patient to never

skip medicines due to unavailability of medicine supply. After development, remodeling and testing the product in different situations and conditions, detailed system wise results are provided in this section. Comments on obtained data, observed behavior, working accuracy, and reliability are also incorporated.

Reminder System: Below figures show the data obtained through an SMS alert seen by the patient and the caretaker

Figure 5.5: When the patient opens the box and takes the medicine

BOX_IS_OPENED TAKING_MEDICINE

Fig 5.6: Reminder received on the Patient End

It's a reminder to take your medicine.

Figure

LOW_MEDICINE_LEVEL

Fig 5.5 shows the text message received by the caretaker when the patient opens the box and takes the medicine. The accuracy of the IR Sensor used is 70-80%. Fig 5.6 shows an SMS alert received on Patient End to take the medications. Fig 5.7. Alert received by the patient when the Smart Pill Box has less medicines

Fig 5.7 shows the alert received by the patient when the level of medicines in the Smart Pill Box is critically low and may run out soon. The accuracy of the ultrasonic sensor is around 60-70%.

5.5Patient Monitoring System: This consists of the real-time cloud environment where the data gets uploaded and can be monitored by the caretaker and the doctor.

Figure 5.7: The Cloud Environment where the Data gets uploaded in real-time

Fig 5.8: Medicine Level, Status of Box and Time-Stamp Inventory System

Figure 5.9: Alert to restock the medicine supply

LOW_MEDICINE_LEVEL

This system alerts the patient to restock the medicine supply before they run out. It is done in advance to make sure that there is enough time to check the availability of medicines in the market and purchase them.

Figure 7: Snapshot of forecasting prototype

The caretaker and the doctor can also check the status of the medicine supply in real-time using the cloud web page. This helps the caretaker to get an idea of when the box may run out of medicines. The doctor can also keep a track of the stock available before prescribing any new medicaions.

CONCLUSION

This paper explains about a Smart Pill Box which can be used to improve the adherence of a patient to medications on a daily basis. It aims at elderly patients and patients

who have problems with remembering medicine dosages and time of taking medicines. All these problems are addressed using an array of sensors, IoT and cloud service. The Smart Pill contains an IR Module and an Ultrasonic sensor for gathering data. These sensors are attached to the box to sense if the box is open or closed. This gathered data is sent to the cloud server using ESP8266 Wi-Fi Module as a mode of connectivity. All the gathered data is thus stored in a cloud server which can be accessed by the caretaker and the doctor to monitor the medications of the patient in real-time. The SIM800C GSM Module is used to send SMS alerts to the patient and the caretaker.

It sends a reminder to the mobile number of the patient to take his medications 15 minutes prior to the time when the medicine is supposed to be taken. Then, an SMS alert is also sent to the caretaker regarding if the patient really took the medication. When the box is opened, an alert is sent to the caretaker. The other functionality of the GSM module is to send an alert to the patient when the supply of medications in low in the Smart Pill Box. When the ultrasonic sensor senses a critically low level of medication, it triggers I/O and an SMS alert is sent to the patient, so that he can restock his supply of medicines. This allows the patient to purchase the medicines before they actually run out. The Smart Pill Box dramatically reduces the occurrence of a patient missing his medications. This in-turn improves the efficiency of the effect of medicine on the disese.

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Analysis of Gain and Directivity of 5.6ghz Microstrip Patch Array Antenna

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ABSTRACT

Communication plays an important role in society for sharing the information between human beings and devices. To perform the better communication, antennas are widely used. There are different types of antennas with different specifications. Microstrip antennas play a very significant role in today's world of Wireless Communication systems. Circular polarization uses the features of linearly polarization. To increase the gain of the microstrip antenna, an antenna array is used. Bandwidth is amount of data that can be transmitted in a fixed amount of time. This can be increased by using 1*2 antenna arrays. One microstrip antenna covers a frequency range from 30HZ to 5.8GHZ. Therefore, to cover 5.6GHZ of frequency, the antenna array is used to 1*2. Also, various parameters like radiation pattern, directivity, gain, bandwidth and beam width of 1*2 circularly polarized microstrip antenna are analyze.

KEY WORDS: ANTENNA, MICROSTRIP PATCH ANTENNA, GAIN AND DIRECTIVITY.

INTRODUCTION

An antenna is an array of conductor. The radio waves are propagating through space and electric currents moving in metal conductors used with transmitter and receiver. Transmitter supplies the electric current to the antenna terminals. Receiver antenna interrupts the power in radio wave. Antenna is basically an electrical conductor and classified as omni directional which is radiating energy in all directions. An antenna is used to radiate electromagnetic energy efficiently and in desired directions. Antennas act as matching systems between sources of electromagnetic energy and space. An antenna acts as a transducer.

It follows the property called Reciprocity that is an antenna maintains its characteristics in transmitter section as well as in the receiver section. Most of the antennas are frequency dependent and they have to follow the same frequency band as of with the communication system. Impaired problem between transmitter and receiver can be avoided. Each antenna will act as a Band Pass Filter (BPF) which is designed for a certain range of frequencies and for remaining frequencies, it will reject the signal. Antennas play an important role in communication systems. In Telecommunication, antennas requirement has increased significantly. Smaller antennas are widely used in mobile communication and therefore many developments are carried out to design compact,

minimal weight, low profile antennas commercial uses. Among different types of smaller antenna, Micro Strip patch Antennas (MSA) plays a vital role in mobile communication.

MSA is a metallic strip antenna on a dielectric layer which is known as substrate over a plane. They are used for high performance applications. It is mainly used because of its smaller size, low cost and ease of production. Only some of the specific frequencies are used in MSA.

MATERIAL AND METHOD

Types of Antenna Micro Strip Patch Antenna: In telecommunication , MSA (also known an printed antenna) usually means an antenna fabricated using microstrip techniques on a Printed Circuit Board(PCB). It is kind of internal antenna. They are mostly used at microstrip frequencies .An individual microstrip antenna consists of a patch of metal foil of various shapes (a patch antenna)on the surface of metal foil ground plane on the other side of the board. Most microstrip antennas consist of multiple patches in a two-dimensional array. The antenna is usually connected to the transmitter or receiver through foil microstrip transmission lines. Microstrip antennas are made of any geometrical shape and dimension. It consists of a very thin metallic strip placed on a ground plane with a di-electric material in-between. The radiating element and feed lines are placed by the process of photo-etching on the di- electric material. The size of the patch will be square, circular or rectangular in shape for the ease of analysis and fabrication.

Reflector Antenna:

Figure 1: Reflector Antennas

A reflector antenna which is shown in Fig.1 is a device that reflects electromagnetic waves. Antenna reflectors can exist as a standalone device for redirecting radio frequency energy, or can be integrated as part of an antenna assembly.

Parabolic Antenna: A parabolic antenna shown in Fig.2 is an antenna that uses a parabolic reflector, a curved surface with the cross- sectional shape of a parabola, to direct the radio waves. The most common form is shaped like a dish and is popularly called a dish antenna or parabolic dish.

Figure 2: Parabolic Antenna

The main advantage of a parabolic antenna is that it has high directivity. It functions similarly to a searchlight or flashlight reflector to direct the radio waves in a narrow beam, or receive radio waves from one particular direction only. Parabolic antennas have some of the highest gains, and they produce the narrowest beam width.

Design Equations
Design equation for microstrip patch antenna

Width of an Antenna:

$$W = C / [2f_0 \sqrt{\varepsilon_r} + 1)/2]$$

Where, W=Width of the patch, C=Velocity of light(3×10^{11}mm), $f0$=Resonant frequency, ε_r= Dielectric constant of substrate.

Length of an Antenna:

$$L = 1/2 \ fc \sqrt{\varepsilon_0} \varepsilon_r \mu_0$$

Where, L=Length of the patch

ε_0= Permittivity, f_c=Critical frequency, μ_0=Permeability, ε_r=Dielectric constant of substrate

Bandwidth of an Antenna:

$$BW = \frac{S-1}{q_0 \sqrt{s}}$$

Where, Q=Quality factor
Directivity of an Antenna:

$$D = \frac{2h^2 E_0^2}{P_{r\pi} \eta_0}$$

Where, η=Efficiency, h=Thickness

RESULTS AND DISCUSSION

Simulation Output

Figure 3: 1*1 Microstrip patch antenna
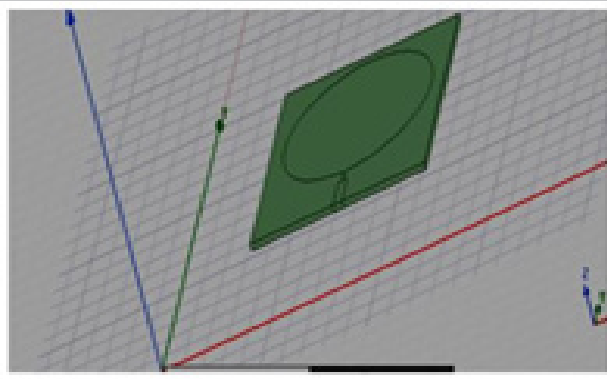
The normal microstrip patch antenna shown in Fig.3 contains the range using 5.6 GHz in 1*1 antenna. Using circular patch polarized microstrip patch antenna are stimulated. Direct feed lines are used to design the microstrip patch antenna. In s-parameter the obtained range is -26.69, VSWR getting the ranges upto 0.8039, the directivity contains the parameter getting the value 3.13 in first case and gain also carry the range -2.79.

Figure 4: 1*2 Microstrip patch antenna
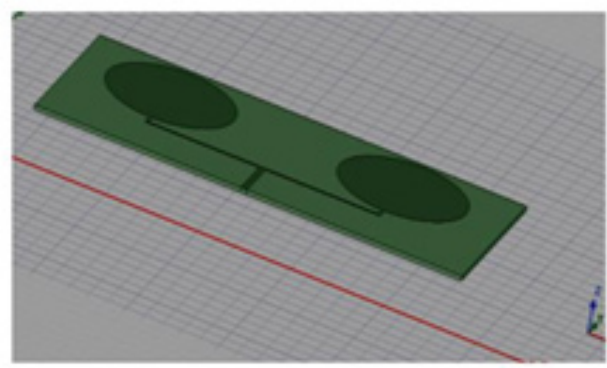
The normal microstrip patch antenna shown in Fig.4 contains the range using 5.6 GHz in 1*2 array antenna. Using circular patch polarized microstrip patch antenna are stimulated. Direct feed lines are used to design the microstrip patch antenna. In s-parameter the obtained range is -10.4, VSWR getting the ranges upto 5.41, the directivity contains the parameter getting the value 8.08 in second case and gain also carry the range3.48. By comparing 1*1 and 1*2 the 1*2 contains the highest directivity and gain in designed antennas.

Comparison chart: The comparison between 1*1 and 1*2 antenna array is shown in Table.1. From the table, gain and directivity of an antenna is increased when an antenna array is increased. Also the reflection coefficient is reduced.

Table 1. Comparison between 1*1 and 1*2

ANTENNA ARRAY	S PARAMETER	VSWR	DIRECTIVITY	GAIN	AXIAL RATIO
1*1	-26.69	0.8039	3.13	2.79	89.04
1*2	-26.74	0.8025	8.08	3.48	102.45

CONCLUSION

In this paper, microstrip patch antenna is plotted and which is simulated in same frequency of 5.6GHz. In the first case the operating frequency using 1*1 array matrix of normal microstrip patch antenna maintains the frequency range, directivity, gain, width upto 5.6GHz. Comparing the first case the second case contains the operating frequency using 1*2 array matrix which is two microstrip patch antenna which is greater than the first case gain and directivity also increases.

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Relative Speed Control for Vehicles by Pothole Detection

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ABSTRACT

Roads are the primary method of transportation. Since these roads are utilized habitually there happens mileage which prompts the development of pothole. An occasional support is required. It is preposterous to expect to keep up every single spot and henceforth this upkeep is not performed frequently. In India almost 30% of street mishaps brought about by pothole on both rural and urban territories. This paper examines about the discovery of potholes and figuring the factor by which the speed of the vehicle must be decreased with the goal that road accidents could decay to a base level. Image processing techniques have been utilized to distinguish the pothole. Strategies like Canny edge detection are utilized for viable identification of pothole.

KEY WORDS: SPEED CONTROL, CANNY EDGE DETECTION, IMAGE PROCESSING.

INTRODUCTION

A pothole is a downturn in a street surface, normally black-top pavement, where traffic has evacuated broken bits of the pavement. It is normally the consequence of water in the hidden soil structure and traffic ignoring the influenced region. Water initially weakens the basic soil; traffic at that point breaks the ineffectively supported black-top surface in the influenced region. Proceeded with traffic activity launches both black-top and the basic soil material to make a gap in the pavement. As indicated by the US Army Corps of Engineers, formation of pothole requires two components to be available simultaneously: water and traffic. Water debilitates the dirt underneath the pavement while traffic applies the heaps that pressure the pavement past the limit. Potholes structure logically

form fatigue of the street surface which can prompt a precursor disappointment design known as crocodile cracking. Eventually, lumps of pavement between the exhaustion splits bit by bit work free, and may then be culled or constrained out of the surface by proceeded with wheel burdens to make a pothole.

Potholes can develop to a few feet in width; however they normally just create to profundities of a couple of inches. On the off chance that they become huge enough, harm to tires, wheels, and vehicle suspensions is subject to happen. Genuine street mishaps can happen as an immediate outcome, particularly on those streets where vehicle speeds are greater.Answering to an inquiry on the passings because of potholes, the service said that in 2018, an aggregate of 4,869 mishaps occurred on streets with potholes and 2015 people were executed on these

streets. In 2017, again the greatest number of passings because of potholes occurred in Uttar Pradesh with 987 cases followed by Maharashtra with 726 passings and Haryana with 522 fatalities.

MATERIAL AND METHOD

Linear actuator: An electric linear actuator is a gadget that changes over the rotational movement of an air conditioner or DC engine into straight movement – that is, it will give both push and pull developments. By pushing and pulling it is conceivable to lift, drop, slide, alter, tilt, push or pull objects, essentially by pressing a catch. Also, Straight Actuators furnish a sheltered and clean development with precise movement control that you, the administrator have full command over. They are vitality effective and have a long lifetime with next to zero support. A linear actuator has a long lifetime with practically no support by any stretch of the imagination. This guarantees an extremely low complete working expense contrasted with other systems

IR sensor: An IR sensor comprises of two sections, the producer circuit and the beneficiary circuit. This is by and large known as a photograph coupler or an optocoupler. The producer is an IR Driven and the locator is an IR photodiode. The IR photottdiode is touchy to the IR light radiated by an IR Drove. The photograph diode's opposition and yield voltage change in relation to the IR light got. This is the basic working standard of the IR sensor. The kind of rate can be immediate frequency or circuitous occurrence. In direct rate, the IR Drove is put before a photodiode with no hindrance in the middle.

Arduino: The Arduino Uno is an open-source microcontroller board dependent on the Microchip ATmega328P microcontroller. It comprises of a circuit board, which can be programed (alluded to as a microcontroller) and an instant programming called Arduino IDE (Coordinated Advancement Condition), which is utilized to compose and transfer the PC code to the physical board.

Relay: Relays are switches that open and close circuits electromechanically or electronically. Many relays use an electromagnet to operate a switch,but other operating principles are also implemented such as solid-state relays. Relays are used in place where it is necessary to control a circuit by a separate low-power signal, or where several circuit should be controlled by signal.

Lead acid battery: The capacity battery or auxiliary battery is such a battery where electrical energy can be put away as chemical energy and this chemical energy is then changed over to electrical energy as and when required. The change of electrical energy into chemical energy by applying outer electrical source is known as charging of battery.

Process Description: The block diagram for proposed method is shown in figure 1 which depict the process of

image acquisition, python algorithm, calculation of brake actuation time, and controlling of vehicle speed.

The pothole image captured is acquired and processed as 2D array. To detect the pothole first the image is grey scaled and blurred after which the edges are detected by canny edge detection technique. Finally the reduction factor is calculated which sets the actuation time for the brake to control the vehicle speed.

Figure 1: General block diagram of the process
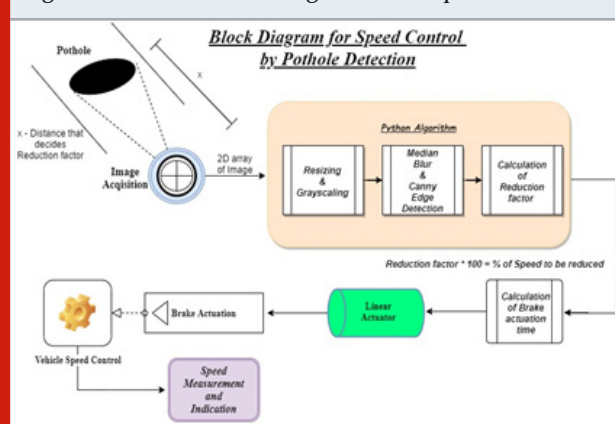
Image processing process: Image processing has various phases of procedure. First stage incorporates catching of video by the camera module which is interfaced with Arduino. In other words, it accepts input as a video. Every edge of video is separated and singular edge is considered as a image and has been prepared. The processed image is then changed over from RGB picture into gray scale by utilizing standard strategies to make picture preparing quicker.

Figure 2: Flowchart of image processing
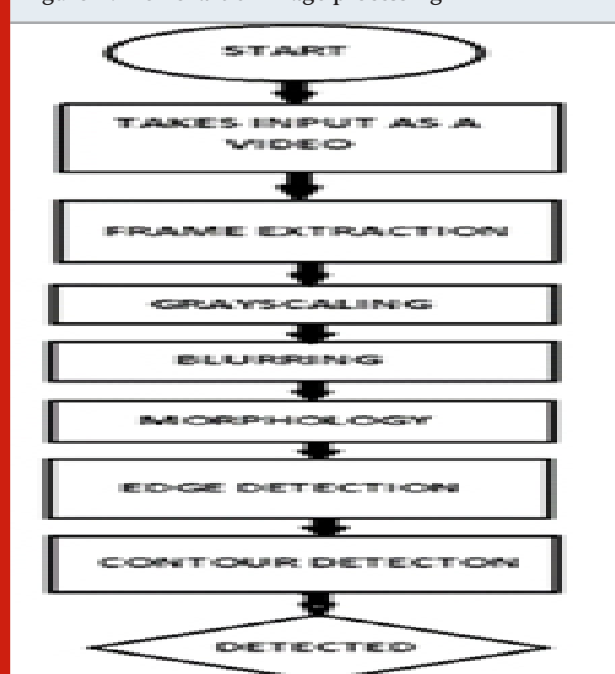
Subsequent to changing over into gray scale, various sorts of blurs on the picture in order to expel undesirable noise from the picture Averaging, Gaussian filter, and Median blur are performed. For accomplishing progressively precise edge we alter the procedure utilizing morphological activity. These activities are commonly nonlinear tasks are which is completed relatively on requesting of pixels without changing their numerical qualities. Disintegration and enlargement are the key administrators for morphological tasks. First we have utilized disintegration subsequent to obscuring which is then trailed by widening.

Otsu's technique have been utilized for lessening the dim level picture to a paired picture. The calculation that we use accept that the picture comprise of two kinds of pixels following bi-modular histogram which is only forefront pixels and foundation pixels. It then ascertains the ideal edge by isolating the two classes so that their intra-class change is least and their inter-class fluctuation is maximal. For better precision of the picture utilize binary image by applying edge and canny edge recognition. Contours are a bend joining every single persistent point having same shading and force. Contours are utilized for object acknowledgment, object discovery and shape examination. In this manner they are valuable instrument in pothole location framework.

Speed Measurement and Control: Speed measurement circuit consists of IR sensor. The IR sensor module consists of IR Transmitter & Receiver in a single pair that can work a Digital Tachometer for speed measurement of any rotating object. An IR sensor consists of an IR LED and an IR Photodiode; together they are called Photo–Coupler or Opto–Coupler. The Infrared Obstacle Sensor has a built-in IR transmitter and IR receiver. Infrared Transmitter is a light-emitting diode (LED) which emits infrared radiations. Hence, they are called IR LED. Even though an IR LED looks like a normal LED, the radiation emitted by it is invisible to the human eye. Infrared receivers are also called as infrared sensors as they detect the radiation from an IR transmitter.

Figure 3: Circuit diagram for Speed Measurement
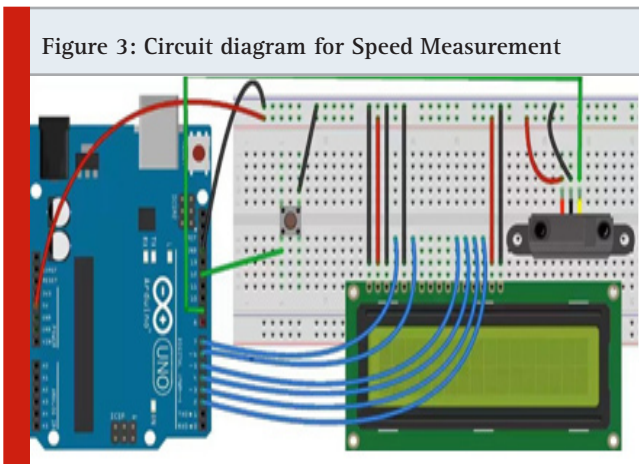
IR receivers come in the form of photodiodes and phototransistors. Infrared Photodiodes are different from normal photodiodes as they detect only infrared

radiation. When the IR transmitter emits radiation, it reaches the object and some of the radiation reflects back to the IR receiver. The output of the sensor is defined based on the intensity of the reception by the IR receiver.

PWM DC motor control: The L298N is a dual H-Bridge motor driver which allows speed and direction control of two DC motors at the same time. The module can drive DC motors that have voltages between 5 and 35V, with a peak current up to 2A. The module has an onboard 5V regulator which is either enabled or disabled using a jumper. If the motor supply voltage is up to 12V we can enable the 5V regulator and the 5V pin can be used as output, for example for powering our Arduino board. But if the motor voltage is greater than 12V we must disconnect the jumper because those voltages will cause damage to the onboard 5V regulator. In this case the 5V pin will be used as input as we need connect it to a 5V power supply in order the IC to work properly.We can note here that this IC makes a voltage drop of about 2V. So for example, if we use a 12V power supply, the voltage at motors terminals will be about 10V, which means that we won't be able to get the maximum speed out of our 12V DC motor. Next are the logic control inputs. The Enable A and Enable B pins are used for enabling and controlling the speed of the motor. If a jumper is present on this pin, the motor will be enabled and work at maximum speed, and if we remove the jumper we can connect a PWM input to this pin and in that way control the speed of the motor. If we connect this pin to a Ground the motor will be disabled.

Figure 4: Motor driver and speed control of DC motor
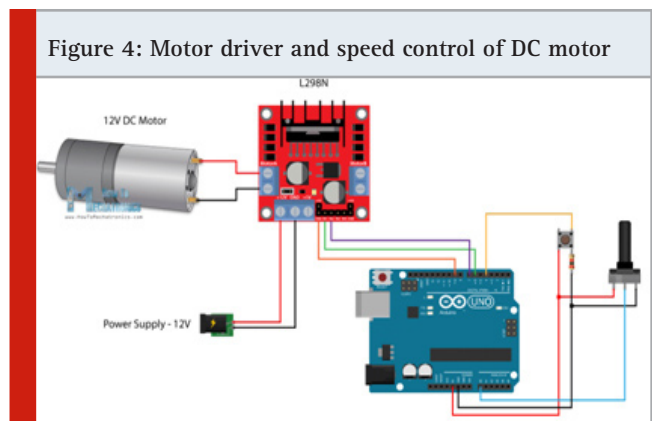
Braking system
Disc brakes generate an incredible amount of stopping power, usually far more than is necessary to adequately stop a road bicycle. This allows the rider to apply much less force to the lever before the bike comes to a halt. This reliability allows you to accurately judge how much force you need to apply in order to achieve the expected result.

Brake actuator: A Linear actuator is used to actuate the braking system in vehicle.The actuator is energized for a particular time gapdepending upon the ratio factor derived from the image. In a normal braking system the time gap is to bedecided by the speed of the vehicle, but

in advanced braking systems a small amount of fixed time gap is provided

RESULTS AND DISCUSSION

The video has been captured by camera and the image is processed by different stages of techniques and we hence obtained a detected and processed image as shown in the figure below

Figure 5: Series of pothole detected

For better precision of the image utilize binary image by applying edge and canny edge identification. Contours are a bend joining every ceaseless point having same shading and intensity. Contours are utilized for object recognition, object location and shape examination. Hence they are helpful instrument in pothole recognition framework. The process after taking the input as video and extraction of frames and converting the RGB image into grayscale image, by performing different blurs on the image with some morphological operation and edge detection techniques we obtain different series of potholes.

Figure 6: Fresh and detected image

A clear information about the white pixel and black pixel that is encountered. The distance of pothole from the vehicle can be measured and the corresponding speed is reduced.

Ratio factor obtained from the processed image is the reducing factor or percentage of speed to be maintained. Measured speed is and the ratio factor is now compared to obtain the speed reducing factor. Assuming that the speed of the vehicle is 60 Km/h and the ratio factor obtained from the processed image is 0.75, so the reduced speed must be minimum of 60 * 0.75 = 45 km/h. After detecting the pothole by camera the speed is measured and is reduced by the program developed. Thus the speed is reduced by the ratio factor obtained from the processed image. The measured speed and the ratio factor is compared to obtain the speed reducing factor.

Figure 6: Processed image
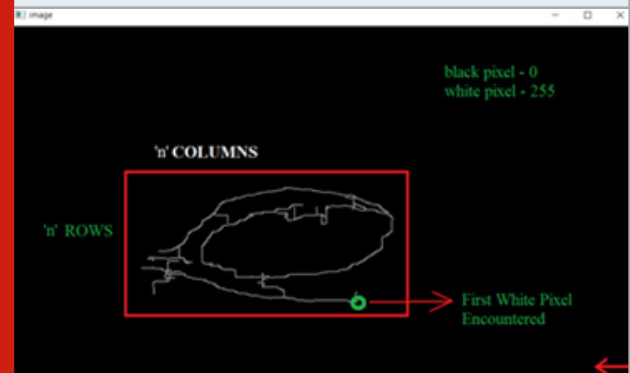
CONCLUSION

Potholes have only negative impacts and thus it must be killed as quickly as time permits. The present framework incorporates the utilization of manual recognition by individuals who are happy to contribute for the improvement of the street. The framework will be introduced in a fixed situation on the front lamp of the vehicle which guarantees less dealing with. Likewise, this framework monitors the carelessness and deferral. The framework utilizes Arduino, which has an ease and high similarity with different interfaces, we likewise utilize 2D vision-based methodology, and this makes our framework progressively moderate. The framework recognizes potholes in time and furthermore quantifies and decreases the speed of the vehicle with the assistance of linear actuator without harming the vehicles for potholes recognition.

Future Scope: The rise of accidents due to pothole can be prevented. We have quite recently used to distinguish the picture that we previously put away. But in future we have wanted to introduce camera in the front light of the vehicle and it catches the street consistently and when it distinguishes the pothole it decreases the speed. The arrangement can be a real time application. By measuring the distance and controlling the speed one can avoid pothole easily. This can be applicable to both rural and urban areas.

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A Compact Multiband Metamaterial Antenna for UMTS,Wimax and WLAN Applications

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ABSTRACT

A compact rectangular monopole antenna loaded with ELC (Electric field Coupled resonator) and CSRR (Complementary Split Ring Resonator) is proposed for obtaining multiband resonance characteristics. The size of the proposed antenna is 23x12.8x1.6mm3 which is designed on FR-4 substrate having dielectric constant 4.4.The metamaterial element CSRR offers negative permittivity characteristics and ELC offers negative permeability characteristics for achieving good impedance matching, multiband and antenna miniaturization

KEY WORDS: CSRR, ELC, METAMATERIAL, NEGATIVE PERMEABILITY, NEGATIVE PERMITTIVITY..

INTRODUCTION

In recent scenarios, metamaterial element emerges for improving the performance of antenna. The first theoretical speculation of the existence of metamaterial has been made by Veselago which could exhibit negative permeability and negative permittivity characteristics (Md.Moinul Islam et al,.2015). Metamaterials produces artificial electromagnetic properties that can be used to enhance the new era in microwave devices (Dushyant Marate et al,.2018).

ELC based metamaterial element is used to improve the performance of the antenna such as dual band antenna design (R.Samson Daniel et al,.2018) and bandwidth improvement (R.Samson Daniel et al,.2017).CSRR

creates negative permittivity characteristics due to pass band behavior (R.Samson Daniel et al,.2018). It offers multiband characteristics (R.Samson Daniel et al,.2017), bandwidth improvement (Bo Yuan et al,.2017), antenna miniaturization (Tanweer ali et al,.2017) and impedance matching (Ramasamy et al,.2014).

Since multiband antennas are in compact size, cost effectiveness, they are widely used in wireless devices (Raphael et al,.2017).Several design techniques has been developed for the design of multiband antenna. By using metamaterial structure multiband and antenna miniaturization have been achieved (Raphael et al,.2017). In order to improve the performance of the antenna metamaterial embedded antenna were used due to their unprecedented electromagnetic properties (Imaculate et al,.2015).In this paper, metamaterial element ELC and CSRR based antenna is proposed for obtaining multiband and 84% of antenna miniaturization.

MATERIAL AND METHOD

The configuration (a) consists of traditional rectangular radiating patch. FR4 substrate is used for antenna design,

having dielectric constant of 4.4. In the configuration (b) the new metamaterial element known as Electric Field Coupled Resonator (ELC) has been introduced in the ground plane. It changes the resonance characteristics of conventional ground plane and offers better impedance matching and dual band resonance characteristics. In the configuration (c) Complementary Split Ring Resonator (CSRR) is introduced to obtain a lower resonance frequency for realizing antenna miniaturization.

RESULTS AND DISCUSSION

Fig 3 depicts the simulated reflection co-efficient (S11) dB of the proposed antenna. It shows that metamaterial patch antenna does not offer good impedance matching.

When the ELC is introduced (configuration b) in the ground plane it offers a dual resonance frequencies of 3.51 GHz and 5.40 GHz. CSRR embedded monopole antenna (configuration c) alters the current patch and creates a lower resonance frequency at 2.1 GHz. Thus the proposed antenna resonances at 2.1 GHz,3.51 GHz and 5.40 GHz for UMTS,WIMAX and WLAN applications.

Figure 1: Design steps of the proposed antenna

Figure 3: Simulated S_11(dB) of the design steps.
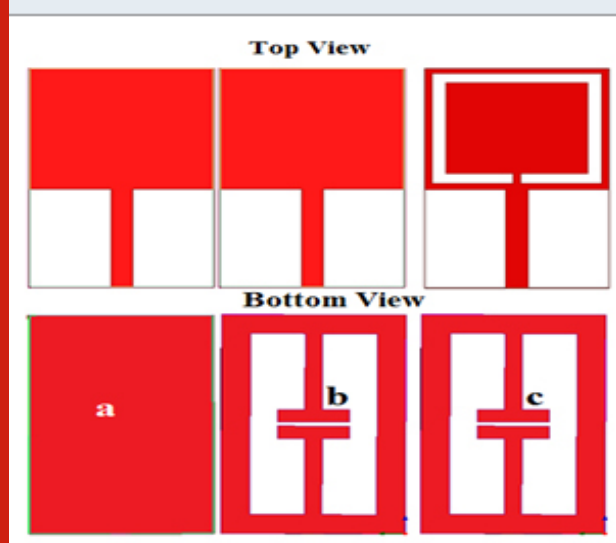
Figure 2: Top view and bottom view of proposed antenna.
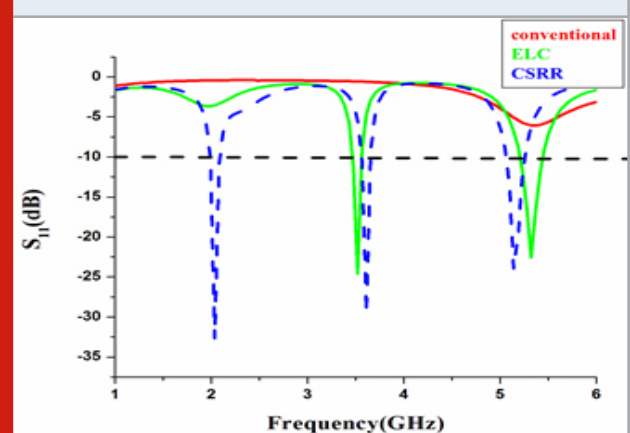
Figure 4(a),4(b),4(c): Far Field Radiation Patterns

Table 1. Dimensions of the proposed antenna

PARAMETERS	DIMENSIONS(mm)
Ls	23
Lc	8
Lf	10.3
Lp	12.7
Wp,Ws	12.8
W1	1.5
W2	5
T	2
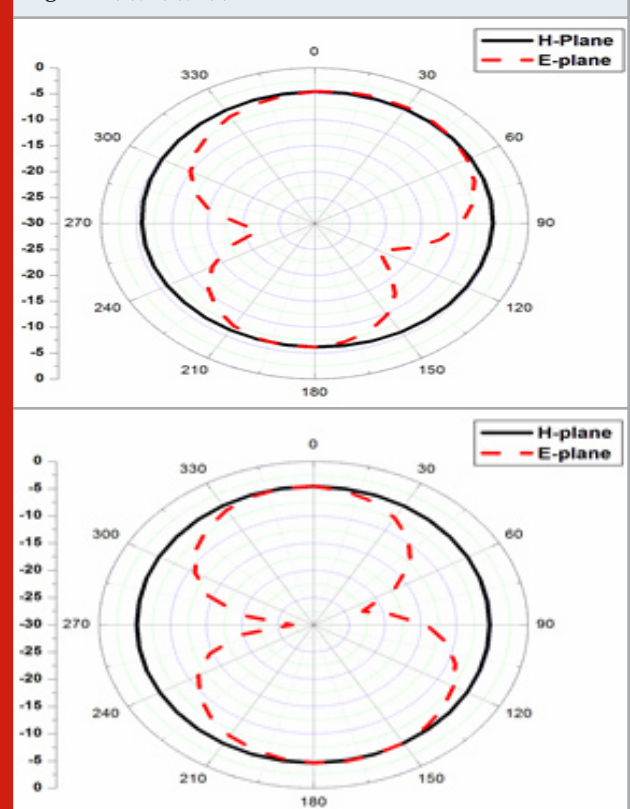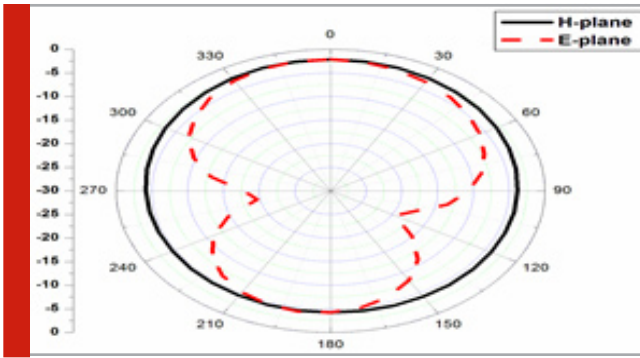
The E-plane and H-plane radiation patterns of proposed antenna at 2.1 GHz, 3.51 GHz and 5.40 GHz are shown in Fig 4 (a), 4 (b) and 4(c) respectively. It covers desired directions of the proposed antenna.

Figure 5: Parametric analysis of CSRR slot width.
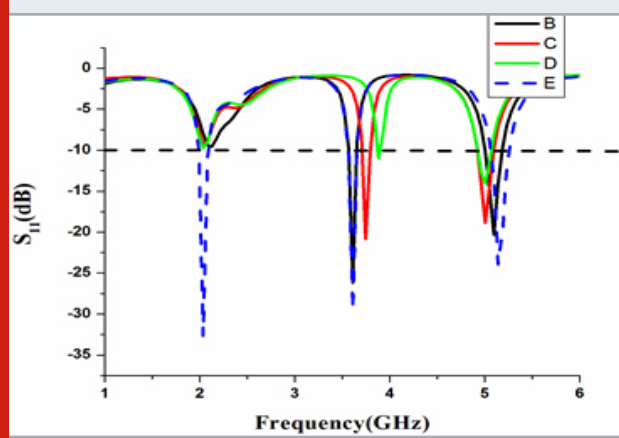
The parametric analysis of slot width is shown in Fig.5. The slot width is varied from 2 mm to 0.5 mm in steps of 0.5 mm. It is inferred that the optimum performance is achieved at slot width= 0.5 mm.

Figure 6: Capacitance effect of ELC.
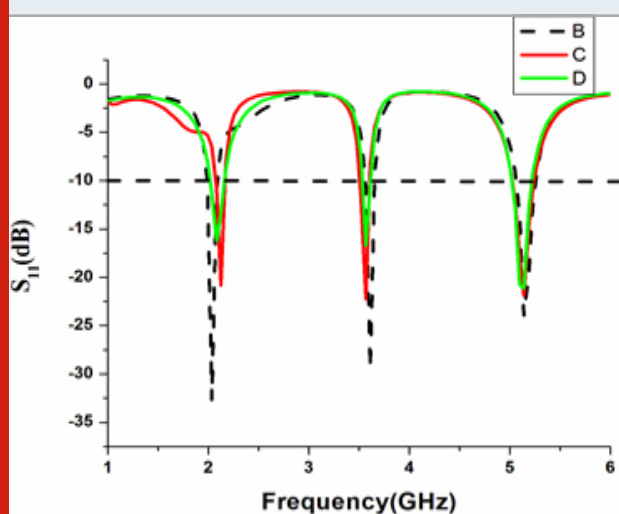
The ELC metallic loop on the ground plane governs the inductance effect (L) and the split gap governs the

capacitance effect. The split gap is varied from 1.7 mm to 1.3 mm in steps of 0.2 mm which is shown in Fig 6. The capacitance plays an essential role for attaining good impedance matching. Thus the better impedance matching is obtained at 1.3 mm.

ELC based metamaterial element creates negative permeability(μ) characteristics due to stop band (S_{21}). Similarly CSRR offers negative permittivity (ε) characteristics due to pass band(S_{11}). Effective medium theory [12] is utilized to retrieve the S-parameters (S_{11} and S_{21}). From these S-parameters the negative permeability and negative permittivity are computed using NRW equations [5].

$$\varepsilon_r = \frac{2}{jk0d} \times \frac{1-v1}{1+v1} \tag{1}$$

$$\mu_r = \frac{2}{jk0d} \times \frac{1-v2}{1+v2} \tag{2}$$

Where

$v_1 = S_{21} - S_{11}$

$v_2 = S_{21} + S_{11}$

The metamaterial properties of ELC element are shown in Fig 7. It creates a negative permeability at 3.48 GHz due to stop band behavior.

Figure 7: Negative permeability characteristics
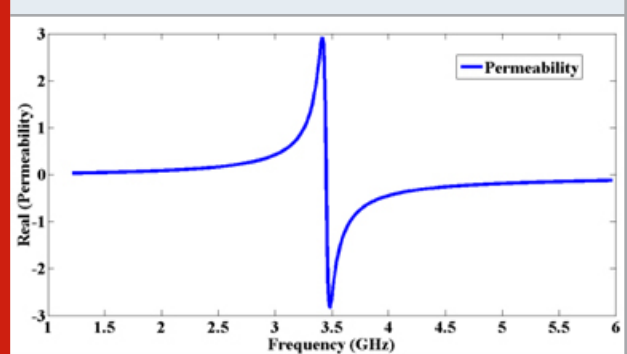
Similarly the negative permittivity characteristics of CSRR are shown in Fig 8. It offers negativepermittivity at 2.1 GHz due to pas band. Hence the metamaterial element can be used to enhance the antenna performances by unusual electromagnetic properties.

Figure 8: Negative permittivity characteristics

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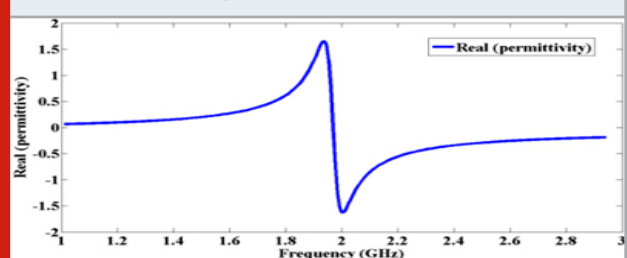
CONCLUSION

In this paper, the compact rectangular monopole antenna loaded with ELC and CSRR is proposed for obtaining multiband resonance characteristics. Here CSRR offers the negative permittivity and ELC offers negative permeability for achieving good impedance matching, multiband and antenna miniaturization.

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Conversational Model Using Neural Machine Translation

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ABSTRACT

The idea of creating a conversational model has been around for decades but due to restraints in computational power and lack of well-documented data, most of these ideas remained as such until the recent growth in the field of Artificial Intelligence (AI) and information processing systems like Neural Networks. In regards to conversational models, the Sequence-to-Sequence (Seq2Seq) models have shown wild success. These models have shown notable success in Neural Machine Translation (NMT), the most popular implementation of it would be Google's Neural Machine Translation (GNMT) that is used to translate between languages. This brought about the thought of using a Seq2Seq NMT model that, rather than translating between languages, would converse with the user in the same language. With the growth of the internet, it is now an easy task to gather well-documented data in order to train the neural network, in this case, we have used datasets that cover a wide range of topics. This paper proposes the use of a Seq2Seq NMT Model in order to create a conversational model that delivers responses to the user in the same language and implement it on the Facebook Messenger.

KEY WORDS: SEQ2SEQ - SEQUENCE-TO-SEQUENCE, NMT – NEURAL MACHINE TRANSLATION, GNMT - GOOGLE'S NEURAL MACHINE TRANSLATION, CHATBOT.

INTRODUCTION

Artificial Intelligence (AI) is the computer program replicating the process of human intelligence. Those process generally comprises the ability to learn, reasoning and self-correction. Most of the creations of Mankind have been imitations of nature and similarly, in order to create an information processing system that could help a computer system process information the way humans do, we created Artificial Neural Networks. Through recent breakthroughs in Neural Networks and overcoming bottlenecks in computational power, it has become possible for computers to process information, to a certain degree, in the way that a human might.

A Chatbot is a conversational interface that utilizes auditory or textual methods to retain a conversation. In general, similar programs are designed to simulate how a person will converse in any given circumstance.

Traditionally these Chatbots have been built based around rules and on a set number of topics, but this greatly limits the capabilities of the system. As a result of the breakthroughs in AI (Artificial Intelligence) and Neural Networks, it has become possible to use Neural Networks in order to process large amounts of data and simulate human conversation without rules by using Artificial Intelligence. This greatly Improves the functionality

of the system as the bot will no longer be restricted to conversations based around set rules and the domain of the conversation will depend entirely on the data that the model is trained on, thereby allowing flexibility in the range of topics that the model could converse about. Some chatbots use advanced natural language processing systems, but many simpler ones search for keywords within the text, then pull a answer from a database with the most appropriate keywords, or the most similar wording pattern.

The use of systems will greatly impact businesses in areas such as Customer Relationship Management (CRM) and could also be deployed in low level service-related tasks such as ordering of food and sales. As we have seen in certain parts of the world, robots are being used in simple manual labor with a focus on functionality; implementing Chatbots on these robots could substantially increase their functionality and make them more user friendly.

MATERIAL AND METHOD

Neural Machine Translation: When selecting a model to train the chatbot on, there are many available options but, the most successful is undoubtedly the Sequence-to-Sequence (Seq2Seq) model which has shown great success in fields of machine translation and speech recognition. One use of Seq2Seq models is in Neural Machine Translation (NMT) which was the first testbed for these models that showed rampant success.

Traditionally this model is used in translation between languages as the model reads the source sentence, understands the context and meaning behind it, and then translates it. This showed great success as older models would tokenize the source and then translate it phrase by phrase, which leads to a more artificial translation rather than how humans would normally converse. This method of translation leads to the thought of whether the model could be deployed in a scenario where it doesn't translate between languages, but rather converses in the same language. This means that the model will read the source sentence, understand the context and meaning behind it, and then reply to the source in the same language.

The model used here is a slightly modified version written by Daniel Kukiela. This RNN is a bidirectional deep multi-layer RNN, utilizing Long Short-Term Memory (LSTM). There are two RNN's being used here, one each in the encoder and decoder. The model uses the encoder to translate the root expression to construct a "thought" vector which is a sequence of quantities reflecting the meaning of the sentence. This thought vector is an important factor as there are multiple, if not millions, of responses that can arguably be a correct response to a sentence. This thought vector assigns values so that answers are more accurate with the context. The decoder, then, processes the input passed to it from the encoder in order to give a response.

The main difference in the model proposed by Daniel Kukiela is that the tokenizing is done using a BPE/WPM-like (sub word) tokenizer. It is similar to the standard tokenizer but was modified in order to maximize efficiency and cater to our specific needs. This tokenizer is somewhere between char tokenizing and word tokenizing, it splits every entity by char, counts most common pairs of chars, and finally joins the pairs to make a vocabulary of desired number of tokens.

Encoder: Once the phrase has been tokenized, it is passed through two multi-layer RNN's- an encoder and a decoder. These RNN's are trained using different weights even though using the same weights, in practice, should give the same result. The main purpose of the encoder is to process the input in order to comprehend the context and purpose of the phrase so that the decoder can respond to it properly.

Decoder: The Decoder has the purpose of talking the output fed from the encoder and producing a response based on the data gathered from reading the millions of responses in conversations fed during the training phase of the bot. We will take a look at the training phase of the bot in more detail later.

Memory Adapter: The memory adapters provide an interface for connecting Chatbot to different storage technologies. You can define the memory adapter which your bot uses by setting the parameter storage_adapter to the import path of the memory adapter you want to use. The chatbot by default runs under the SQL (Structured Query Language) storage adapter, classchatterbot. storage. SQLStorageAdapter(**kwargs). The SQL (Structured Query Language) Storage Adapter enables Chatbot to store the conversation data in any SQL Alchemy ORM (Object Relational Mapper)-supported database. All configurations are optional, and a sqlite3 database is used by default. It will check if tables are available, seek to build the appropriate tables if they are not.

RESULTS AND DISCUSSION

Phases of Conversational Model: There are three main phases in the development of this conversational model. These phases each have unique purposes that are instrumental for the running of the bot.

Prior Processing: Prior processing relates to modifications that were applied to the data before they are fed into an algorithm or neural net. It is possible to use a dataset that has already been pre-processed as there are a large number of these available on the internet. These datasets might be enough for a personal project but if the model is to be used practically, it will become necessary for pulling data from the internet in the form of raw data and then performing transformations in order to clean the noise in the data. One of the best ways to retrieve such useful data is through the twitter API(Application Program Interface) which allows you to pull a number of tweets based on some parameters. In our case, we have

passed through some already pre-processed data that cover a wide range of domains.

Figure 3.1: Screenshot of database in prior processing

Training: Training is the most important part of any deep learning project. The training phase includes loading example conversations into the data base of the chatbot and passing these examples through the Recurrent Neural Network in order to ascertain the weights to be set to each neuron. It either establishes or builds upon the structure of network data that describes the sets of known statements and responds. Once a data set is given to the model trainer, it generates the necessary entries in the knowledge graph of the chat bot so that inputs and responses of the statement are represented correctly. The accuracy is little difficult to test due to the millions of appropriate responses to any given question.

Figure 3.2: Screenshot of training the chatbot using datasets.

Figure 3.3: Screenshot of training the chatbot using datasets

Implementation: In order to test the capabilities of the bot, we decided to deploy it on the largest social media platform, that is, Facebook. This would help demonstrate how useful chatbots can be to businesses as they could run on their social media pages and help them gain customers, increase traffic and improve their reputation. The Facebook Messenger has a familiar UI that users will be comfortable using/ making it the most approachable platform.

Figure 3.4: Screenshot of server connectivity.
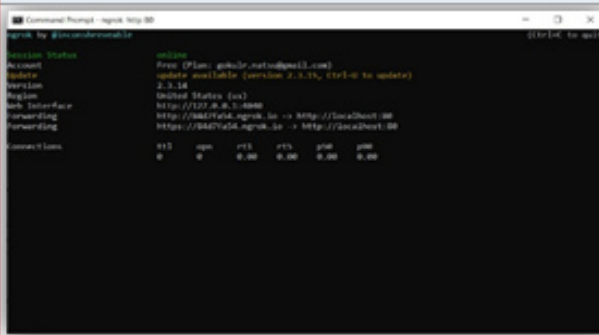
1. Screenshot

Figure 4.1: Test screenshot of Chatbot conversation with user.
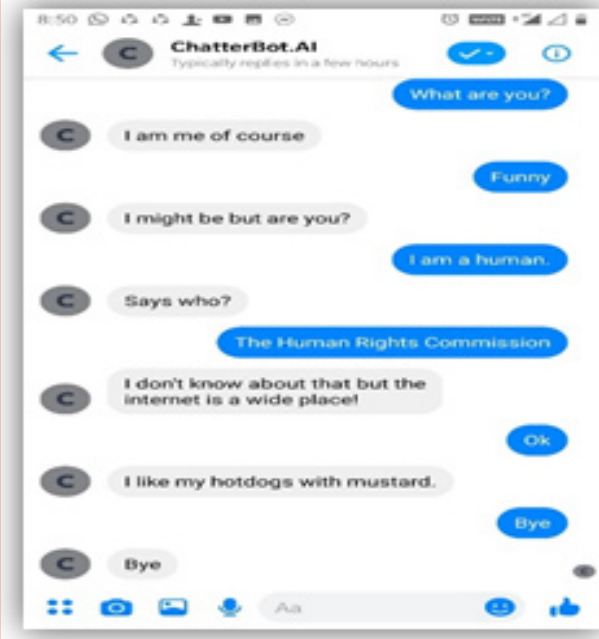
CONCLUSION

Through the implementation of this Chatbot it has been made clear that Customer Relationship Management systems could benefit greatly with the services it could provide such as prompt responses and around the clock availability. Implementation of it on social media platforms could be a game changer in terms of marketing as the reach of the chatbot greatly increases and users can converse with their interested brands or services thus gaining them positive reputation and feedback from the user which can be integral for the growth of

the business. Further improving the system could help it take up the role of online therapists or help users with more sensitive topics such as mental health and illnesses which they might not feel comfortable talking with another person.

Future Enhancement: The current Chatbot could improve in many ways, from implementing better Natural Language Processing (NLP) techniques in order to clearly comprehend the context and dialog flow of a conversation, to changes in the model used in order to allow for better efficiency. The most welcome change would be the inclusion of better methods to hold context in longer conversations to best represent the user and API calls, that make better use of the tokenization to actual representation of user and make full use over internet functionalities the system is offered.

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Hardware Implementation of Robust 2-D Image Watermarking Using DHWT and Raspberry Pi

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ABSTRACT

In this paper, we propose the blind two dimensional image watermarking method based on Double Haar Wavelet Transform (DHWT) and its implementation using Raspberry Pi 3 for protection and authentication of the data. The proposed watermarking method offers perfect mid frequency band which is the primary necessity of a superior watermarking method with good imperceptibility and robustness. Eigen values of the mid frequency band of host image obtained using DHWT is modified with that of the binary watermark image multiplied with an appropriate strength factor. In this paper, implementation of the proposed algorithm in Raspberry Pi 3 has also been presented. Experimental analysis of simulation and hardware implementation of proposed method shows that this method accomplishes very high imperceptibility and robustness against different sort of image processing attacks.

KEY WORDS: M-CHANNEL FILTER BANK, DHWT, SVD, DIGITAL WATERMARKING AND RASPBERRY PI 3

INTRODUCTION

With the development of internet world, digital watermarking algorithm has been proven as a competent technology to overcome the problem of distribution of unauthorized digital information. Digital watermarking is mainly categorized as spatial and spectral methods. Lot of papers and researches has been presented in both spatial and spectral domain for 2-D image watermarking scheme. In Spatial domain based watermarking technique, pixel values are altered directly to embed secret image (Da L. et al, 2009). Whereas in spectral domain based watermarking technique, various common transforms like DWT, DCT and DFT are used to obtain transform coefficients of host image. Then the transform coefficients are modified for achieving very high robustness against various attacks like image processing, geometrical and addition of noise (Subramanyam A.V et al, 2012; Vundela et al, 2013). Robustness and imperceptibility of watermarking system depends on frequency band of embedding the watermark. Mid frequency band offers better results as compared to low and high frequency band of embedding (Byun et al, 2005).

Wavelet transform is a significant technique being used in the field digital image watermarking. A variety of wavelet transform based watermarking algorithms are proposed because of its advantage in multi resolution property (Lien et al, 2006; Mahmood et al, 2006). Zhou et al (2018)

proposed a combination of all phase discrete cosine biorthogonal transform, discrete wavelet transform and Singular value decomposition for embedding and reconstructing watermark. In order to diminish the effects of watermarking, DC coefficients of each subband in HL and LH bands are preferred for inserting watermark. Lin et al (2015) proposed Redundant Discrete Wavelet Transform (RDWT) and sub-sample technique for implementation of reversible watermarking for medical images.

To improve the capacity of watermark embedding sub-sample technique has been proposed. To ensure secure communication, PWLCM based image encryption algorithm has been adopted. Ernawan et al (2018) proposed Watermarking by the combination of RDWT and SVD observing trade-off between imperceptibility and robustness. Modified entropy is used for determining watermark inserting position. Watermark embedding is performed by assessing the orthogonal matrix U. Also, the watermark image is scrambled by Arnold chaotic map to ensure additional security. This scheme requires high computational cost due to the use of RDWT and Arnold chaotic map.

Mishra et al (2014) proposed watermark embedding and extraction scheme based on SVD and DWT transforms. Eigen values of LL3 subband of host image are altered using Eigen values of watermark image using multiple strength factors (MSFs). Firefly Algorithm utilizes imperceptibility and robustness as an objective function to obtain optimal values of MSFs. Chinmayee et al (2018) proposed a watermark embedding algorithm based upon the relation between two DCT coefficients of adjoining bands. DCT coefficient of each band is varied within a defined range from nearby block. Range of value used to vary coefficient is determined by the difference between DC and AC coefficients of a few low frequency bands. Ansari et al (2016) proposed IWT (Integer Wavelet Transform) and SVD based watermark embedding and extraction scheme. Initially the host image is transformed using IWT. SVD is performed then to determine singular values which are used for embedding watermark. To enhance robustness, Artificial Bee Colony (ABC) is employed to optimize the scaling factor.

Hajjaji et al (2019) proposed FPGA implementation of digital watermarking using DWT. A hardware cosimulation strategy has been developed using the Matlab-Xilinx system generator. Virtex-5 FPGA on the ML507 platform has been used for implementation in Xilinx platform. Khoshki et al (2014) proposed a FPGA hardware implementation for image watermarking based on Discrete Cosine Transform (DCT). DE2-115 board has been used for hardware implementation using DSP builder software which generates VHDL code for FPGA board from Matlab Simulink file. Nayak et al (2017) proposed technique using lesser prominent image feature regions for hiding the copyright information by means of phase congruency and SVD methods.

Hardware realization is implemented using VHDL and

synthesized using Virtex-7 technology. Maity et al (2014) proposed VLSI architecture for Reversible watermarking using Reversible Contrast Mapping (RCM). RCM performs simple integer transformation on pair of pixels and the least significant bits (LSB) are used for data embedding. (8×8) and (32×32) block architectures were developed with 6-stage pipelining technique for high speed operation. In this research work, Double Haar Wavelet Transform (DHWT) based robust watermarking has been proposed for 2-D images and it has been proposed to implement in raspberry pi 3.

MATERIAL AND METHOD

Multiwavelets consist of several scaling functions whereas basic wavelet has one scaling function (Temi et al, 2005; Wang et al, 2006). In comparison with scalar wavelets, multiwavelet offers better output performance for digital image processing applications. A multiwavelet system can provide better reconstruction, especially at the boundaries. Because of these advantages, it is most popular in image processing applications especially in image watermarking (Lin et al, 2008; Vundela et al, 2013). Each multiwavelet system is signified by a matrix that decomposes an image into a collection of sub band. Depending upon the application, the sub band help to emphasize specific aspect of the host signal (Nguyen et al, 1990). The structure of a classical filter bank is shown in Figure 1.

Figure 1: M-Channel Filter Bank
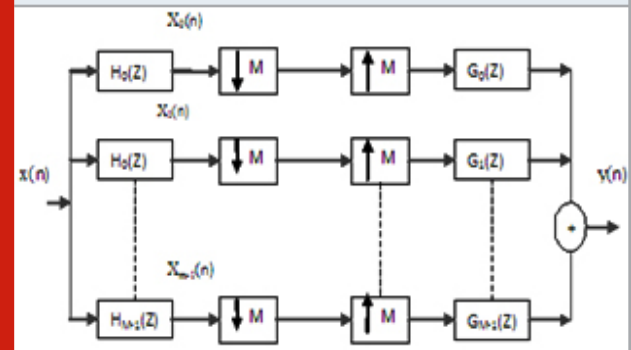
The decomposition and Reconstruction filter banks are defined as

$$H = \frac{1}{3}\begin{pmatrix} 1 & -1 & 0 \\ 0 & 1 & -1 \\ 1 & 1 & 1 \end{pmatrix} \quad G = \begin{pmatrix} 2 & 1 & 1 \\ -1 & 1 & 1 \\ -1 & -2 & 1 \end{pmatrix}$$

Let $x_0(m,n)$ be an image of N X N pixels. The steps for performing 2-D discrete double Haar wavelet transform are defined by the following steps.

1. In the horizontal direction, the host image x_0 (m, n) is filtered by the filters *H0 (z), H1 (z)* and *H2 (z)* to produce x_{00}(m, n), $x_{01}(m, n)$ and $x_{02}(m, n)$ sub images respectively.

2. In the vertical direction, the three sub images x_{00} (m, n), $x_{01}(m, n)$ and $x_{02}(m, n)$ are again filtered by H_0 (z), H_1 (z) and H_2 (z) producing nine sub images $x_{0j}^n(m,n) 0 \le j \le 8$

3. Down-sampling the images $x_{0j}^n(m,n)$ $0 \le j \le 8$ with an interval of three, we obtain nine sub images $x_{0j}^n(m,n) 0 \le j \le 8$

4. Steps (1) – (3) can be repeated on the sub image x00(m, n), so as to get the other sub images in the next scale.

Proposed Method: The proposed scheme implements 2-D digital image watermarking technique based on DHWT in Raspberry pi 3. In 1-level 2-D DHWT, image is divided into nine sub bands. Figure 2 depicts the 1-level 2-D DHWT. The proposed digital watermark embedding process is shown in figure 3. The host image x0(m, n) and binary watermark image 'W' are transformed using 1-level DHWT which produce nine sub bands in each. Out of the nine sub bands only the mid frequency bands of host image and watermark image are selected to embed the watermark in order to offer better imperceptibility and robustness. SVD is applied on the selected sub band of host image and watermark image to obtain Eigen values.

Figure 2: 1–level 2-D DHWT
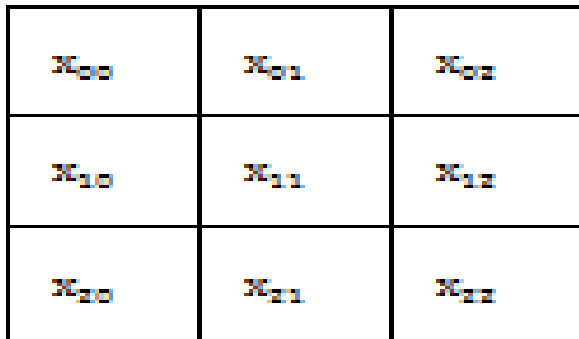
Then to embed watermark, the Eigen values (σ) of the selected sub band of host image x11(m, n) are replaced by the Eigen values (σw) of the selected sub band of watermark image multiplied by an optimal strength factor α. Inverse SVD is applied on the updated Eigen values σ* to obtain the watermarked sub band $x_1^*(m,n)$. Then inverse 1-level 2-D DHWT is applied on

$$x_1^*(m,n)$$

to obtain the final watermarked image $x_w^*(m,n)$

During Watermark extraction, initially 1-level 2-D DHWT is applied on the watermarked image $x_w^*(m,n)$

Out of the nine sub bands obtained from DHWT, only the watermarked sub band $x_1^*(m,n)$ is selected for reconstruction. SVD is applied on the selected sub band of watermarked image to get Eigen vales σ*. Then the

watermark is extracted by dividing the Eigen values with the optimal strength factor α used in embedding. Inverse SVD and inverse 1-level 2-D DHWT is performed to reconstruct the watermark image. Figure 4 shows the proposed watermark extraction process.

Figure 3: Watermark embedding algorithm
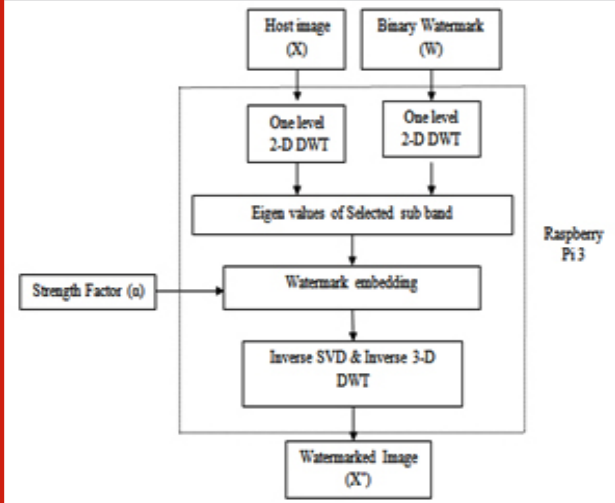
Figure 4: Watermark extraction algorithm
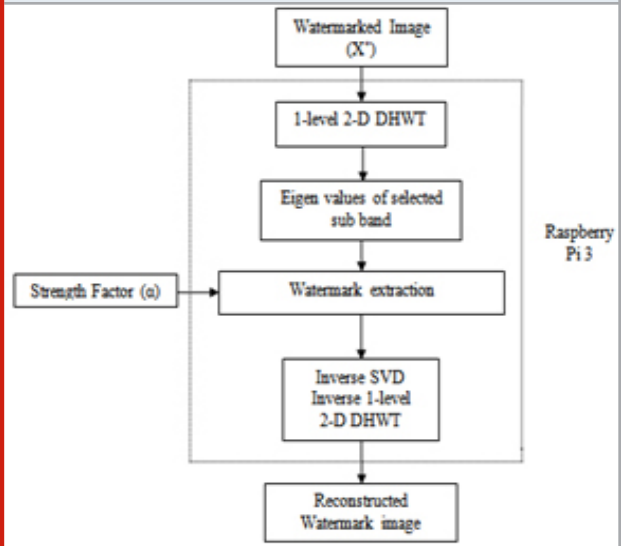
RESULTS AND DISCUSSION

The proposed method is evaluated on various sample images such as Boat, Circles, Lena, etc using Raspberry pi 3 is shown in figure 5. The results show that PSNR of 55.025 dB can be achieved without perceptibility keeping α at 100 for moon image. Figure 6 shows the host image, watermark image, watermarked image and extracted watermark image. To estimate the quality of watermarking technique, various measures like Normalized Cross-Correlation (NC), Mean Square Error (MSE) and Peak Signal to Noise Ratio (PSNR) are used.

Figure 5: Raspberry pi implementation
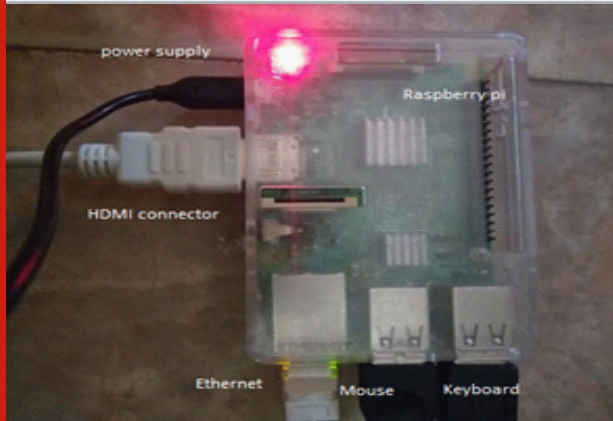
Figure 6 a, b, c. d

Figure 6.(a) Host image

Figure 6.(b)Watermark image

Figure 6.(c) Watermarked image

Figure 6.(d) Extracted watermark

PSNR, MSE and NC are given is defined by equation (1), (2) and (3).

$$PSNR = 10 \log_{10}\left(\frac{255^2}{MSE}\right) \dots\dots\dots (1)$$

$$MSE = \frac{1}{MN}\sum_{x=1}\sum_{y=1}(f(x,y) - \overline{f}(x,y))^2 \dots (2)$$

$$NC = \frac{\sum_i \sum_j p_{ij} p_{ij}^*}{\sum_i \sum_j (p_{ij})^2} \dots\dots\dots\dots (3)$$

Table 1. PSNR and NC for various images

Image	PSNR	Normalized Correlation
Cameraman	41.365	0.96763
Lena	50.132	0.97819
Rohith	50.180	0.99752
Baboon	36.966	0.98307
Boat	39.895	0.99194
Circles	33.966	0.91425
Circuit	52.402	0.99828
Fruits	38.146	0.98517
Girl	40.226	0.99704
Moon	55.025	0.99539

The obtained PSNR values for different sample images and normalized correlation for extracted watermark using hardware implementation are shown in the table 1 and figure 7 & 8.

Figure 7: PSNR for various images
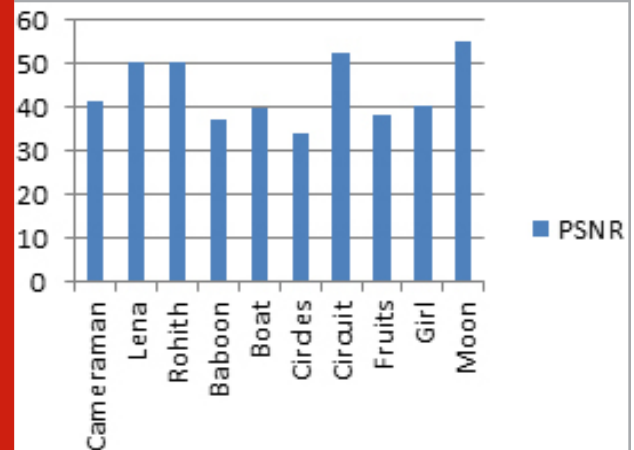
Figure 8: NC for various images
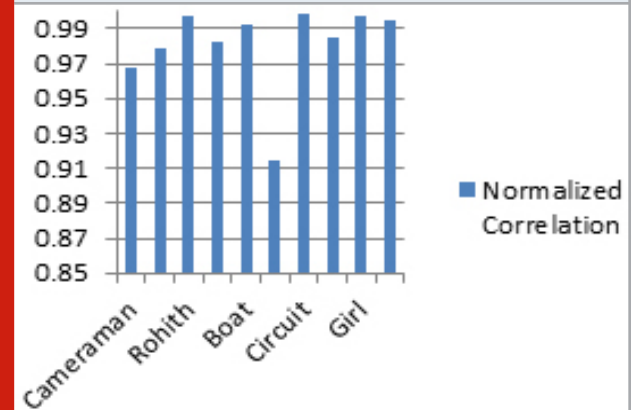
A perfect watermarking method should have high robustness against different attacks like image processing, geometrical and addition of noise. Some of the image attacks are Salt and Pepper noise, Gaussian noise, speckle noise, average filtering, rotation, median filtering and so on. To evaluate quality of watermarking scheme, these attacks are employed in watermarked image. The following figures 9-13 show the normalized correlation obtained against various attacks for different images using raspberry pi implementation.

The proposed watermarking technique is evaluated with existing recently published papers like Zhou et al, 2018; Mishra et al, 2014; Chinmayee et al, 2018; Ansari et al, 2016; Hajjaji et al,2019; Nayak et al, 2017 depending on the results obtained from Lena image. The comparative results are shown in figure 14 and 15. It can be concluded that the PSNR of the watermarked image and correlation

of watermark is better than some of the existing schemes and in acceptable range.

Figure 9: NC under Gaussian noise, speckle noise, salt & pepper and Poisson noises
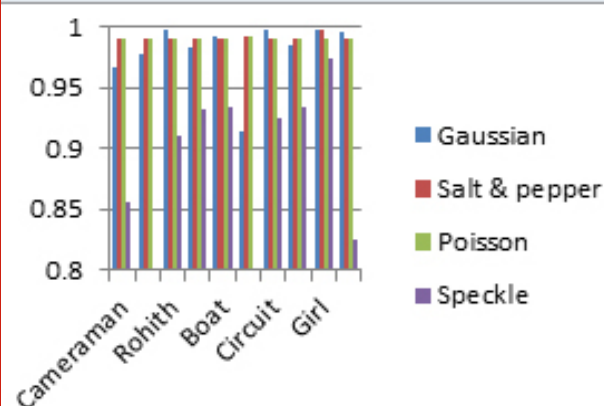
Figure 10: NC under histogram equalization
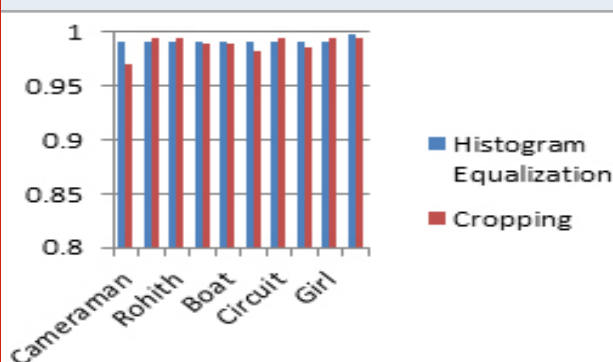
Figure 13: NC under various angles of rotation

Figure 11: NC under average filtering of various filter size
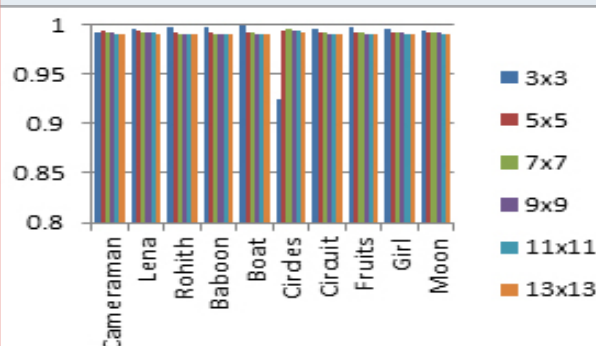
Figure 12: NC under median filtering
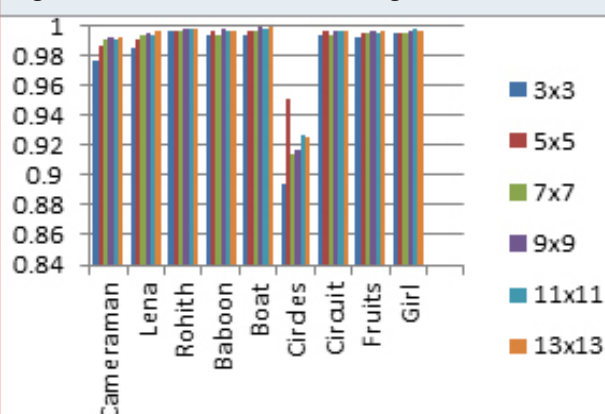
Figure 14: Comparison of PSNR obtained from Proposed Method and Existing Methods
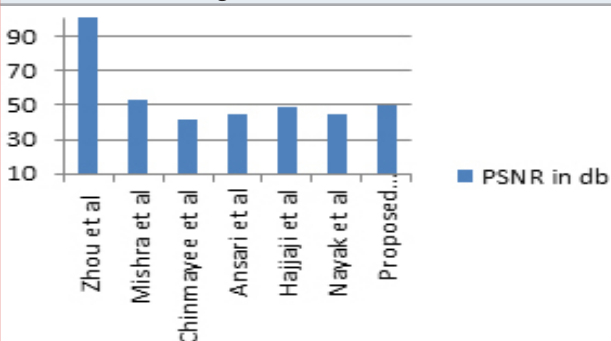
Figure 15: Comparison of NC obtained from Proposed Method and Existing Methods

CONCLUSION

In this paper, a new Raspberry pi implementation of digital image watermarking algorithm was proposed based on Double Haar Wavelet Transform. The proposed method produces a perfect mid frequency band and hence it provides better robustness and imperceptibility. Singular values of the mid frequency band of binary watermark image multiplied by an optimal strength
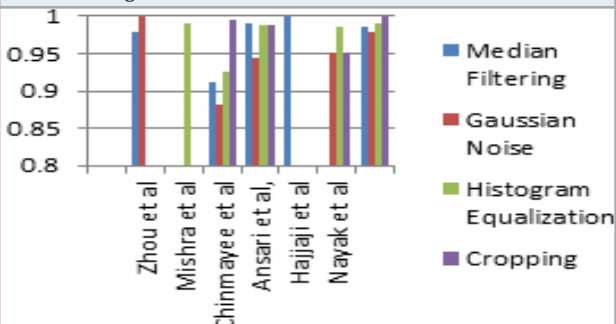
factor is modified with that of host image. The proposed raspberry pi implementation achieves an acceptable range of imperceptibility and robustness against various types of like low pass filtering, median filtering, histogram equalization, rotation, noise addition cropping etc. Thus, the proposed method meets the foremost requirements of watermarking technology.

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Life Saving System for Scavengers

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ABSTRACT

Human security should be a high priority. A good workplace safety system should be implemented so that safety considerations are reasonable. Toxic waste is often discharged into sewage and sanitation zones, which are not easily detected by human emotions. The familiarity of improving their prevention and safety of sewer networks is not based. This article is about building an embedded IoT system for monitoring drains and creating an alarm on a wireless network. Dangerous gases such as ammonia, hydrogen sulfide, methane and carbon monoxide are discharged from the wastewater each time they are measured by gas sensors and their health parameters, heart rate, body temperature, respiratory rate are updated to the client when it exceeds normal levels. Using the Internet of Things. The advantage of this intelligent system is its accurate response time and accurate detection in end-cases with security resources.

KEY WORDS: GAS SENSORS, HEARTBEAT, RESPIRATION, IOT.

INTRODUCTION

Health and safety are always a priority, despite the growing technology and the human race. Although the causes and consequences of wastewater are high, the need for effective monitoring and warning systems is growing. Without a proper sewage management system, our community could suffer serious harm to our lives. Some areas of concern in terms of economic and social aspects of sustainability in wastewater design are energy control and stench. The stability of such infrastructure in India has suffered for decades, which has had an immeasurable impact on the human and economic costs associated with infrastructure development.

Wastewater is a mixture of toxic and non-toxic gases that are released and collected as a result of the decomposition of wastewater components in organic household or industrial waste and sewage systems. Sewer gases may contain hydrogen sulfide, ammonia, methane, esters, carbon monoxide, sulfur dioxide and nitric oxide. Biochemical reactions that occur in sewer pipes generate significant amounts of hydrogen sulfide, methane, carbon dioxide and other volatile substances known as sewer gases. These toxic gases lead to environmental pollution, destruction of sewer pipes, costly operational discharges, public safety issues and litigation. It is important to check biochemical reactions and re-check for healthy sewer pipes. To date, many projects have been designed and developed to identify functional deficiencies in the Wastewater Collection System (WCS). But modern teaching methods are not intended for mapping. In addition, a complete wastewater test is expensive due to such a harsh and hazardous environment.

When indoor plumbing was developed in the mid-1800s, many believed that the disease was transmitted by meiosis

or "bad air." Initially, traps were designed in sewage pipes to prevent these harmful air from returning to buildings. But when cholera broke out on Broad Street in London in the summer of 1854, Dr. John Snow, among other things, tried to show that the culprit was contaminated water, but not the obscene smells coming from the sewer. Later, as the theory of microorganisms on diseases developed, the community was not in a hurry to accept that the smell from the sewers was relatively harmless.

Thus, the municipalities seem to be disposing of wastewater only when they receive sterile complaints. But there is a clear reason to control wastewater. This is an important measure of conditions in sewer systems and may indicate areas for further verification or corrective action to be outlined. The data collected is used to minimize the health and safety risks associated with working in sewers, which have become more common in recent sewer fiber optic cables and allow researchers to better understand sewer gases.

In this article, we intend to develop a system for monitoring low-cost wastewater. The system allows routine monitoring, early detection of problems and targeted rescue measures - significantly increasing maintenance time, reducing maintenance budgets, controlling illegal toxic waste and increasing public safety by reducing pollution and pollution. For this purpose, we offer a new Saver Snort system, which includes sewage sensors for sewage sludge monitoring. In addition to the health risks, harmful gases generated in sewage systems such as hydrogen sulfide (H2S) are a major cause of erosion and destruction of sewage structures, resulting in several hundred million dollars.

Health Effects: Sewer gas may have a slightly unpleasant odor in most homes, but often does not cause serious health problems. Residential sewage pipes mainly produce gases such as nitrogen, oxygen and carbon dioxide. Methane is often the next highest concentration of gas, but is usually at non-toxic levels, especially in systems with proper ventilation. However, sewage gas with a distinctive "red egg" smell to have, especially sewerage systems, septic tanks or other treatment facilities, the hydrogen sulfide content may be due to the accessories such small concentrations detected, and human vibration sensations, these chemicals are less revealing eyes, irritating You can taiyac, cough or sore throat, shortness of breath and can cause fluid in the lungs. Long exposure to low levels can lead to fatigue, pneumonia, loss of appetite, headache, irritability, memory loss, and dizziness. High concentrations of hydrogen sulfide (> 150 ppm) can cause olfactory fatigue and make the odor indistinguishable. High concentrations (> 300 ppm) can cause consciousness and death from hydrogen sulfide. Extremely high concentrations (> 1000 ppm) can cause immediate decline after one breath.

Aim: In order to protect the sewage workers from death due the toxic gas effluents from the sewage. The IOT module is designed so that the gases are monitored at regular intervals and the intimation on the levels of gases are send to the end users. A low-cost module to be deployed for monitoring the levels of gases.

Objective: Caring for safety is essential for implementing a good security system in the workplace of the cleaner. This intelligent system is accurate in extreme cases thanks to its quick response and safety proof.

Characteristics of the analysis of toxic gases: Many toxic gases, such as carbon monoxide, are colorless and odorless. In addition, due to olfactory factors, some toxic gases, such as H2S, have an unpleasant odor at low concentrations, but such an aroma disappears at higher concentrations. When drainage workers believe that the presence of toxic gases can be easily detected by smell, it can be very dangerous. H2S, CO and CH4 are the most popular hazards.

Hydrogen Sulfide (H2S): Hydrogen sulfide is a dangerous toxic gas that can be identified even at very low concentrations with the strange smell of a "rotten egg". H2S has the effect of shutting off the sense of smell at a concentration of 100 ppm, and, of course, personnel cannot observe any changes in concentration. The smell can be very dangerous for detecting the presence of hydrogen sulfide. Further degeneration can detect these harmful gases.

Carbon Monoxide (CO): If coal is burned in poorly open areas, gas is emitted without color or odor. This is done when gasoline / diesel generators or other fuel-powered devices are used in workplaces with adequate ventilation). The release of carbon monoxide in concentrations above 350 ppm can cause drowsiness, fatigue and collapse. Carbon monoxide concentrations above 1200ppm can be harmful.

Methane (CH4): Methane is usually generated when several bacterial processes destroy the core. It is a colorless, very chaotic, and flammable gas that can cause fire and explosion. The concentration of methane in a poorly ventilated area can cause oxygen depletion due to normal air displacement. Statistical analysis: non-sanitary waste represents a serious threat to health and the environment. This causes human damage in the wastewater treatment process. It should be noted that the mortality rate of sewer collectors and people in the world is increasing sharply according to statistics..

MATERIAL AND METHOD

A. IoT device for permanent gas monitoring system: This project is mainly for a person who works in wastewater treatment. A device has been developed to control the amount of gases in the wastewater. When the gas level exceeds the threshold value, an alert is sent to the observer. Levels are controlled using ppm (parts per million). The call notification and SMS will be sent to the supervisor. The natural decomposition of the materials leads to the release of toxic gas. Using IoT, we can identify harmful gases such as hydrogen sulfide, carbon monoxide, methane and many other

harmful gases. In the review [12], wireless sensor network for monitoring air pollution. Wireless Sensor Network. A system for monitoring air pollution. It uses the Air Quality Index (AQI), which is a data aggregation algorithm to consolidate data, eliminate duplicates, and filter out false readings.

B. Monitor the use of atmospheric gas temperatures in a nearby room: The project is aimed at monitoring air pollution. Air Quality Monitoring (AQM) involves monitoring of toxic and unstable compounds in ambient air. Two-dimensional (2-D) is used to determine the amount of gas. Environment is at great risk due to air pollution [13]. To determine the effectiveness of air pollution, it is important to develop low cost and low power sensors. Indoor air quality system is monitored. Metal oxides are well known for their gas sensing domain. An anti-gaseous ambient temperature sensor is used to monitor air pollution. This air pollution monitoring concept can be implemented when toxic gases are detected in waste gas monitoring.

Existing System: The intelligent device for the identification of hazardous gas with emergency warning in this existing system while detecting LPG and combustible gas. PIC microcontroller monitors it. A signal is produced and message is sent as an alert system to the approved user to help reduce the critical situation more quickly. Of example this machine only detects two gases. It is essential to know the captious amount of the respective gas. This device is only suitable for domestic use in residential zones.

A paper entitled "Existing Program" focuses on processes control. When a suspected leak occurs, sensor detects the leakage between 400-600ppm in the program and sends the warning message to the end user and triggers the alarm to provide the security circuitry. It controls the knob of cylinder using relay DC motor. When it hits the lowest weight 500 g it automatically registers for cylinder requirement. This machine is only targeted towards domestic gas detection

Figure 1: Proposed Block Diagram
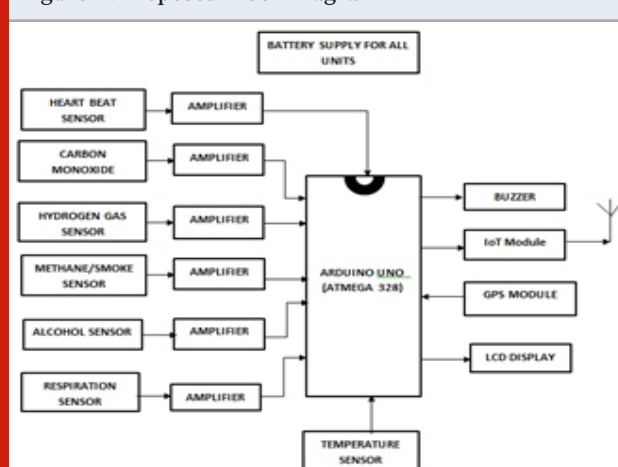
RESULTS AND DISCUSSION

Proposed System: Wastewater is a very strong greenhouse gas and contributes significantly to climate change. Trench for determining and monitoring gas based on the amount of harmful gases in ppm. Toxic gases such as methane, hydrogen sulfide and carbon monoxide, including these parameters, determine the employees' heart rate, body temperature and respiratory rate. Remote location is controlled using the IoT platform. This means that when the speeds of ordinary PPM gases are higher than the data, the data is transmitted to the recipient through a cloud connection. This system is very reliable and economical.

Heartbeat Sensor
- Heartbeat sensor is made of a super bright red LED and light detector. The heart beat sensor is mounted in the index of the heart sensor's finger nose and output is connected to the RB0th PIC microcontroller.
- The LED must be super bright as the maximum light must pass through the finger and be measured by the detector.
- When the heart pumps a blood pulse through the blood vessels, the finger becomes slightly opaquer and the detector receives less light.
- The signals of the detector differ with each heart beat. This difference is converted into an electrical pulse. This signal is amplified by an amplifier that produces analog voltage between 0 and+ 5V of the logic level.
- Works with each pulse on the theory of light blood flow modulation through the finger.

Figure 7: Snapshot of forecasting prototype
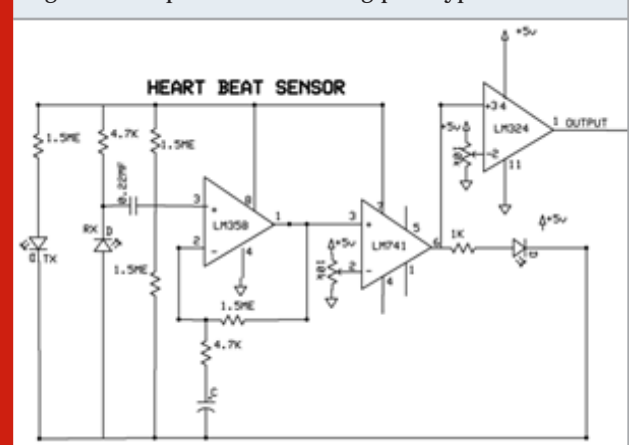
Temperature Sensor
- LM 35 Temperature Sensor the LM 35 Series is an accurate integrated LM 35 temperature sensor whose output voltage is linearly proportional to the Celsius (Celsius) temperature.
- Temperature is placed on the skin surface. The temperature is then output to RA0
- This gives the LM35 an advantage over linear temperature sensors, measured in degrees Kelvin

Figure 3: Temperature Sensor
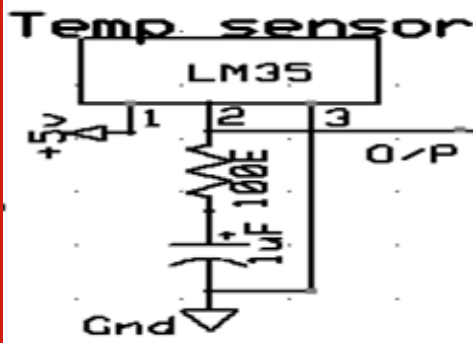
Methane Sensor
- The MQ-4 gas sensor detects methane gas concentrations in ambient air and generates analog voltage readings.
- A concentration sensitivity range of 300 to 10,000 ppm is suitable for leak detection. A signal conditioning circuit is used to change the change in conductivity to match the output signal with the concentration of the input gas. The MQ-4 gas sensor is very sensitive to methane, propane and butane.
- The sensor can be used to detect various fuel gases, in particular methane; it is low cost and suitable for various applications.
- The MQ-4gas V module is equipped with a card tray with an operating voltage of 5 V DC.
- The output values for the sensor can be either analog or digital.

Traits
- Analog and digital output
- CH CH4, very sensitive to natural gas
- Alcohol is slightly sensitive to alcohol and smoke.
- quick response
- stable and long life
- Voltage Operating Voltage: 5 VTC

Applications
- Sewer gas detector
- Domestic gas leak detection
- Detection of industrial combustible gas
- Alcohol Checker.

Alcohol Sensor
- The MQ-3gas Q sensor is equipped with an alcohol-sensitive material that has low conductivity in clean air. When the desired combustible material is present, the conductivity of the sensor is high.
- The steel of the seasonal gas sensor module has an exoskeleton and a sensitive device.
- This sensor is exposed to current through the connecting elements. This current is called the heating current, and the gases next to the sensitive element are ionized and absorbed by the sensitive element.
- This changes the resistance of the sensor, which goes out of the current value.

- Channels The connecting channels of the sensor are robust, so that the sensor can be safely connected to the circuit and enough heat is transferred to the internal zone. They are cast from copper and coated on top.

Gas Sensor MQ-8
- MQ-8 gas sensor composed of micro AL2O3 ceramic tube, sensitive layer of Tin Dioxide (SnO2), measuring electrode and heater are fastened into a plastic and stainless-steel net cover. MQ-8 gas sensor has high hydrogen gas sensitivity and anti-gas interference.
- The enveloped MQ-8 has 6 pins,4 of which are used to gather signals, and other 2 are used to supply heating current.
- The MQ-8gas module is mounted on a 5VDC working voltage PCB board. The values of the sensor data can be obtained both in analog and digital form.

Applications
- Hydrogen gas leakage detection
- Portable gas detector
- Fire safety detection system
- Domestic gas leakage detection

Arduino Uno

Figure 4: Arduino
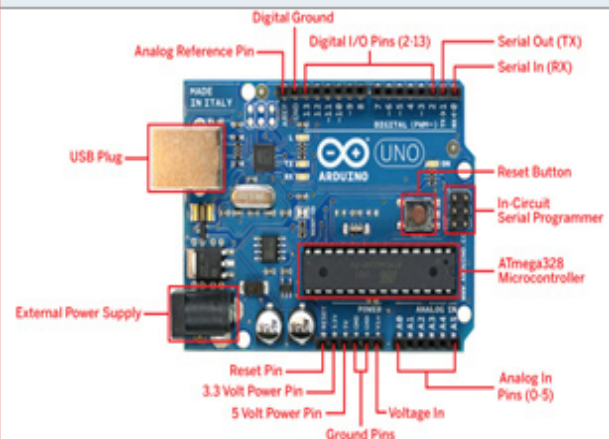
- GPS - Global Positioning System
- The module is used in GPS tracking and vehicle navigation.
- Tracking systems allow the base station to monitor vehicles without interrupting traffic, while as a navigation system, the driver helps to get to the destination.
- The design is more or less identical, whether it is a navigation system or a monitoring system.
- Someone somewhere In the event of an accident, the GPS system monitors the location of the car and sends information to a person through the cloud through the IoT module (ESP 8266).

CONCLUSION

This paper introduced the poisonous gas monitoring

system, a revolutionary sewer gas monitoring system, along with the monitoring the person involved in cleaning. The project key inventions are its fully automated, end-to-end monitoring system and its low-energy self-localizing strategy with GPS location. From the point of view of implementation, the main is that the human temperature along with the surrounding, respiration and heart beat are also monitored.

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Identifying the Fertilization of Crops by Detecting Its Disease Using Image Processing

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ABSTRACT

Agriculture is main reason for the development of our country. Technology has proven its fullest in this area too. But also manyfarmers are still unaware of what disease does the required crop is affected of. Identifying the crop disease requires large amount of time and needed much knowledge in it. The proposed method focuses on providing the name of the crop disease and what fertilizers can be used for it. At the initial phase the input image is pre-processed. Features like Grey level Co-occurrence matrix (GLCM), are withdrawn from the pre-processed image. Then the fertilizer decision making is done using Layered Recurrent Neural Network (LRNN). This whole process is simulated using MATLAB 2016b. The farmer can simply upload the picture of the infected crop and can see the information about that particular crop. The result displays what is the name of the disease that has been affected to the crop and what fertilizers can be used to avoid the disease. It also displays the required amount of fertilizers that must be given to the crop. The performance is noted that the detection rate and data protection is higher than existing SVM classifier.

KEY WORDS: IMAGE PROCESSING, NEURAL NETWORK, FEATURE EXTRACTION, CONTRAST ENHANCEMENT AND MEDIAN FILTERING.

INTRODUCTION

Now a day, technology plays an important role in everyone's life. Agriculture is an area which needs much improvement. An infected crop can destroy its own self and damage the other crops too. Still now most of the farmers don't know what pesticide / insecticide should be given to the infected crop. They are also not sure about the quantity also. If they provide a wrong fertilizer with surplus or excess amount, it may damage the whole farming field. This paper gives a solution to their problem.

The farmer can simply upload the picture of the infected crop and can see the information about that particular crop. The result displays what is the name of the disease that has been affected the crop and what fertilizers can we use to avoid those disease. It also displays the required amount of fertilizers that must be given.

In older days, people who are experienced technologically, identified the problem and acquired a solution to it. However because of many environmental changes the forecast has become tough.Image processing technique can be applied to discover the disease manually and intimate the farmer about it. It is a method to transform an image into digital form and perform some operations

on it, in order to get an enhanced image or to get some useful information from it. This helps in manipulation of the digital images by using computers. It has lot ofmeritscompared to processing the analog image. It supplies a vast number of algorithms which is used with the input data. In this technique, some processing issue such as noise creation and signal distortion at some point in signal processing can be avoided. It buildskey research area within engineering and computer science disciplines too.

Applications
- Face detection
- Feature detection
- Medical image processing
- Remote sensing
- Automated sieving procedure
- Finger print recognition
- Pattern Recognition
- Machine/Robot Vision
- Video Processing
- Microscopic Imaging

The main objective of image processing is to accept input image through user. Pre-processing the image and segment it using the algorithms, extracting the features and finally classify it using the trained machine and display the output to the user. The flow of the above mentioned process is displayed in Figure.1.

Figure 1: Block diagram for Fertilization Management
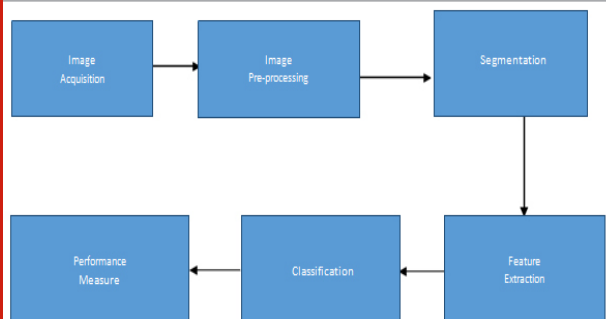
(Bharat Mishra et al,.2017), took a survey on detecting leafdisease using many image processing techniques. They classified each and every image with the help of analysis tools and applications. In this paper, most emerging technologies that are used for predicting a disease are discussed. The problems that are present in identifying a leaf disease are highlighted. Among many ways to predict the leaf disease they conclude by saying that image processing techniques are best and easy way to retrieve the required outputs.

(S. Singla et al.,2016), classified the diseases that can be attacked to plant like fungi, bacteria and viruses. These not only restrict the growth of plants but also destroy the crop. To find a disease manually, it would be time consuming and includes many laboratory works. Hence, the work surveyed the different types of existing methods

in identifying the crop disease but failed to calculate it in short period of time.

(A. Akhtar et al.,2013), have suggested a technique for automatic identification and categorization of plant disease. They compared performance of various machine learning techniques like CNN, SVM etc., for detecting the crop disease pattern from the leaf images. A three phrase framework is implemented i.e., the image is partitioned, then features are extracted and at the end image is classified using support vector machines. The method was unable to prove that the particular framework works well for all the types of leaves.

(Y. Swang et al.,2012), implemented the feature extraction method for detecting a crop disease using SVM classifier. They considered the three aspect features such as texture, color and shape of the leaf. The results analyzed the feature extraction of the image and prospected the applications of extraction techniques in future detection of crop disease. Main drawback is other features of leaves are not taken into consideration.

(B. Banu et al.,2011), predicted the weakness of current practical applications and the inability in the segmentation process as real world changes occur in the image. Genetic algorithm method is used to implement image segmentation. The goal in using this algorithm is to provide continuous adaptation methods and to interact with dynamic environment. The experimental results demonstrate the capability to adapt the segmentation performance in outdoor color imagery.

(Al-Hiary et al.,2011) described about the K-means clustering and Neural Networks (NNs) applications are articulated for clustering and diseases categorization which influenced on plant leaves. Disease recognition with low computational effort is main focus of the proposed approach. Five diseases were tested using this algorithm which affect the plants; such as: Early scorch, Cottony mold, ashen mold, late scorch, tiny whiteness. (M. Hemalatha et al., 2011) explored the challenges in using data mining techniques in the agriculture domain. They found that using machine learning algorithms like SVM Classification and neural networks are new method for discovering or predicting the crop management and soil fertilization. This work concludes that the applications of machine learning techniques take partanessential role in field of farming and similar sciences.

(Argenti et al.,) proposed rapid algorithm for co-occurrence matrices parameters calculation. This method has been applied to the categorization and segmentation problem of artificial and natural scenes: it depends on the parameters of co-occurrence matrix, is carried out pixel-by-pixel by utilizing supervised learning and maximum likelihood estimates. The trouble of recognizing texture boundary has additionally been considered and a classification scheme based on more than one window for every pixel is presented. Simulation results show the classification rates development that can be attained by

using this approach when compared to a single-window classification.

(Sasirekha et al.,2015) detected the several leaf diseases with severalleaftypes by data mining method. It helps to improve the crops productivity. The author searched the use of generalized rule mining for generalizing data to a higher level of abstraction in a public health dataset and differentiated the co-occurrences of disease in various stages. (Zhang et al.,2015) plant disease recognition method is suggested depends on images of plant leaf. Initially, the spot is segmented, and the disease feature vector is extracted. Then the K-nearest-neighbor classifier is used for the extracted features to analyze the plant diseases. The maize variety is used for testing purpose. Proposed method identifies the disease with high recognition rate.

MATERIAL AND METHOD

In the existing system, k - means algorithm is used to combine the pixels and differentiate them into healthy and infected clusters. Later, those clusters were labeled and trained using a SVM Machine Bharat (Mishra et al,.2017). The result of this classification will determine which clusters contain infected pixels. This system performs the segmentation of the single leaf as input and filter is applied to predict the diseased part of the leaf. It only detects affected part and does not give any recommendation.

In the Proposed system, LRNN is used for the process of classification. In SVM, kernels are used to perform complex functions. But by using LRNN, instead of using kernels, multi layered architecture can be used. Since it is a feed forward system, time is reduced in calculating the disease for a particular crop. In this system, three diseases are found for the rice crops and the amount of fertilizer that should be used for that crop is also recommended. LRNN is trained with sample images and a comparison is made between existing and proposed method, in which proposed system gives higher rate of accuracy than the existing method. In the proposed method, five steps are required to complete the process as stated below in Figure.2.

- Selecting an input image
- Pre-processing
- Segmentation
- Feature Extraction and
- Classification.

Selecting an input image: On the first step, the farmer should select the picture of the diseased crop. While running the application, the first option displayed is input image. Clicking that button will take the farmer to the selection dialog box. There the user should select the destined folder where the image of the crop is located. The image will get stored and resized based on the parameter that is given. With the fixed dimension, the selected image will be displayed on the screen.

Pre-processing: Now the selected image is preprocessed. Generally, all images will be of RGB model and in this step, it is changed to another color phase known as L*a*b*. L* is termed as Luminosity or Bright layer and a*b* is known as Chromaticity layer. Colors that fall on red -green axis is denoted as a* and colors that fall on blue-yellow axis is denoted as b*. Median filtering of the image is done to find the sample region of each color. All the necessary information is found in those chromaticity layers. Finally, it calculates the sample region's average color in that a*b* color phase.

Figure 2: Crop Disease Prediction
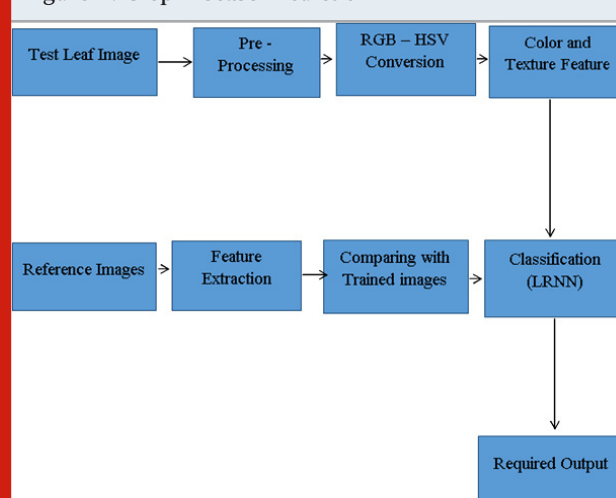
Segmentation: Segmentation is a process which extracts the needed area from the background. The algorithm used for this process is k means clustering which is best suited one for clustering. It is an unsupervised algorithm. To form a cluster, we should calculate the minimum distance which is known as Euclidean Distance Metric. Among different clusters, the closest cluster is found. Total number of clusters formed is also identified for further enhancement.

Figure 3: Layered Neural Network Architecture
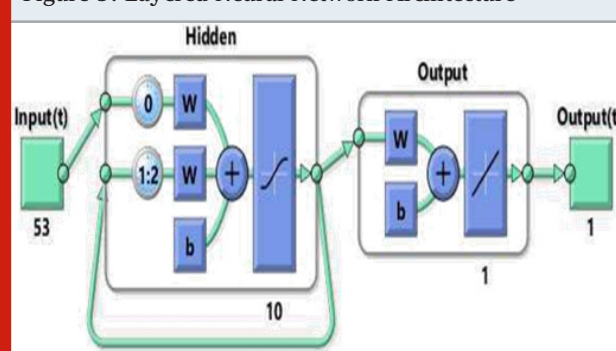
Feature Extraction: In general, every image has certain features. Here Gray Level Co-occurrence Matrix(GLCM) is used to derive the feature of segmented picture. The RGB image is now changed into grayscale picture for better extraction. Gray level co-matrix helps us to bring out the texture of the image. Generally, all images will

have pixels confined within 0-250. It calculates how pairs of pixels that have some specific value occur in an image. A graph is generated on the basis of histogram values for the segmented image. Twenty two features are extracted in this work and few of them are as follows: Entropy, uniformity, dissimilarity, contrast, correlation, cluster shade etc.,

Classification: The Proposed classifier used is LRNN. Figure 3. explains the main benefit of using this algorithm as it is a layered architecture and feed forward system. In the existing system, SVM is used as the classifier. It uses certain techniques called Kernels to estimate boundary for the expected output. Kernels are used to learn complex functions. But in the proposed system, instead of learning complex functions, multi-layered structure can be implemented. To classify the images, LRNN should be trained first. Rice leaves along with their disease are stored in a dataset called as training images. Three plant diseases are stored in it and it can also be extended to as many by using Multi SVM. This algorithm works best for image recognition, classification and data protection.

RESULTS AND DISCUSSION

MATLAB is a matrix laboratory package developed by mathworks that operates as an interactive programming environment. It can be used for algorithm development, modeling, simulation, data analysis, visualization, etc., The MATLAB (MATLAB 2016b) tool is used for predicting the disease and fertilizer recommendation. During the classification process, the image will undergo into Layered Neural Network and after processing, the required output will be displayed as diseases name followed by fertilizer recommendation and suggestions given to the farmer about the fertilizer quantity level in the GUI is displayed in Figure 4.

Figure 4 Disease Name Prediction and fertilizer recommendation.
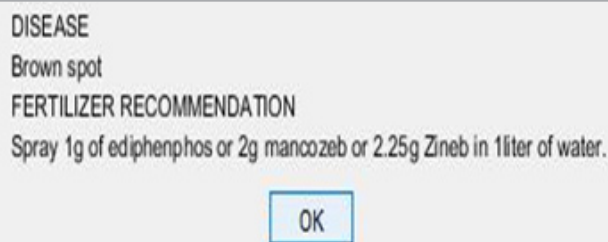
A graph is plotted for describing the comparison between the existing and proposed method. Various factors are taken into consideration to measure the performance are Accuracy, Sensitivity, Specificity, Precision, Recall, f-measure, g-mean. Figure 5. Comparing accuracy, sensitivity and specificity between existing SVM and proposed LRNN network.

Figure 6. explains the comparison parameters such as precision, F-measure and G-mean between SVM and LRNN network.

Finally ROC (Receiver Operating Characteristics) curve. This graph helps to find the threshold value. A threshold value is one which takes the median predicted values of positive test cases. To find out that threshold value, this ROC curve is plotted.

Figure 5: Comparison of parameters–Accuracy, Sensitivity, Specificity
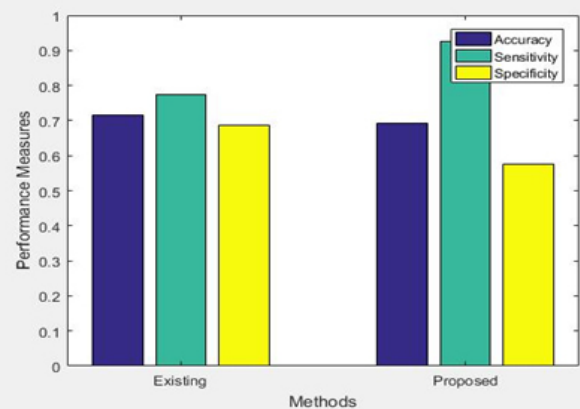
Figure 6 Comparison of parameters - Precision, F-measure, G-mean
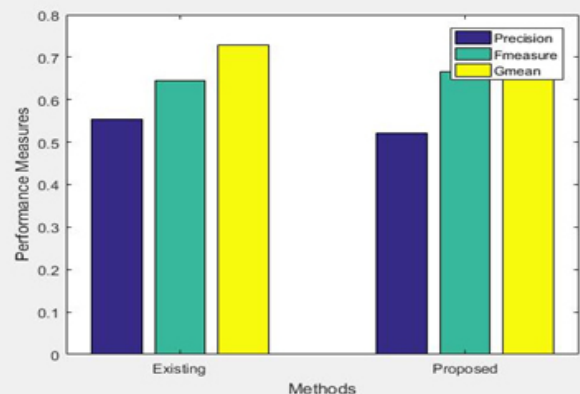
A probability curve is obtained which describes the True Positive Rate(TPR) and False Positive Rate(FPR) of above mentioned performance metrics in Figure 7.

Figure 7: ROC Curve
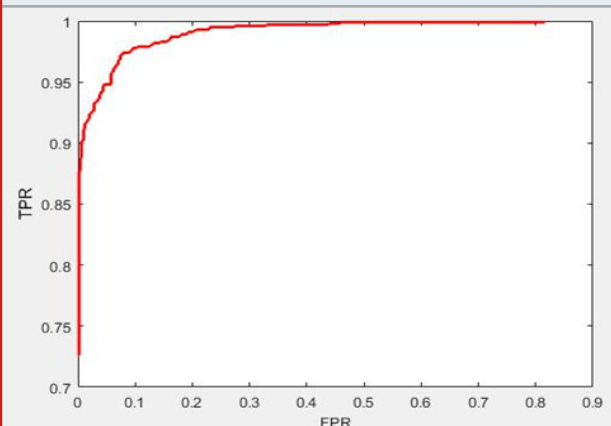
CONCLUSION

Thus, the whole study identifies the disease of a rice crop and gives a possible solution to that problem using image processing. The five steps can accurately detect a leaf disease. The experimental results have proven that the disease can be detected using less computational effort. Using the proposed LRNN method, the disease can be assessed at the initial stage itself and the life of crops can be saved. The graph displaying the performance of factors such as accuracy, sensitivity, specificity in existing method has some considerable amount of variations when compared to proposed method. Accuracy differs from 60% - 70%, Sensitivity from 79% - 90%, Specificity from 60% - 70% and so on. Like this, many pest control tools can be used without violating any people and environment. So that agriculture can be taken to the next level of success. This approach can be extended in future by increasing the number of training samples with optimal features. Different algorithms can be used for segmentation and classification to improve the efficiency even better. The whole process can be automated in order to detect the disease in very short time.

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Implementation of Energy Aware Clustering in IoT Using Wireless Mesh Networks

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ABSTRACT

Internet of Things (IoT) enables the connected devices to communicate its data over Internet protocols or the web. With increase in wireless service performance, we can get control of the issues like interference in routing and dynamic load balancing in IoT using wireless mesh networks (WMN). These wireless networks inter communicated with vast data, which results in network traffic. These issues will affect synchronization in the network which leads to loss of data and security of the network. To minimize the mentioned issues, an energy efficient clustering-based routing algorithm is proposed. The algorithm also trims down the communication delay and improves the lifetime of the network. The simulated results give you an idea about that the proposed method having better performance.

KEY WORDS: WIRELESS MESH NETWORK, CLUSTERING, LIFETIME, ROUTING, INTERNET OF THINGS (IOT).

INTRODUCTION

Wireless Mesh Networks are established using assorted devices supports distinctive addresses, which are skilled to identify and share data for computing. In this modern world WMN is incorporated in diverse sectors namely smart homes, smart healthcare, smart urban, intellectual logistics and so on. On the other hand, a significant amount of amendment is demanded in each field to make sure of WMN services. Wireless Mesh Network (WMN) has turn out to be the catchphrase in this era for its capacity in delivering quicker connectivity among devices. A related circumstance is likely in IoT environment too, where numerous nodes or devices communicate among them (Aldabbas O et al,. 2017; M Mathankumar et al,.

2019; Mohammad 2015). Hence, many nodes are prone to congestion and nosiness in WMN links.

A wireless mesh network (WMN) has set of nodes that are systematized in mesh configuration. It comprises of gateways, meshed clients and routers. Those meshed clients are the end users like computers, gadgets, personal and other wirelessly connected devices; meshed routers are acting as transceivers for communicating data through gateways. To ensure the availability of parts, routing concept is employed for steady connections and re-configuration of gridlocked paths using recovery algorithms. These networks are reliable and offer redundancy. Failure of one node doesn't affect the operation of other nodes, they communicate with each other through intermediate nodes.

The coverage of a particular network hinge on the deployment of nodes. The routers are transportable in accordance with the definite demands of the network. These routers never bounded in shortage of sources when compared to other nodes. In the recent decades, many researchers recommended the data flow balancing in

routing paths of WMNs. Still it is tedious to find a way for addressing the load balancing and latency issues before designing any network. A well-organized routing among the clients and routers reflect on diverse parameters. There comes the differentiation between the WMNs and other technologies like wireless sensor networks (WSN) (M Mathankumar et al,. 2018; M Preethi et al,. 2015).

Thus, it augments the chances to run into throughput and delay issues by taking up the existing routing algorithms in WMNs. Here the routing demands are satisfied by utilizing the mobile ad hoc networks (MANET) solutions. Broadcasting methods are used for path discovery, congestion control and routing optimization. The well-liked multipath routing in WSN is AOMDV (Adhoc On-demand Multipath Distance Vector) routing protocol which is drawn from AODV protocol. AOMDV perceives abundant disarticulate trail among the nodes and fault tolerance in path recovery. To stay away from stale path, this protocol uses minimum time out values. AOMDV uses the cluster head that revises the sequence number of the group at times and broadcasts by group hellos (Silva B N et al,. 2017; Suryaprakash S et al,. 2018).

MATERIAL AND METHOD

Wireless Mesh Network: Here a few LPC21xx processors are employed for the formation of network, to enable transceiver operations and to act as relay node. In mesh network configuration, the communication between the nodes carried out using intermediate node as a relay. Figure 1 shows the block diagram of Wireless Mesh Network.

Figure 1: Block Diagram of Wireless Mesh Network
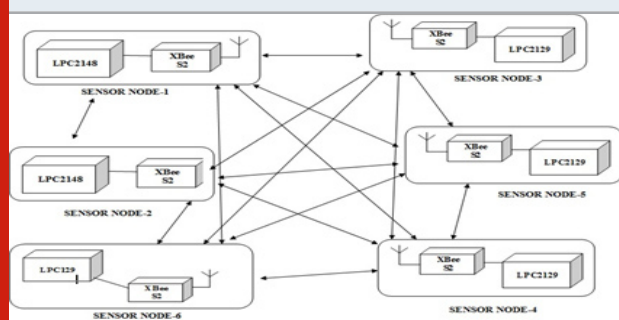
Clustering for Wireless Mesh Network: Clustered network entitles peer-to-peer type of network development with slightest routing overhead by deploying multistage routing strategy. These kinds of topologies are applicable for latency free applications. Any node or fully functioned device can be the coordinator. Usually there will be one coordinator elected for the WMN. It creates first cluster and designates a value of zero as unique cluster identity. Ensuing clusters are fashioned with a nominated cluster head for respective cluster. A 16-bit unique identifier is integrated with every network. The coordinating node is a network device constructed to sustenance network functionalities and supplementary responsibilities such as, (i) supervising the associated

devices (ii) enables peer communication (iii) assign 16-bit short identity address to the devices (iv) periodical generation of radio signals. This network guarantees the primary performance characteristics such as latency and throughput of many mobile clients or nodes. A WMN structure does not deem energy resources and agility as significant challenges. The figure 2 explains the structure for clustering in WMNs.

Figure 2: Cluster Structure of Mesh Network
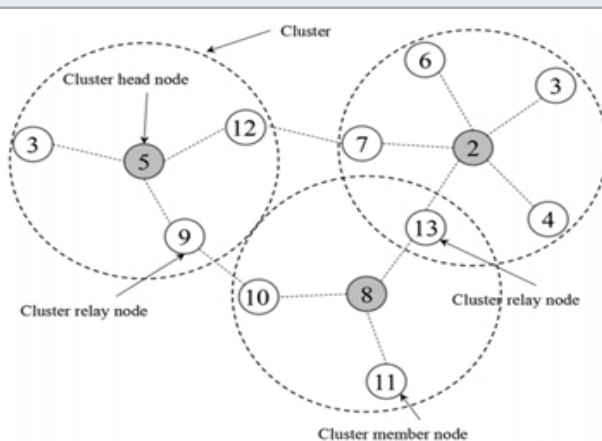
RESULTS AND DISCUSSION

Experimental Testbed: Here both unicast and multi-cast can be achievable. The data processing procedure is burned in the hardware and the communication module specifications are as trails: the node can be configured as ROUTER AT through exclusive PAN coordinator ID and its channels. MY-source address is zero for every single node and the Destination address-DL will be FFFF. Figure 3 and 4 showcase the formation of cluster and pseudo-code in WMNs.

Figure 3: Cluster formation
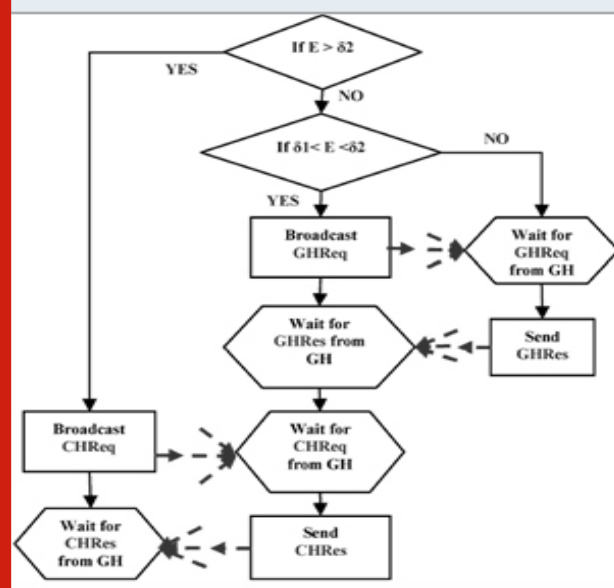
Figure

Figure 4: Pseudo-code for WMN

```
Set baud rate and desired frequency
Assign 6 Dipswitch's
Calculate Real Time Temperature using
        while (ADC Data register == 0)
        ADC = (ADC data register >>6) & 0x3ff.
        Final = (ADC * 2.898)/10.24
        End While
If (Switch == High) goto transmitter Loop
Transmitter loop: Transmits Temperature Value
Else goto receiver loop
Receiver loop:
        If( checks whether data collecting from individual node or as group node transmission)
        Individual Node:
Display data with specification individual node
        Group Node:
Display data received in group with group specification
        End If
End if
```

The figure 5 and 6 demonstrates the prototype arrangement of clustering in Wireless Mesh Network.

Figure 5: Hardware Setup of Cluster network 1 of Wireless Mesh Network
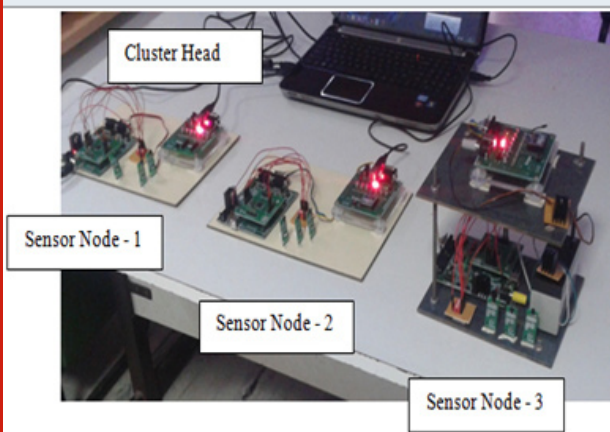
Figure 6: Hardware Setup of Cluster network 2 of Wireless Mesh Network
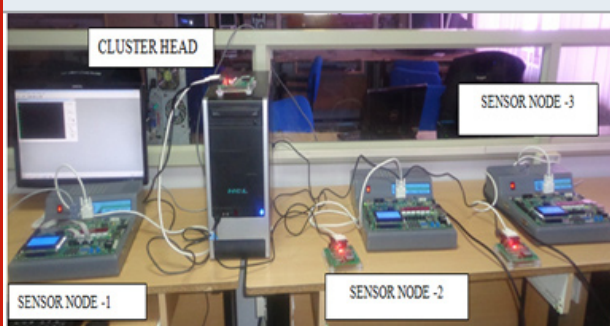
The following parameters are inferred from the proposed network which reduces the complexity and existing issues. Figure 7 shows that there is upsurge in throughput, lessening in communication delay and boosted rate in delivery of packets. Figure 8 demonstrates the parameters like energy dissipation, standard deviation for certain number of packets.

Figure 7: Throughput, Delay and Success rate of the Network
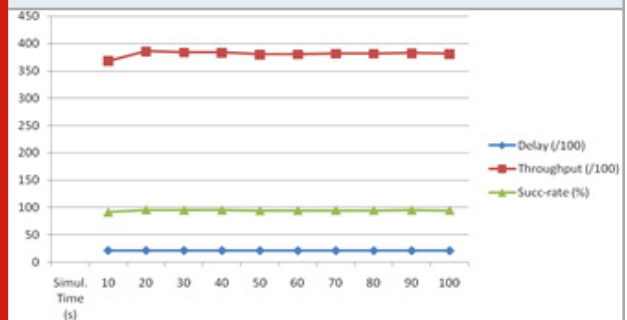
Figure 8 Energy Dissipation and Standard Deviation of the Network
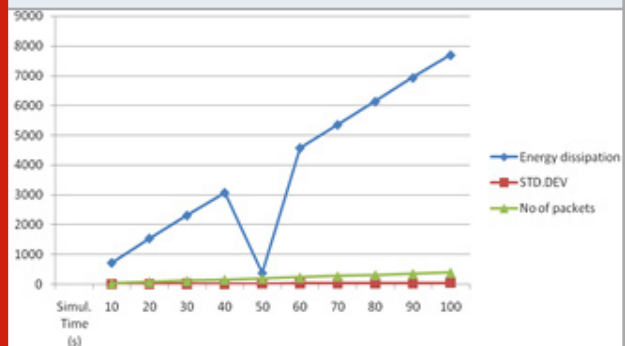
CONCLUSION

The simulation divulging that the anticipated system integrates lively balancing of load and path finding procedure in WMNs. This scheme used for designing a load balancing protocol that chooses a path which delivers a improved throughput, fewer communication delay with small nosiness. To conclude, the developed scheme is compared with the previous schemes and it demonstrated better results which in turn improves the network performance.

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Intelligent Smart Home Security and Automation System Using Iot Blynk Server

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ABSTRACT

Ongoing advancements in PDAs and reasonable open source programming structures have empowered designs to assemble ease home mechanization and security frameworks on the Things Internet. These instruments comprising of sensors called Passive Infrared Motion Sensors and IP Network Monitoring Cameras. Those sensors, keen electrical apparatuses and other IoT gadgets connect by means of a home entryway to the Internet. This venture sets out the design for a financially savvy shrewd entryway sensor that illuminates a client by means of an Android application about open entryway occasions in a home or office condition, and home robotization. With the improvement of correspondence innovation these gadgets have drawn significant consideration. A shrewd home (SH) is an IoT program that utilizes the Internet to track and control gadgets utilizing a home computerization framework. The disadvantages of existing home computerization frameworks are absence of utilization of IoT innovations, antagonistic User interface, remote correspondence extend restricted, and significant expense. This investigation presents an IoT-based home security and robotization framework that is practical and half breed (nearby and remote), with an easy to understand interface for advanced mobile phones and PCs. A model named IoT HoMe is worked with a calculation to permit home conditions to be checked and home apparatuses to be overseen over the Internet consistently and anyplace. In the execution, many programming dialects are utilized and more entryway sensor usage are tended to just as a portion of its constraints, for example, potential obstruction from other radio recurrence devices

KEY WORDS: IOT, ESP8266, LM 35, BLYNK APP, IP CAMERA.

INTRODUCTION

Today we live in the 21st century where innovation assumes an indispensable job in human life. Home computerization empowers us to screen family unit apparatuses, for example, light, lock, ventilator; AC etc. It additionally gives an enacted home security and crisis framework. Home computerization applies not exclusively to lessening human exertion, yet in addition to vitality effectiveness and efficient, and this gadget regularly benefits more seasoned individuals by checking home apparatuses with the guide of their cell phones since they don't have to go to various areas to kill the hardware on or. The framework is sheltered, easy to utilize, dependable, flexible and moderate.

This present endeavor's essential objective is to develop a smart home system consumed to screen home machines

through the web. The home computerization system you make can be immaculate with in every way that really matters each and every home mechanical assembly and can be used to remotely control them from wherever on the planet. The Arduino Uno can talk with the ESP8266 Wi-Fi module and sensors, for instance, Temperature Sensor, PIR Sensor, Fire Sensor, LCD Display and Relay Circuit to allow remote accessibility to the contraption.

The undertaking is constructed utilizing Arduino Uno Atmega328 and NodeMCU (ESP8266) as microcontrollers controlling Channel Relay, which are additionally liable for the activity of the home machines. The Arduino Uno is redone using the Arduino IDE and is interfaced with various sensors, for instance, the temperature sensor, the PIR sensor, the flaming sensor through jumper wires. The sensors outfit the arduino with different sorts of wellsprings of data which are changed to play out those sorts of exercises in the wake of getting the arduino allowing the customer the ability to thus kill on/off mechanical assemblies for instance Light and fan the contraptions can be gotten to by methods for the android application called the blynk application which suggests that if any exercises we have to murder any devices on/ that we can do through that android application.

Concerning security, we have given entryway security by entering the validated individual's secret word from his/her Smartphone, which can open the entryway. Consequently the principle objective of our examination is to structure a framework that can caution an interloper's proprietors and others by sending a notice to their PDAs. The customer will in like manner have the choice to use his propelled cell to stop or start the alert remotely also. This framework will assist clients with protecting their homes by putting the gadget at the entryways or windows and checking the action through their advanced cells. With the progression of innovation controlling and checking of electronic machines utilizing android application, it has gotten conceivable to associate with the Internet.

It offers us the chance to have full authority over a given spot, regardless of whether it is a long way from it. IOT encourages us to same to that control various devices and lessens the human exertion. This process is carried out in low cost, and it is possible to control several devices in a simple circuit. Our user-friendly interface makes it easy for a user to control home appliances over the Internet. In home automation program internet access is used from a distance to monitor.

Web has been used for years only for browsing websites, searching for information and downloading apps and other items. Technology advancement drives internet contact with machinery and computers. In addition, people are concerned about expense overheads. In offices a division of people is only employed to supervise certain typed manual work.

Those frameworks are supplanted by home mechanization. Expenses for that are extraordinarily diminished.

Moreover, in cases occupied with overseeing hardware squander vitality for physical work. Apparatus are believed to keep on running when individuals are absent in their separate spots. So as to beat this test household mechanization is required. Home robotization is doing that difficult activity. In this way home mechanization is seen as being vitality proficient. The home robotization has expanded a lot of reputation starting late. The example is in like manner to propel the usage of home motorization frameworks. If we see homes, strip shopping centers, schools, home robotization frameworks are utilized, thought will be drawn. Despite checking sensor data and controlling family mechanical assemblies, the proposed system gives additional emergency forewarning convenience and customized turn-off of a machine to avoid power wastage. This structure henceforth enables ground-breaking home robotization over the Internet.

Motivations and Problem Statement: The upsides of SH computerization systems consolidate effortlessness of accessibility, reduction of benefits, settlement, comfort, preoccupation, confirmation and security. An assessment was done to perceive the issues with the present home computerization systems. A large portion of existing systems are unsuitable for certain customers in light of their critical costs and upkeep inconveniences.

In any case, existing home computerization frameworks need IoT innovation and UIs are disagreeable. In some current SH computerization frameworks wellbeing and security are not considered. Security and wellbeing are significant components for forestalling mishaps in any SH. Some present SHs have lacking usefulness and highlights on the grounds that the first installer might not have adequate information on the establishment and authorizing of the gadget.

The Existing systems have constrained access to the remote correspondence range as they utilize short-run remote interfaces, for example, ZigBee, Bluetooth and WiFi..There are impressive custom made mechanization frameworks available. These frameworks can be ordered into two principle classifications: neighborhood control and remote/worldwide control, which contrast as indicated by their working idea.

Neighborhood control frameworks basically utilize an in-house gadget with a stationary or remote correspondence innovation to interface with the focal center point or door and clients can just control home apparatuses locally. Remote/worldwide control frameworks permit clients to utilize their cell phones/workstations to control home machines from anyplace on the Internet. Home robotization frameworks can have an easy to understand interface to follow and oversee natively constructed machines productively. To address these issues and lessen the restrictions of home mechanization frameworks, the present investigation presents a financially savvy and half and half (neighborhood and remote) IoT@HoMe robotization framework to extend the correspondence run and grant customers to adequately and profitably screen their homes by methods for a simple to utilize

interface using propelled cell phones just as workstations paying little psyche to time and zone.

The proposed framework was structured by microcontroller, IoT modem and hand-off driver circuit which interface the savvy LED light. This additionally incorporates the nodemcu gadgets where the approved individual can cooperate with cloud or Android IoT application to control the Street light from wherever with the assistance of IoT.

MATERIAL AND METHOD

Related Works: SHs reflect not genuine structures but rather an idea. Sci-fi has upheld the meaning of home mechanization for quite a long time, and the American Association of House Builders exhibited it in 1984, hence setting up SHs. A SH is innovation joining which empowers clients to accomplish a superior nature of living.SH is a voice right hand to control every single home apparatus remotely. SH can help improve wellbeing, solace, comfort and oversee resources.SH bolsters the old and individuals with incapacities by giving them a sheltered and make sure about environment. For the most part, two kinds of SHs can be classified, in particular wired and remote frameworks. Wired systems use fiber-optic, transport and electrical cables. Remote systems incorporate sender and recipient.

Today, numerous new applications utilize remote innovation to speak with different gadgets, for example, radio waves or infrared. SHs could work with remote and wired frameworks simultaneously. SH robotization frameworks have gradually become universally handy convenient controllers that fulfill individuals in their every day schedules. SH assumes a noteworthy job in network improvement. The key highlights of SHs therefore incorporate continuous observing, programmer security, remote control, and fire and gas alerts. Taking into account that SHs handle delicate and individual information, security and security methodologies should be worked to shield clients and corporate information from encroachment while keeping up solid services (Shouran et al,. 2017)

As a rule, IoT is a moderately new advancement, empowering existing homes to have great registering and systems administration capacities with the fast improvement of the Internet and correspondence advances. In a SH setting, keen apparatuses can be associated legitimately to the home system, and clients offer the orders to control every machine independently. At the point when orders are given either by means of discourse, cell phone or PC, shrewd gadgets may consequently react. IoT is a maxim that interconnects and interfaces protests that arrange gadgets.

The information is joined from various gadgets and means investigative Internet waves to show the most significant information with frameworks intended to address explicit issues. IoT can specificate valuable and futile information precisely. These information can be utilized to recognize

designs, define proposals and distinguish potential issues that may emerge. However later on, IoT is viewed as a remarkable wonder. Earlier IoT-related examinations on SHs are talked about right now many works dependent on SHs. As needs be, the expansion of home machines in the IoT surveys concentrates on SHs.This study's discoveries and proposals lead to a wide comprehension of the propelled client perspectives towards security in SHs. A portion of the related work is along these lines done in home automation (Edmonds et al,. 2016).

A mechanization control of SH has been proposed utilizing the Bluetooth and GSM modules. This examination expects to help individuals with inabilities and the old screen home machines from remote locations. The residents utilized remote interchanges from Bluetooth and GSM to screen the home. Bluetooth was likewise used to follow the indoor and GSM frameworks to control the open air machines. Bluetooth can lessen framework costs on the grounds that most cell phones and workstations have this worked in application. Clients can screen and control the apparatuses from remote places by sending SMS through GSM. Be that as it may, such a framework has constraints in the two cases. Bluetooth has a restricted information range and GSM is costly because of the SMS costs (Davidovic et al,. 2015).

It proposed SH computerization dependent on sensor innovation, which could screen home machines consequently utilizing Android-based cell phones as remote controller. The creators utilized Raspberry Pi as microcontroller, and Bluetooth as convention for correspondence. Wi-Fi associated the cell phone to the Raspberry Pi controller which was associated with a similar system AP utilizing savvy appliances.All sensors balanced their data over Raspberry Pi to a close by server. The customer can't anyway arrive at the server and can't legitimately utilize the cell phone to transmit the orders to the Raspberry Pi controller when it is outside the Wi-Fi AP range (David et al,. 2015).

Use of the Arduino 2560 microcontroller with Bluetooth module to assemble a home mechanization and ecological observing project. Different sensors and switches were utilized to screen home machines through sites or Android applications. The site controls Arduino by passing data to it as codes. Arduino Super is more exorbitant than NodeMCU, and in view of its constrained element sensors, the utilization of Bluetooth is inadmissible for SH applications, so switches were utilized to screen home machines through sites or Android. home computerization framework dependent on Message Queuing Telemetry Transport (MQQT) utilizing ESP8266 was executed. ESP8266 was associated with actuators and sensors, and MQTT was utilized for control and checking. Wi-Fi was utilized as the model contact, and MQQT worked gadgets utilizing ESP8266 (Imran et al,.2016).

A web-based IoT architecture using GSM to execute SH applications, and a SH design control framework based on GSM was introduced. This research suggested a system

allowing users to track and control smart devices over the Internet, where users offer commands over the web, and the user feedback is translated to GSM-SMS commands. These orders are sent to the incorporated framework module, which is put wherever on the planet and can be legitimately associated with the gadgets the through GSM arrange. Moreover, the module is controlled through an IoT operator by the GSM organize (Ravi et al,. 2016)

Existing System: Home robotization is the use of in any event one PCs to control the major home devices and contraptions normally and even remotely. On occasion, an automated home is known as a sharp house. Home motorization may consolidate water sprinkling, warming and cooling arranging and modernized action, window covers, security structures, lighting, and sustenance preparation gear. An inside and out arranged home robotization system's focal fragments join a PC (or PCs) with authentic course of action, the various devices and structures to be controlled, interconnecting connections or remote associations, quick Internet organize, and the PC's emergency support power source, its peripherals and central home machines. The current home robotization program relies upon selective parts of correspondence to automate home devices. The issue with this procedure is that a creating extent of home devices can't be stretched out to fit a comparable robotization framework.

Technologies

X10:X10 is an adaptable home robotization stage that utilizes existing electrical links from your home to remotely control lighting, machines, security frameworks, pools and considerably more. X10 remote control, move, and module orders go through standard family cabling from X10 transmitters to X10 collectors. Required no new cabling. For extra remote gadgets X10 home robotization frameworks convey unlimited chances.

ZIGBEE: The Zigbee Partnership includes salespeople who made product to work with it. It uses one of the key parts in IEEE which allows a work framework to talk about correspondingly with most devices. It likewise devours next to no power and uses a work arrange structure to give incredible range and quick correspondence between gadgets. In any case, a few clients have noticed that Zigbee gadgets frequently experience issues speaking with those made by various makers, so on the off chance that you are searching for consistent interoperability it probably won't be the best choice.

Z-WAVE: Z-Wave is a remote home mechanization convention working on the recurrence band 908.42MHz. It is moderately new with regards to home mechanization conventions, however has advanced quickly as of late. The Z-Wave Alliance people group behind it currently flaunts in excess of 1,000 distinctive good gadgets, offering you a wide scope of choices with regards to robotizing your home. One of Z-Wave's key highlights is that it utilizes a type of system called a "work organize," implying that one Z-Wave gadget must exchange the sign to another until it arrives at its proposed goal. This transfer framework extends its range essentially. It is

likewise very low force which is appropriate for battery-based gadgets.

WI-FI: Wi-Fi is an innovation that makes it conceivable to interface different electronic gadgets or contraptions to a remote LAN (WLAN) principally utilizing UHF 12 cm and SHF ISM 5 gigahertz (6 cm) radio groups. The "Wi-Fi" is a Wi-Fi Alliance brand. The brand "Wi-Fi Certified" must be utilized by effectively finishing the affirmation test for Wi-Fi Alliance interoperability. Specific Wi-Fi-empowered gadgets incorporate PCs, computerized sound players, pc game consoles, cell telephones, tablet PCs, advanced cameras and compact printers.

Proposed System: The IOT is a situation where antiquities, PCs, autos, structures, and different things that are profoundly coordinated with gadgets, programming, sensors, and system correspondence permit such ancient rarities to accumulate and share information starting with one thing then onto the next. This system permits the articles to be naturally detected and overseen over the present framework. This system gives chances to consolidating things into PC based system framework to improve execution, exactness, and monetary increase. This innovation is digital physical structures when it is joined with sensors and actuator. Instances of the IOT are savvy frameworks, brilliant houses and keen transportation.

Because of the combination of different innovations, the IOT definition was made in 2013, going from remote correspondence to web and implanted frameworks to electromechanical frameworks. It implies including remote sensor organize, control framework and robotization to permit the IOT. Distributed computing is so significant in the web of things, since it fills in as a front end to get to the web of things. Distributed computing is presently increasingly mainstream administration that accompanies more preferences and qualities. An IoT mechanized house has three inexactly ordered segments: equipment, programming, and the convention for correspondence. Such three segments are significant for building a savvy home, since every one of them is pivotal. IoT arrange furnishing with the correct equipment guarantees productive making of IoT models Choosing the correct contact convention is vital. A very much created and checked convention can assist with staying away from execution contrasts and framework incorporation issues. A further urgent segment of the IoT arranges is the firmware, alongside the correspondence convention.

Project Description: IOT and Arduino based Home Security framework venture is intended to help an individual in shielding his/her home from robbery and temperature checking and light and fan control. This venture utilizes different sensors from which information is transmitted by means of IOT over a site.

Working Principle: This gadget has two primary modules: the control module for the equipment, and the correspondence module for the applications. The focal

point of this gadget is the Arduino microcontroller that can likewise go about as a smaller scale web server and the interface for all the equipment modules. Right now contact and controls experience the microcontroller. Wellbeing being the undertaking's principle reason, any household security is the most basic element of this program. The fundamental advantage of this framework is, it is completely computerized.

When empowered, it needs no human association at all, and is likewise very financially savvy. Clients will show these information on the cloud stage, for example, BLYNK Network. IOT and Arduino based Home Security framework venture is intended to help an individual in shielding his/her home from robbery and temperature checking and light and fan control. This task utilizes different sensors from which information is transmitted by means of IOT over a site. This gadget has two fundamental modules: the control module for the equipment, and the correspondence module for the applications. The focal point of this gadget is the Arduino microcontroller that can likewise go about as a small scale web server and the interface for all the equipment modules. Right now contact and controls experience the microcontroller. Wellbeing being the task's principle reason, any residential security is the most basic component of this program. The primary advantage of this framework is, it is completely computerized. When empowered, it needs no human connection at all, and is additionally very financially savvy. Clients will show these information on the cloud stage, for example, BLYNK Network.

Figure 1: Proposed block diagram
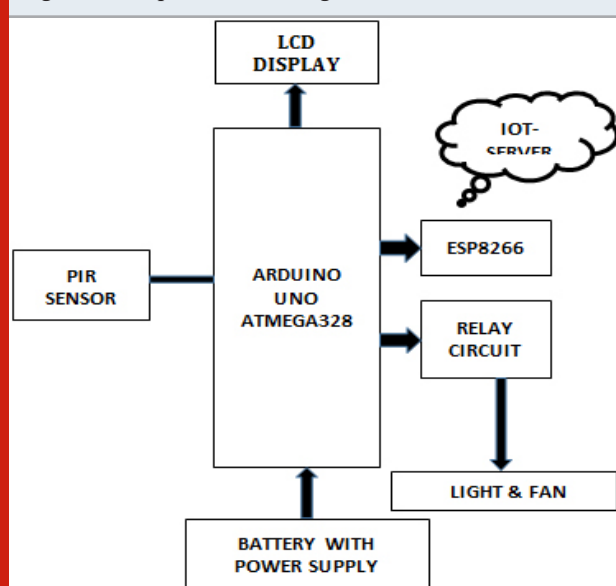
The associations are made according to the circuit chart and the subtleties of the unit level of age, transmission and overabundance vitality put away in the battery are at first given. Wind power plant courses of action are done in the circuit, and the photovoltaic cell is situated in the circuit. Utilizing a rectifier, the delivered vitality is corrected again and afterward it gives the bidirectional

DC-DC converter for the transmission of the stock to the cost.

Figure 2: Circuit diagram for interfacing Lm35
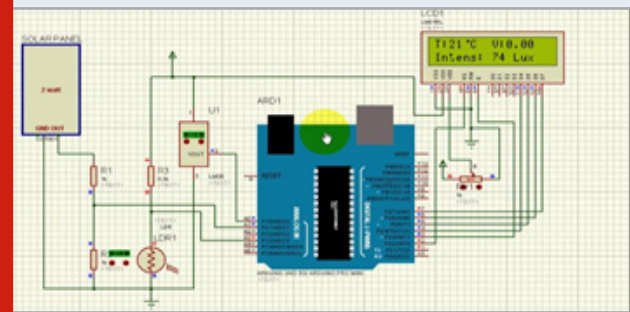
Driver Circuit

Figure 3: interfacing street light to relay circuit
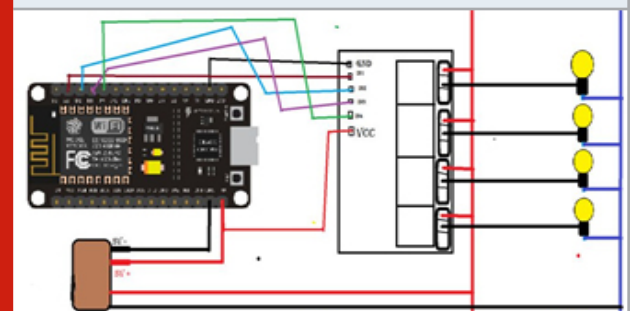
The entire transfer driver circuit is microcontroller interface. The light is appended to typically open transfer (NO). The information signal originates from the Server or IoT gadget. The info signal begins from the Server or IoT gadget. The microcontroller triggers the driver circuit.

Advantages
- Renewable energy source
- Reduces electricity bills
- Low maintenance cost
- Technology development

Research Contributions: The fundamental commitment of this examination is the improvement of a powerful, ease, and compact IoT@HoMe framework for nonstop checking of home conditions and agreeable Internet control of home apparatuses paying little heed to time and area. To meet these prerequisites, the accompanying points and commitments are received right now:

(I) Design and production of a SH model encouraging the observing and control of home apparatuses utilizing an IoTplatform and advancing home security using NodeMCU as an entrance to interface the gadget to the Internet.

(ii) An IoT based shrewd home security and control calculation.

(iii) Implementation of a propelled minimal IoT add-on controller (IoT@HoMe) as a gadget for following and dealing with a genuine house.

(iv)   IoT@HoMe gadget usefulness approval as far as robotization, wellbeing and security and execution assessment of the framework assembled.

SH item structure and assembling depend on IoT. The proposed framework consolidates Wi-Fi for nearby control and IoT to permit remote control and observing by means of an IoT stage. This condition permits the freedom of portable supplier and client area. NodeMCU is utilized as a microcontroller and Wi-Fi as a convention for correspondence. Clients can get messages sent from the Wi-Fi-associated microcontroller controlled system from any separation on their cell phone or PC by ensuring that the electronic gadgets are associated with the Internet. NodeMCU is customized with Arduino (IDE) programming. This application assists with composing the codes and moves the program to the microcontroller's chip. The gadget can be melded into the switches and sensors of the home machines to permit compelling control. A few sensors are associated with oversee family unit apparatuses and mounted all through the family to distinguish exercises and occasions, and the detected information is sent remotely to a portal. The framework is joined with notice frameworks to recognize any risk to security. The program proposed offers security and solace, specifically for the old and handicapped.

Methodology: This area clarifies the procedure embraced right now, includes the orderly course of action of different research stages together with the far reaching structure and usage of the IoT@HoMe system and SH model. Moreover, it portrays the assortment of segments and their consolidation to meet the plan goals. In Figure 2 the flowchart shows the applied system of this examination. The work starts with the recognizable proof of issues found in current SH frameworks. The most noteworthy issues with the arrangements accessible available are their high beginning organization costs and unpleasant UIs. The demonstrating procedure centers around choosing the materials and parts expected to assemble the SH model and to build up the IoT@HoMe framework.

The SH is planned with NX10 programming, and the model is made with compressed wood.The computerization framework is planned and actualized by IoT@HoMe. The wiring and correspondence between the different segments (bulb, fan, engine and sensor) is mounted and tried on the IoT@HoMe framework (NodeMCU, transfer board, DC source, and others) joined in the SH model. After the microcontroller and parts are connected, the coding is done to achieve the necessary undertakings. The detail is then reviewed to choose whether there is any issue with the gadget functionalities. Testing is done to confirm viability of the program. At the point when any issue is distinguished, the program comes back to the past advance, which is improvement and streamlining. At the point when it shows great execution the gadget is concluded.

Design Enhancement and Optimization: The equipment framework actualized in the SH model is tried and

the plan improved and advanced when any mistake happens until the framework can perform well. This progression is basic for framework execution upgrades and mistakes location. The issues experienced during the former stages are subsequently characterized and fixed. This progression is rehashed until effectively executed. For instance, LED bulbs are utilized as substitutions for actuators to peruse the yield before beginning the genuine execution of our framework. After aggregating all the programming codes into NodeMCU, the actuators, for example, fan, engines, signals, bulbs and transfer module are utilized to test the breadboard viably. Every link association introduced are tried utilizing a multimeter. The wires are named and called to help the client unmistakably check any part of the association with the system. The wires are additionally covered and fixed with dark lace for wellbeing and association. Right now, gadget is evaluated to show that all sensors, actuators and NodeMCU work successfully.

Overall System Architecture: The general framework engineering of the mechanization framework worked at IoT@HoMe. For this examination the NodeMCU sends the sensor information to the MQTT server (Adafruit. IO) and reacts to the client's gadget to-framework orders. for example, turning on/off LED-like actuators. Utilizing the incorporated Wi-Fi module the NodeMCU interfaces with the Internet. Clients can follow server information by signing in to any electronic gadget that can get to the Internet and screen lights, fans and engines.

Figure 4: Proposed Architecture
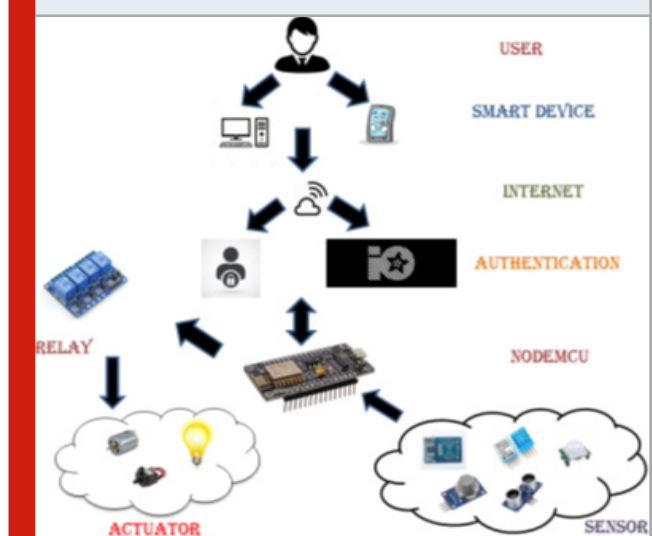
RESULTS AND DISCUSSION

The implementation encompass microcontroller, step down transformer, PIR sensor, fan, light,relay. The implementation starts from pir sensor which detects the human and informs the owner,so that the safety is provided for the home. And blynk server software is used for viewing the stay telecasting and for controlling the house appliances. Blynk is a Platform with IOS and Android applications to control microcontrollers on the

Internet. It's a digital dashboard where you may build a image interface for your mission by really dragging and losing widgets. A universal community digicam adapter for the Windows running system.It very well may be utilized with heaps of conventions, cameras with MJPG yield or static pictures. Works with any application that utilizes DirectShow API, for example, Skype, errand person.Deals with Windows 2000/XP/Vista/7/8.

Figure 5: Flow of project
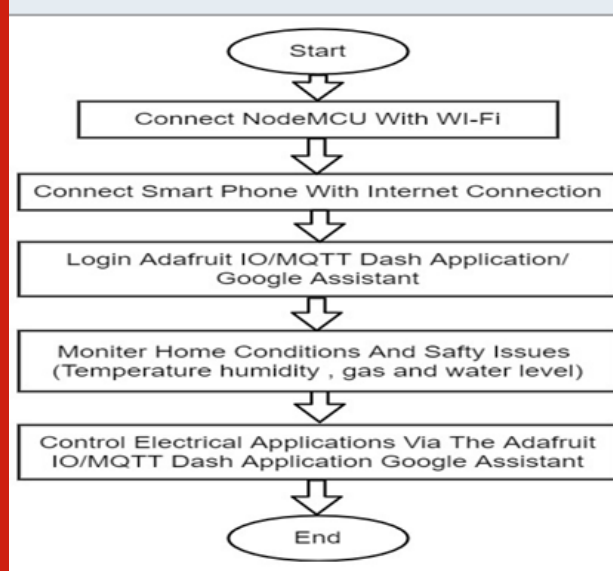
Figure 6: Implementation Hardware
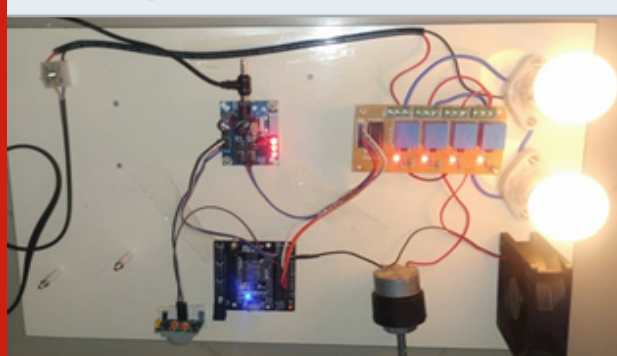
Figure 7: BLYNK IoT App development
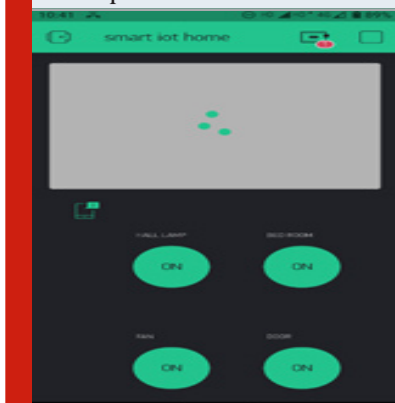
Figure 8: BLYNK Camera VIDEO Output
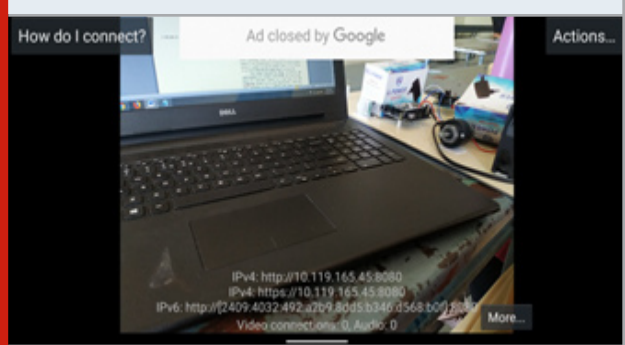
CONCLUSION

The IOT advances the quantity of advantages to society and our paper permits us to give and show the intensity of IOT equipped for contributing the foundation to assemble enormous quantities of uses and empowering them to be fused on the open stage. This engineering offers a sensible and less expensive approach to execute IOT detecting, observing and control frameworks in the local and modern benchmarks. The objective of remotely controlling home machines utilizing IOT innovation to interface framework parts as remote advances will end up being increasingly engaged in a genuine home systems administration advertise. The Wi-Fi administration is the worked in help for all Android-based cell phones; the home access framework to screen can utilize the handset, Wi-Fi, 3 G or 4 G to get to the facilitating webpage site page utilizing the Android App.

This venture proposed the structure, assembling and usage of a conservative, easy to use, and minimal effort IoT-based SH mechanization framework. In a genuine house the assembled IoT@HoMe framework can be handily actualized to permit ongoing observing of home conditions and control of home apparatuses. The NodeMCU controller was associated with a few sensors and actuators, which changed the information to the IoT server.

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Prototyping Exploration of Glaucoma Using Dnn

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ABSTRACT

Glaucoma is the one type of eye disease that damages our retina by causing an high pressure in our eye. These issues can be resolved by using automation concept of deep learning techniques. Deep neural network (DNN) which is a multi- hidden layer and conjunction to segment the optic cup and disc identify the eye disease glaucoma. DNN is a part of deep learning(DL). It has an ability to increase the classification and fitting capability to big data. It is applied as a regression model. It takes power, inclination, and versatile standardized force score (ANIS) of picture fragment highlights for learning. It predicts the comparing retinal limit pixel. It's utilized to foresee the maladies precisely. It is utilized distinguish the ailment without any problem. It is utilized to build up a programmed framework to portion irregular retinal layers in optical rationality tomography (OCT) pictures. Assess its exhibition in correlation with human evaluation. DL has an incredible picture information preparing capacities to accomplish high - exactness forecast.

INTRODUCTION

Given all these disorders, glaucoma, a serious disease that affects the eyes and the leading cause of blindness in the world, according to the American Academy of Ophthalmology, glaucoma is a complex disease that damages the optic nerve. This occurs when a fluid (called a fluid) develops in the front of the retina when pressed on it. In general, the pathology of glaucoma can be broadly divided into two types: "open angle" and "closed angle" (or "closing angle"), both described with respect to the angle bounded between the iris and the cornea.

The case of a sharper open angle suddenly appears, which leads to a quick loss of images, while the closed angle tends to progress gradually with a slower speed. Since the medical diagnosis is mainly carried out in a human study of glaucoma and other visual impairments, the use of image processing algorithms has become a necessity, especially when ophthalmologists have to manage a large set of fundus images. Such a computer device allowed clinicians and medical specialists to reach more patients, while simultaneously striving to improve the accuracy of diagnosis. Clinical studies of retinal images are still physically conducted, trying to deliberately distinguish and monitor the development of eye diseases. In addition, these visual examinations take a lot of time, since they depend on the experience of the doctor to be successful, noting that some pathologies may require intensive examination for several years in order to ultimately identify and cure.

Fundoscopy is a invasive indicative imaging technique that takes into consideration the obtaining of retinal pictures. One of its applications is the diagnosis and treatment of diseases related to micro vascular circulation in the retina such as hypertension and diabetes. Enlistment

ARTICLE INFORMATION

twists pictures to a typical reference outline, with the goal that a physical point on the retina is harmed at similar organizes in all the distorted pictures.

Enrollment of retinal pictures can be utilized to make pictures of higher goals and definition to fasten pictures into an all-encompassing picture of the retina, or a "mosaic". Enlistment strategies depend on the extraction of basic data between the test and the reference pictures. Enlistment approaches can be sorted as worldwide or neighborhood techniques." Worldwide techniques look at force designs in pictures by means of relationship lattice. In retinal picture enrollment, the couple of existing worldwide strategies depend on shared data.

Local methods rely on localized features or vessel trees. Neighborhood techniques are increasingly vigorous to nearby changes because of anatomical contrasts or enlightenment antiques. Accordingly, they are progressively well known contrasted with worldwide techniques. The veins are commonly darker than the foundation tissues in the shading fundus pictures however more brilliant in the FA pictures, and are now and then being darkened because of the impacts of the infections

MATERIAL AND METHOD

Related Work: Kyungmoo Lee Glaucoma is the second driving visual ailment causing visual impairment because of slow harm to the optic nerve and resultant visual field misfortune Segmentations of the optic plate cup and neuro retinal edge can give significant parameters to distinguishing and following this malady. The earlier information about the states of the cup and edge was fused into the framework utilizing a curved structure based methodology. the reason for unearthly space 3D OCT(SD-OCT)volume is to depict and assess a strategy that can naturally fragment the optic circle cup and edge. the master of glaucoma commented on to the cup and edge region utilizing planimetry and the explanations of the principal master were utilized as the reference standard. Raheleh Kafieh It give a quick division strategy dependent on another sort of otherworldly chart hypothesis named dispersion maps. Optical rationality tomography (OCT) is known to be one of the amazing and sacred strategies in retinal imaging. OCT gives micron-goals, cross-sectional sweeps of organic tissues by utilizing retro reflected light

OCT innovation advancement, which has been a field of dynamic research since 1991, During the most recent decade OCT picture division has just been completely investigated. In this paper, Based on another sort of phantom diagram hypothesis named dispersion maps we present a quick division technique. The ghostly area OCT pictures portraying typical macular appearance is performed after research. The introduced approach doesn't require edge-based picture data and rather depends on territorial picture surface dependent on OCT picture division. Zou Liang As a neuro advancement issue, neuroimaging advances, as attractive reverberation

imaging (MRI), couplet with AI calculations, are by and large progressively investigated as biomarkers in ADHD. In this paper, we build up an ADHD arrangement strategy by means of 3-D CNNs applied to MRI filters. A considerable number of parameters may utilized since significant neural frameworks, the huge number of MRI tests in pooled enlightening assortments is still modestly confined if one is to take in isolating features from the rough data. Or maybe, from helpful MRI (fMRI) and fundamental MRI (sMRI) data here we propose to at first separate critical 3-D low-level features.

Fuyong Xing: It gives a quickly developing field, explicitly for microscopy picture examination. In PC supported determination and anticipation mechanized microscopy picture examination assumes a significant job. AI strategies have controlled many elements of clinical examination and clinical practice. As of late, in PC vision the profound learning is developing as a main AI apparatus and has pulled in extensive consideration in biomedical picture examination. In this paper, for microscopy picture examination we give a preview of this quickly developing field, explicitly. We abridge present profound learning accomplishments in different errands, for example, discovery, division, and arrangement in microscopy picture examination and quickly present the famous profound neural systems. Specifically, we clarify the models and the standards of CNN, completely convolutional systems, repetitive neural systems, stacked auto encoders, and profound conviction arranges, and deciphers their plans for explicit assignments on different microscopy.

Yeong-Mun Cha It also provides highly accurate segmentation on a single-pixel scale for each retinal layer. The optical coherence tomography images should provide valuable information about eye disease. It is used to find that disease automated segmentation of retinal layers. The optical cognizance tomography pictures should give significant data about eye infection. It is utilized to find that sickness computerized division of retinal layers. the debasement of neighborhood quality pictures is must. Because it is against for Sensitive extraction of exact layer boundaries.so Sensitive extraction of precise layer limits is vital.

Problem and Model Description: OCT segmentation algorithms and segmentation algorithms as a whole can be divided into two main categories: algorithmic approaches and data-based approaches. The main classification includes. The first calculations, for example, the recognition of the dependent time, the limitation of the edges and the geometry of calculation; subsequent calculations include graphics research, dynamic form, and batch-based techniques.

Despite the fact that these calculations are an incomplete section of retinal images, their cases are due to their previous assumptions and their fixed numerical models. The second category uses artificial intelligence methods, which have recently attracted considerable attention both in industry and in scientific circles; consequently,

research on the development of segmentation approaches has gradually shifted towards deep learning.

Busy deep learning systems are used in many clinical studies. The three-dimensional convolutional neural system (CNN) is used to analyze the problems of hyperactivity deficit in useful and auxiliary images of attractive reverberation (MRI). We have proposed an automatic intermittent circuit which uses the prediction of the limiting pixels using the regression of the deep neural network (DNNR). The regression task uses the characteristics of the corresponding A-scan segment as an input instance and returns the vertical coordinate of the corresponding limit pixel of this A-scan segment in the axial direction. In other words, each boundary line is predicted by a small deep learning network using the appropriate functions. This simplifies the segmentation problem versus interpreting it as a pixel classification problem. Deep learning is used for the regression model, which uses the well-known learning algorithm - stochastic gradient descent with pulse - to update system parameters.

Rewording the problem as a regression system obviates the need for a cumbersome CNN system to classify each pixel in the image. Next, we discuss the detection of eye diseases using the method on the fundus images. Many people today suffer from more eye diseases. Therefore, by using this situation, many doctors and hospitals can easily steal more money from patients. Ordinary people are the most affected by this problem. We propose a method for accurately identifying a disease.

Figure 1: Block diagram

System Implementation
Data Acquisition: The data of images can be capture from camera. In computing, all data is logically represented in binary. This is true of images as well as numbers and text. a significant qualification should be made between how picture information is shown and how it is put away. Showing includes bitmap portrayal, while putting away as a document includes many picture groups, for example, jpeg. It contrasts from customary strategies by utilizing warm pictures as information sources.

Preprocessing: Noise is unwanted information that can result from the image acquisition process then the acquiring images are stored in a dataset. Then it perform some preprocessing steps are performed in that stage like separate the foreground background images are processed in that stage. It is used to eliminate the blurriness' in the images.

Segmentation: Segmentation is one of the key issues in picture handling. A well known strategy utilized for picture division is thresholding. After thresholding a binary image is formed where all object pixels have one grey level and all background pixels .This segmentation is used to separate the retinal layers automatically then this separated layers are stored in dataset.

Classification: This method is used to classify the retinal layers. Separately classifying the retinal layer images. Then the classified images are stored at database. This classification method is used to individually classify the segmented retinal layers.

Feature Extraction: The feature extraction is the process of classified images is stored in dataset. Then the comparison of current uploading image and already segmented images. Then finally it provides optimized result accurately.

Figure 2: Image Processing
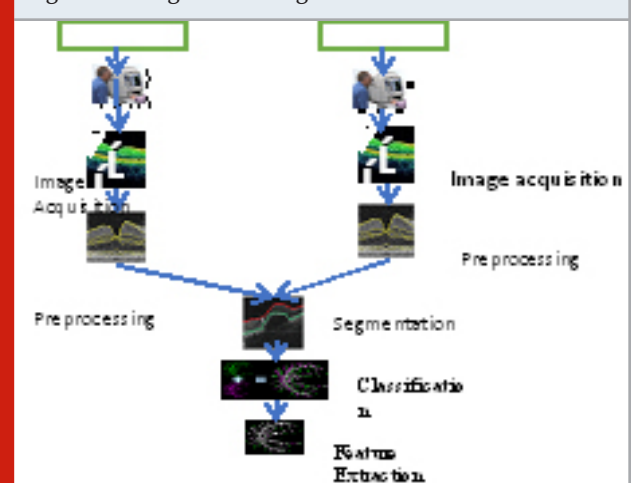
Performance Evaluation: This method is used as a process of accurately segment the retinal layers and detects the disease accurately. Then this method is used to predict the disease is affected or not affected process is accurately.

RESULTS AND DISCUSSION

Experimental Result and Expected Outcomes: In the comparative work CNN technique has need to separate and the data set, and clustering algorithm for prediction. The output gives the accuracy.

Precision: Accuracy considers all recovered examples, yet it can likewise be assessed at a given cut-off position, considering just the highest outcomes returned by the framework. This measure is called exactness at n or P@n. Accuracy is utilized with review, the percent of every single pertinent example that is returned by the hunt. The two measures are now and again utilized together in the process to give a solitary estimation to a framework. Note that the significance and usage of "precision" in the field of information recuperation changes from the

importance of precision and exactness inside various pieces of science and development.

Recall: In data recovery, review is the portion of the important examples that are effectively recovered. For instance, for an ideal hunt on a lot of datasets, review is the quantity of right outcomes separated by the quantity of results that ought to have been returned. In double order, review is called affectability. It very well may be seen as the likelihood that an important examples is recovered by the question It is inconsequential to accomplish review of 100% by restoring all examples in light of any question. Thusly, review alone isn't sufficient however one needs to quantify the quantity of non-pertinent knuckle designs additionally, for instance by likewise figuring the Precision. Precision recall and F-Measure are then defined as

Precision = tp/($tp+fp$)

Recall = tp/ $(tp+fn)$

Recall = 2* [(Precision* Recall)/(Precision* Recall)]

Accuracy Rate
Accuracy = tp + tn /($tp+tn+fp+fn$)
Whereas,
P – Precision
R- Recall
F- (F-Measure)
A - Accuracy

Below table is represent the results of CNN and sMRI& fMRI in signature pattern and finger print knuckle pattern and the accuracy obtained. Pattern and the accuracy obtained.

Table 1. Pattern Accuracy				
Methods	P	R	F	Accuracy
CNN	0.98	0.895	0.92	92.98%
fMRI &tsMRI	0.95	0.896	0.94	92.66%

The below graph provides the accuracy levels that has been obtained by considering precision, recall and f-measure values, which concludes the accuracy in predicting the patterns.

Figure 3: Comparison Graph
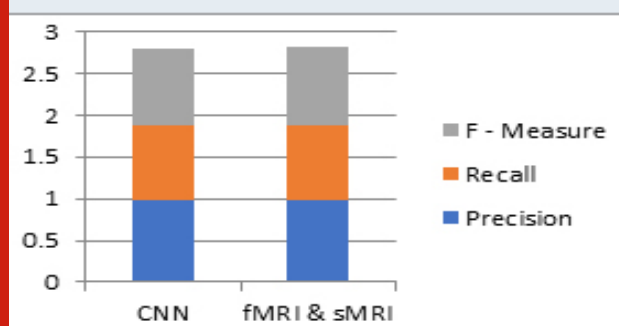
CONCLUSION

A retinal layer segmentation scheme based on the DNNR model, which predicts a boundary pixel using three selected characteristics for each boundary line: ANIS, intensity, and vertical gradient in the axial direction. A theoretical DNNR analysis based on the loss function of MSE and SGD with impulse for optimization was also discussed in detail. In each of the A-scans, the characteristics of the reference line segment are extracted to predict the edge pixel as a regression problem. Then, the predicted pixels are followed by sliding windows using the Otsu clustering method. Another way of setting the task into a regression task can significantly reduce the complexity of the neural network, as analysis of complexity shows.

Future Enhancement: We are currently adapting our approach to solve the problem of recording multimodal images. Competitive results have already been obtained only thanks to a slight modification of our conveyor. This particular change is simply to provide gradations of multimodal images in both color and grayscale instead of raw images as input to the step of extracting characteristics from our structure, and it is also used to flexibly overcome problems related to the intermittent layers of the retina in retinal pathology, such as macular openings. Certain preliminary conclusions concerning patients diagnosed with diabetic retinopathy aim to ultimately contribute to other medical applications, such as multimodal recording. In addition, we intend to broaden our approach to calculate the three-dimensional stereoscopic reconstruction of fundus images, which is another major problem related to the context of diagnostic assistance.

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Xiang H Tian X Yang F Shi W Zhu H Chen and X Chen (2018) Automatic segmentation of retinal layer in OCT images with choroidal neovascularization IEEE Trans Image Process vol 27 no 12 Pages 5880–5891.

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Estimation of Calories and Micro Nutrients from Food Image Using Deep Learning Algorithm

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ABSTRACT

In this paper, Food detection, categorization of calories and micro nutrients are carried out. As well as , it helps to know the intake habits and dietetic assessment for people . The healthy lifestyle is must for every individual in today's world along with giving utmost importance to what they consume as regulate to attain the similar. This paper focuses on creating software which offers the calorie and micro nutrients of the food image which the user is going to consume. The software will obtain images as input from the user in order to achieve this concept. The image will be detected with the aid of Faster Deep Learning algorithm from the food item. Using image processing and segmentation, the image of food will be taken and calculates the nutrition and calorie content. This work provides accurate evaluation and proposes a capable way to compute and handle day by day food intake of patients and and dietitians

KEY WORDS: DEEP LEARNING CONVOLUTION, CALORIE AND MICRONUTRIENTS ESTIMATION, IMAGE PROCESSING.

INTRODUCTION

In an individual's life health is one of the important aspects. If a person to stay in form and keep up a healthy diet, it takes some amount of effort. Unit of energy is obtained. People get energy from the food and drink they consume, For physical activity the energy is used,the calorie is the form of energy. For human health calories is essential. The solution is taking the correct amount. Every human being needs their own quantity of energy per day based on their age, weight and work carried out. To survive the human body needs calories. If the consumption of calorie is too low or too high then the

health problem will in the long run. The quantity of calories in food tells us how a large amount of potential energy they contain. Calories is not only important, other than calories are taken from the substance also important. Vitamins and minerals are necessary nutrients which plays major role in executing different types of tasks by the human being. Consuming sufficient nutrients (good for health) and taking beyond limit (which can wind up harming you) are identified through fine line.

Nowadays it is very difficult for a person to track the calories consumed by them. The intake of calories plays a very vital role in one's healthy lifestyle. Previously, the users used to track their calories intake with the help of charts or timetable. Otherwise they used to maintain a strict diet where the food item which has to be consumed was fixed along with its quantity. These methods are a bit tedious and difficult for the user to follow judiciously. We have come up with a project to help the user track the

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number of calories and identify the type of mineral and vitamin content which it takes in with the help of simple images of the food item. Through the Deep Learning CNN the calories and micro nutrients are estimated. The Deep Learning Convolution(Krizhevsky et al,.2012, Kuhad et al,. 2015) are studies in literature. Food Recognition and Detection by intake of image(S. Yang et al,. 2010, Vaibhavee Gamit 2016).Food calorie and micro nutrients are measurement(S. Yang et al,.2010 , Pouladzadeh Parisa et al,.2014, Dhananjay Khade et al,.2016)

MATERIAL AND METHOD

An image processing based approach to measure the calorie substance present in the food image. In the food category, we can take several food images as the input dataset.

We collected information in the form of jpg ,png to set the set the images values. In deep learning , Convolutional neural network is a type which can do difficult tasks with texts, images etc., and which is used in various domains. It defeats the various limitations of normal machine learning algorithms. Block diagram shows the overall procedure of estimating the calorie and micro nutrients for the given set of images.

Figure 1. Block Diagram of Calorie and Micro Nutrients Estimation
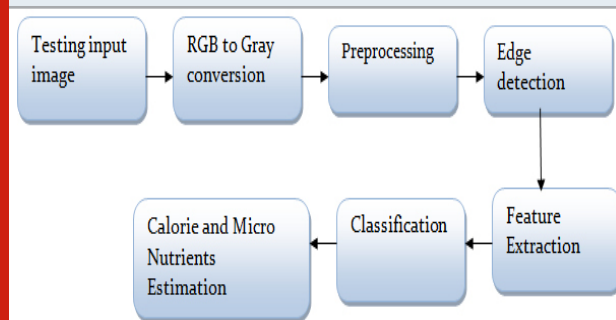
RESULTS AND DISCUSSION

Data processing: Input food images are in RGB format. The input image was converted into different channels i.e, Green band, Blue band and Red band separately. The input RGB image was further converted into grayscale using RGB to gray conversion process. Based on RGB image we need choose values after RGB we need to separated the color image from the RGB image. All the image preprocessed and resized into the size [256,256].

Figure 2: Input Image
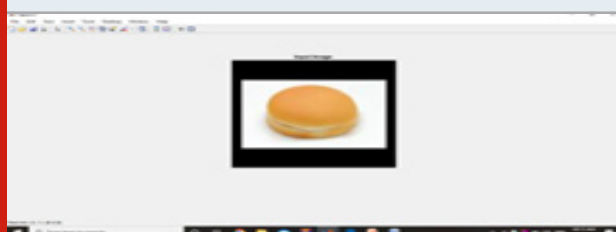
CNN layers training

Convolution layer: In CNN architecture a convolutional layer is a basic component which is the combination of linear and non-linear operations are performs the characteristics extraction, i.e., the establishment function and convolutional operation. For feature extraction it needs a particular type of linear operation which is convolutional, array of numbers which are small, called as kernel. In the functional the input across it, Tensor which is called as array of numbers. The product between the input tensor and each element of the kernel by element-wise is intended at each position of the tensor, in the corresponding position of the output tensor the output value is obtained by summed up, which is called as feature map.

To form an arbitrary number of feature map,In multiple kernels this procedure is applied repeatedly, The different characteristics of the input tensor are represented; the different kernels can, thus, be considered as different feature extractors. The convolution operation is defined by two key main parameters which are size and number of kernels. Padding, a technique to deal with the issue in common zero padding, on every side of the input tensor where the rows and columns are of zeros which are added, through the convolution operation the centre of kernel is fit on the outermost element and keep the in-plane dimension as same. Figure 3 shows the analysis of segmented convolutional layer weight.

Figure 3: Convolutional Layer weights
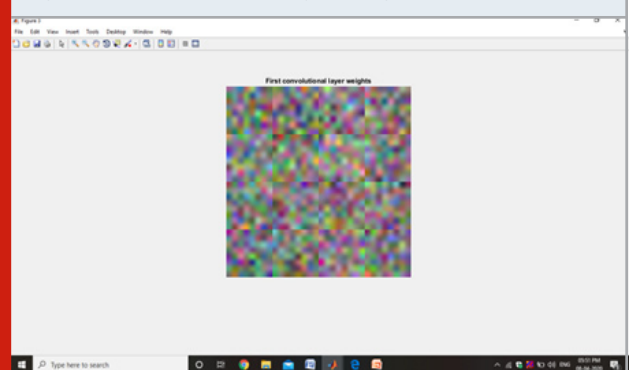
Max pooling: The most accepted form of pooling operation is Max pooling operation.The input feature maps which are extracts patches, in each patch outputs are the greatest value, then all other the other values are rejected.

Global average pooling: A further pooling operation importance noting is a global average pooling. An extreme type of down sampling is performed by a global average pooling method, the height and width of the featured map is down sampled into 1x1 array, this is performed by just taking the average of all elements in each feature the map, where we can retained the depth of the featured maps. On before the fully connected layer this operation is typically applied only once. By applying global average pooling the advantages are followed as: (1) The number of learnable parameters are reduces (2)

To accept the variable size of input the CNN is to be in enables condition.

Figure 4: Pooling
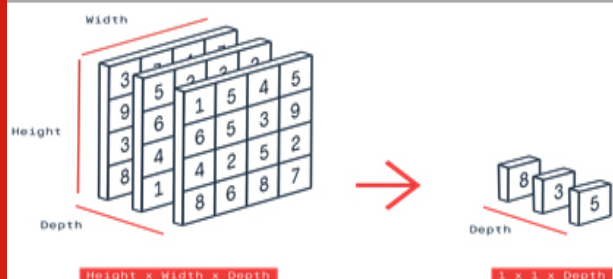
Fully connected: The output characteristics are mapped by the typically compressed the pooling layer or final convolution layer. i.e., changed into a array of numbers (or vector) one-dimensional (1D) , the dense layer are said when one to more fully connected layers are associated. each output by a learnable weight by each input is connected to it.

Figure 5: Layer Fully Connected
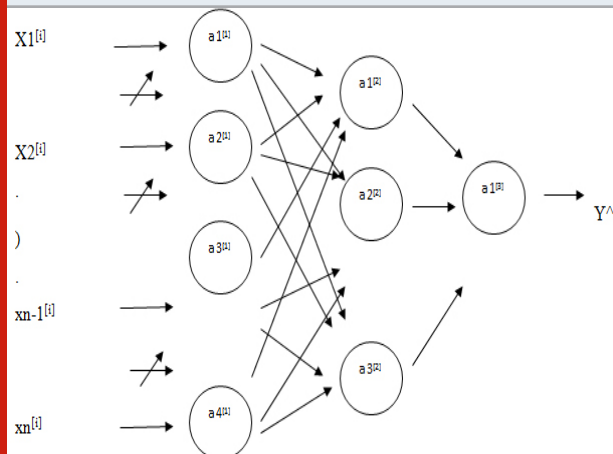
When the pooling layers are created, the features extracted by the convolution layers are downsampled. In the CNN , the fully connected layers mapped is the final output. The fully connected layer shows the similar number of output nodes and the number of classes. The non linear function called rectified linear unit are followed by each fully connected layer.

Training network: Minimizing the deviation between the output predictions and given ground truth tables is done by knowing the kernels in the convolution layers and weight in fully connected layers, this processes is defined as Training a network. The general method used for training neural networks is Backpropagation algorithm. The gradient fall optimization algorithm and loss functions are very important. A model performance under specific kernels and through the loss function, the weight is calculated. This function is done on a training dataset through forward propagation, According to the

loss value the learnable parameters, specifically kernels and weights are updated by optimization algorithm called gradient descent and backpropagation with others.

Figure 6: Layers Training

The calorie value and micro nutrients(vitamins and minerals) value of the food which was renowned also displayed. The combination of multiple feature channels provides corresponding information to get better recognition accuracy.

Figure 7: Calorie value and Micro Nutrient Values
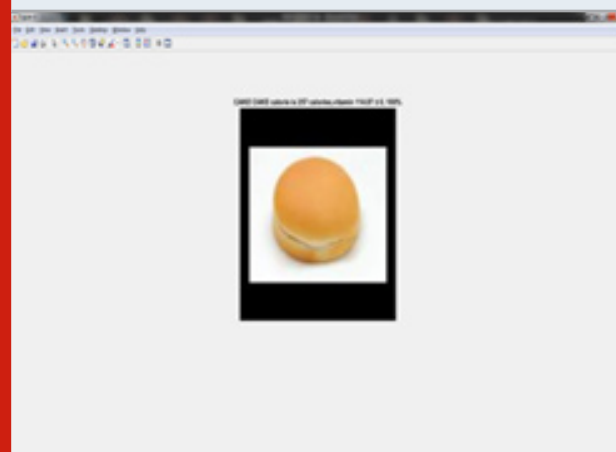
Figure 7 displays the calorie and micro nutrient values of the input image. THe calorie value is 265, vitamins are b1,b3 and the mineral is folic acid for the input image. The proposed system will certainly improve and facilitate the current calorie and micro nutrients measurement techniques. To closely controlling their daily food intake this system will helps the people.

CONCLUSION

Through this proposed system, people can select their favourite food by knowing the calories and micro nutrition. In this system, the healthy food items are identified by using image processing based on their calories and micro nutrients. We employ histogram equalization technique for enhancing the contrast of the given input image. The shape based algorithm was also applied to extract the shape based features. We have proposed a system to identify and recognize the best

healthy food for people in their daily life. The calories and micro nutrients in the food image are estimated using Deep learning convolution through this proposed system.

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IOT Enabled Smart Securable Kitchen Using BLYNK Server

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ABSTRACT

This document describes various aspects of IoT and its role in smart cooking. Sometimes the world of things changes so quickly. Many systems have been created to make human life easier. Now people are very busy with their work. People think that there should be technology to reduce the load. IoT meets the needs of this person. People usually cook food to cook. But when a gas cylinder leaks, it becomes a dangerous condition. This thesis describes the design and operation of smart kitchens using the Internet. Various technologies, such as sensor networks, cloud systems and network technologies, support IoT. We proposed the design and development of an online gas leak warning system. Gas sensors were used to detect gas leaks in the kitchen; Its built-in plug-ins are integrated into the Nodem microcontroller programmed in the built-in C language. The ESP is configured to send gas leak alerts as alerts. We also get additional security features with an automation system that includes a temperature sensor and a weight sensor. Our system returns results in the form of a notification. This system helps control gas leaks in the kitchen, resulting in a faster response to leaks. Blink uses an IoT-specific operating system to create an Android application. It can be used in a variety of applications, including smart home, kitchen, gas leak monitoring and smart hotel applications.

KEY WORDS: IOT, SMART KITCHEN, BLYNK SERVER, GAS SENSOR, WATER LEVEL SENSOR, ANDROID APP.

INTRODUCTION

The use of information and communication technologies has brought about enormous changes in human life. (Kiritsis et al,. 2011) Modern society is evolving towards a digital environment. Previously, the "Internet of computers" became "the Internet of people" for the emergence of social sites (Eisenhauer et ala, 2009). The next wave is mobile computing. Our current generation of Internet connections has made faster access possible with better quality. In addition to developing this technology, there is an "IoT" so that you can achieve mobility and understanding. This was made possible through the interaction between the Internet, wireless sensor networks and certain devices connected via smartphones. (Weber et al,. 2010; Haller et al,. 2010)

These devices on the computer can receive, process and deliver products according to the schedule. Technologies such as sensors, cloud computing, networks and nanotechnology have been used. (Hong et al,. 2010) IoT applications can be found in many fields and in various food products. The kitchen is a unique place called the main center or business center of the house or hotel. One of the main requirements is the place where it is cooked, i.e. the food.

It is a common center of social activity where all family members share their feelings or their feelings. (Dohr et al,. 2010) It has all the basic amenities. Our system

offers a combination of technologically advanced devices with interactive services. It is an integrated system that contains hazardous materials such as electric stoves, gas cylinders, refrigerators and oil. Reader and shortcuts to provide all the necessary information on the safety status of all kitchen items. This study discusses specific references to IoT applications and their role in our system in various technologies and in various fields.

Figure 1: Smart Kitchen

The Internet of Things has changed people's lives. The massive increase in the number of people using the Internet and changes in Internet technologies have made the network compatible. Each of them is uniquely identified by a computer engine integrated into the Internet infrastructure. The ability to create ecological systems to respond automatically to human behavior has many advantages. The surrounding intellect reacts to the behavior of the inhabitants of the house and offers them various conveniences. Distribution into "things".

The ultimate goal is to create a better place to live, where the objects around us know that we love, what we want and what we need, and therefore we act without clear instructions. Natural gas is a common energy source that is commonly used for cooking and heating in homes. Accidents caused by gas leaks result in financial loss and injury. A gas leak condition is stored in the database to detect gas leaks and alert the subscriber with warnings. The database can be used to display the status on the Android device. This system is a smart system, but it also provides warnings to users, as it does not create sound interference when the audio signal is constantly activated. Thanks to this technology, explosions due to gas leaks can be prevented, which considerably increases the safety of people and property when using domestic cooking gas.

Objective: When things like household appliances are connected to the network, they can work together to provide meaningful common services, rather than as a group of independent organizations. This can be useful for some real applications and services, for example, you can use it to create smart homes; Window closing can be automated when the air conditioner or gas stove is open to oxygen during use. The concept of IoT is especially valuable for people with disabilities, because IoT can support a person in the process of building or building

a better society, because the devices can work together to work as one organization. Right now, a lot of work has been done to implement.

MATERIAL AND METHOD

Related Work: And Sato et al. Al suggested using a network of GSM cell phones to detect gas leaks. They used two gas sensors; Used to detect gas leaks at a specific location. They used 8051 microcontrollers and an assembled GSM phone. The GSM smartphone is designed to send fuel leak indicators via SMS, which indicate the exact area of failure of the GSM phone for quick response. This entire system can be quickly detected in the event of a gas leak.

Bello and Gedalli proposed an intelligent connection, and the quality of communication between the two systems in IoT depends on how the devices work. In IoT, different devices work with different network standards, which can cause many network problems that cannot be resolved using traditional routing protocols. Therefore, this document provides a unique routing mechanism that provides intelligent access to a device for device communication in IoT. In 2016, Sun et al. In addition, IoT proposes to build a network of connected devices and smart sensors so that this network cannot forget the past and create a plan for the future.

Guo et al. All-Range radios include the development of IoT, based on a specific technology and method of interaction between mobile phones and smart vehicles with Wi-Fi and Bluetooth. This will create opportunistic connections of intellectual things, limiting the distribution and dissemination of information between and among opportunistic communities; It is based on human dynamics and communication. This article suggests another way to create IoT, which can be created using radio frequencies if necessary. Abe and others have developed a mechanism to automatically close the gas valve when a gas leak is detected. Subscribers with status and status are notified and notified. It automatically uses a closed solenoid valve to close the gas valve before seeking help with directions and alarms. After that, the leak will return to normal operation.

Proposed System: We proposed a system based on the design and creation of a gas leak alert system based on the short message service. Gas leaks in the kitchen are detected by gas sensors; Its outputs are then connected to the PIC microcontroller programmed in assembly language. Gas leak alerts are sent by SMS using a SIM 900 card. We can get many other security features that can be integrated into an automation system, including a temperature sensor and a sensor. weight. Gas leak system provides quick response time in the event of a leak.

Project Implementation: The IoT-based smart kitchen system is shown in Figure 1. It uses various sensors to detect gas leaks, fill the water tank, and check the bucket; All versions are connected to the ATmega32 microcontroller programmed in assembly language. An

output in the form of an SMS message configured by GSM for receiving telephone notifications. We benefit from high security features that can be integrated into an automation system, including a temperature sensor and a weight sensor. The system constantly monitors kitchen services.

On this machine, IoT is used to automate devices. For this purpose, a gas bottle, bucket and water tank are used, and they are equipped with various sensors, as described above. Various sensors detect changes in parameters and take values accordingly. For example, the weight of the gas, water tank, and bucket is reduced by a weight sensor that sends a message to the user and stores the value accordingly. Thus, the function of all sensors is the same.

Working principle

Figure 2: Proposed block diagram
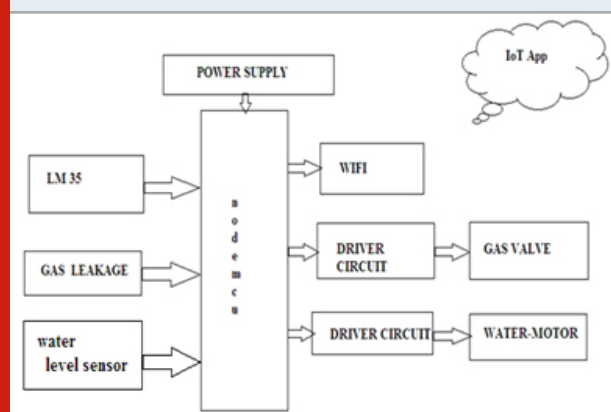
Proposed Circuit diagram

Figure 3: Interfacing gas sensor with nodemcu
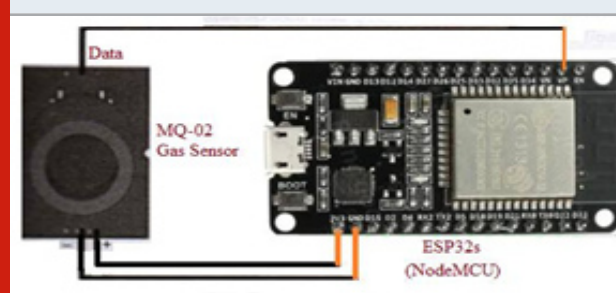
Figure 4: Interfacing Relay circuit with Nodemcu
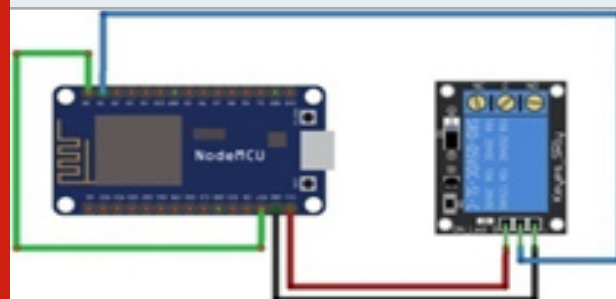
Figure 5: Interfacing LM 35 with Nodemcu
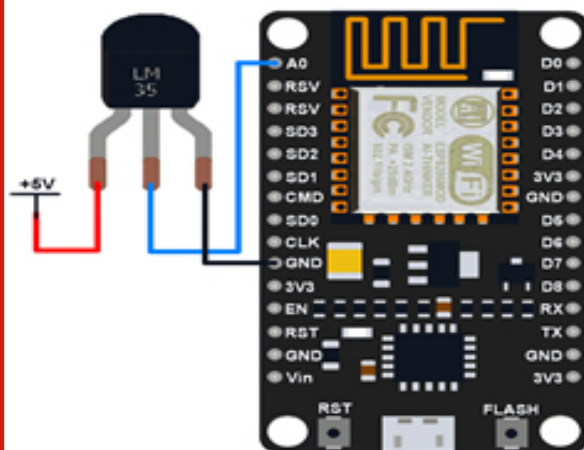
Our Smart Kitchen multi-sensor system is designed, designed and tested. Test results show that the system can send SMS alerts when gas sensors have gas concentrations at the entrances. This method is used in public buildings such as homes, hotels and restaurants. All automation functions, such as the security functions of gas leak detection systems, are included. For this, we use gas sensors, weight and temperature sensors. Gas sensors are used to detect gas leaks in the system, and weight sensors are used to determine the weight of the gas cylinder. Temperature sensors will be used to determine the current room temperature. All readings are sent to a server which stores the information and associated data; It stores information about equipment, sensors, records and system conditions, ambient temperature and information

RESULTS AND DISCUSSION

System Architecture

Figure 6: System Architecture
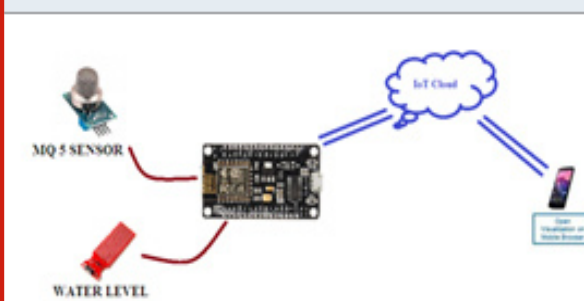
Methodology: The system architecture consists of a Wi-Fi module, an ultrasonic sensor, an Arduino microcontroller, a cloud and a mobile application. The figure above shows the architecture of the entire system. An ultrasonic sensor is connected to each container in the kitchen, which consists of different products of different sizes. This forms the sensor assembly. Then the sensor nodes are connected to the Arduino microcontroller. Wi-Fi (ESP8266) is connected to the microcontroller. Product level information from sensors is transmitted

to the cloud using the Wi-Fi module, in which data is stored and analyzed. This analyzed result can be viewed using the mobile application.

IoT: IoT (IoT) is a concept of machine-to-machine interaction without any human intervention. This communication will take place on the Internet. It is one of the growing platforms that connects large integrated applications. Models integrated with the Internet and the cloud form the Internet of Things. In our Smart Kitchen system, the data from the ultrasonic sensor will be transmitted to the cloud platform via the Internet. This data can then be extracted from the cloud and viewed. This parameter of the so-called IoT.

Cloud Storage: Cloud storage is similar to data storage on a computer, where data is stored on several remote servers. This stored data is available online. This system uses the Thing Speak cloud platform. Thing Speak is one of the open source clouds used by many IoT applications. Grocery store level data is stored in the cloud using the Wi-Fi module, and then the stored sensor data can be analyzed and retrieved using HTTP.

IOT–IOT Platform

MQTT Protocol: The hypertext transfer protocol (HTTP) is used for most web communications. The connection between these connected devices is at the heart of IoT. HDDP has many limitations, making it a poor choice as an IoT protocol. MQTT uses the MQTT protocol for IoT because MQTT offers several key advantages over HTTP, such as an improved user interface, greater flexibility and scalability, lower operating costs, lower development costs and higher efficiency. MQTT is a telemetry messaging transport queue, an editor / subscription protocol that makes it easier to send messages to multiple subscribers from the same editor. As shown in FIG. 1 editor initiates the connection by sending a message to the intermediary. When a message arrives, the broker responds with a status code. MQTT clients are behind the routers. They use network address translation (NAT) to translate from a private network address (192.168.x.x, 10.0.x.x) to the public.

Once the connection is established, the broker must keep it open until the publisher sends a disconnection order or the connection is lost. It is a very simple and easy messaging protocol, low bandwidth, unreliable networks or high latency. Policy development goals include reducing network bandwidth and device resource requirements. MQTT provides a measurable and economical way to connect your devices to the Internet. MQTT provides security by allowing the client to send a user name and password for authentication. We provide cloud viewing on our computer or mobile phone.

NodeMCU: It is an open-source LUA based firmware developed for ESP8266 wifi chip. ESP8266 Development board/kit contains the main functionality of ESP8266 chip, NodeMCU firmware. NodeMCU Dev Kit/board consist of ESP8266 wifi enabled chip with TCP/IP protocol.

Figure 7: ESP 8266
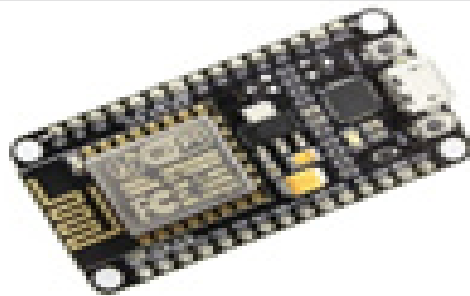
4.2 Blynk IoT Platform: The Blink IoT application platform has been developed for IoT applications. It can remotely control Nodemuk tools anywhere. This server operates at the regional level and is paid for in real time between Golem devices and on-board devices. It manages the thousands of devices and materials built into it. The Pliny library is designed to provide communication with the server and process all incoming and outgoing commands from your Flynn and Nodem applications. This own server will store information and display it efficiently. It offers better accuracy and greater efficiency.

Using the Internet, Blink is a platform with Android and iOS applications for managing Andrew and Raspberry Pi. You can drag and drop widgets to create a graphical interface for our project, which is a digital toolbar. Everything is very easy to set up, and you will start working in five minutes. Blinking is not associated with any particular shield or table. Instead, it supports your favorite equipment. Whether you are an Arduino or nodemcu connected to the Internet via Wi-Fi, Ethernet, or this new ESP8266 chip, Blink can help you connect and prepare your IoT. Blink was developed for IoT. Remote device management, display of sensor data, data storage, visualization and much more with this application.

Figure 8: Blynk App Overview

There are three major components in the platform: Flynn App - You can create amazing interfaces for your projects using the various widgets we provide.

Pliny Server - Facilitates communication between the smartphone and the hardware. You can run our private Flink server locally or use our Flink Cloud. It is an open access application. It can easily handle thousands of devices and even operate in a raspberry bag.

Flink libraries - used for all popular hardware platforms - communicate with the server and process all incoming and outgoing commands.

Each time you press a button in the Flink app, the message is sent to the Flink cloud, where it magically hits your equipment. It works the same way in the opposite direction, and everything happens in seconds.

Figure 9: Blynk Cloud Architecture
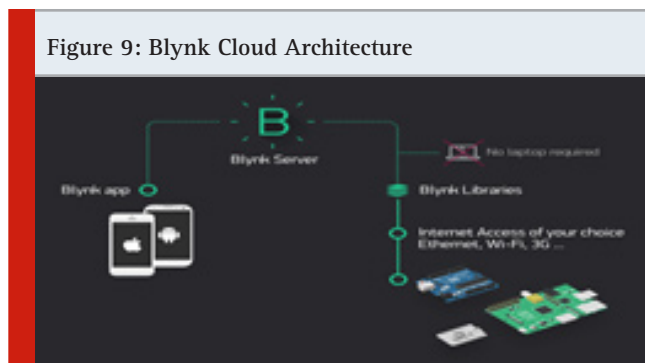
Characteristics of Blynk are that it supports all hardware & devices Connection to the cloud also will be done by Ethernet, Wi-Fi, Bluetooth, BLE and Set of easy-to-use Widgets. We can also monitor via in-built widget called History-Graph and also supports Device-to-Device communication over an oversized extent.

4.3 Applications
1. Monitor all sensors and their values to safely detect gas leaks, temperature and humidity in the room, and the user's daily use of the system.
2. Incorrect measurements are indicated when the exhaust fan is operating.
3. Records computer data, such as daily data monitoring.
4. Intelligent system for gas household appliances using the Internet of Things. Inhaling leaks in our daily lives can cause shortness of breath and when the inflammation causes an explosion and many deaths, it becomes a serious threat.

CONCLUSION

Our IoT Smart Kitchen system is designed using a variety of sensors, and is also designed, engineered, and tested. The results show that the system can send SMS alerts whenever there is a fuel concentration at the inputs of the gas sensors. Thus, this system can be used in residential buildings and public buildings, such as motels and restaurants. Our system provides you with all the automation functions with safety functions in the event of a gas leak. For this we use gas sensors, temperature sensors, weight sensors. When gas sensors

are used to detect gas leaks in the system, weight sensors are used to influence the charge of the gas cylinder. Temperature sensors are used to determine the current room temperature. The server stores statistics and the corresponding records are stored there. Temperature sensors are used to determine the ambient temperature. The server stores all information about equipment,

Sensors and records, system status and readings, as well as information about the ambient temperature and users. Reference values are set on each sensor, and when it exceeds these values, it sends a notification to the device regarding a gas cylinder leak. An Android device is used to communicate with the user and the server. It can send the user an email notification and SMS server, which can be viewed on Android devices. This can help prevent major accidents. This is a cost-effective and time-consuming solution. It can be used in many applications, such as home automation, military control and hospital management. One of the innovations is the dual power system, that is, the battery and power supply. Our computer is designed to be used for various purposes using various methods, which makes the system more secure.

Future Work: Future updates include the provision of a dual power system, which includes a battery in addition to a common power source. Additional kitchen options can be added to the design of future collectors. Use different methods to further secure the system. Some sensors can also be improved to improve performance.

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Certain Investigative Analysis on the Diagnosis of Lung Nodules in CT Scan Using Image Processing Techniques

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ABSTRACT

Detection of lung cancer at premature status is a prominent means of preventing a patient from death. One of the tools for the detection of lung nodules is computed tomography. By applying various techniques involved in image processing such as pre-processing, segmentation, extraction and classification it is possible to obtain better performance and results. The technologies that are most commonly preferred are applying median pre-processing filter, optimum segmentation thresholds and BPN classification in order to obtain greater precision and sensitivity for lung nodule detection.

KEY WORDS: IMAGE PROCESSING, LUNG-NODULE, SEGMENTATION, CLASSIFICATION, ACCURACY.

INTRODUCTION

Lung cancer is a very common cancer that affects human lungs. American cancer society has reported that lung cancer affects more than ten percent considering all cancer cases analysed in a period of five years. Occasionally, this incidence rises to 50 percent. Excessive growth of uncontrollable cells in the lung tissue causes lung cancer. These lungs tissue defects are commonly called lung nodules. The size of those tissues is approximately about 1 mm to 30 mm. Usually, they can be classified into four varieties, well-circumscribed nodule, juxta-vascular nodule, pleura-tail nodule and juxta-pleural nodule. Pulmonary nodules are considered as the initial stage of

lung cancer which can be determined by the MRI scan CT scan, SPECT and PET scans.

Computer tomography (CT) is considered one of the best imaging methods for the recognition of pulmonary nodules, particularly as it has applied helical technology. With a reduction in partially successful lower volume effect, the CT again improves sensitivity with only a reduction in the size of thick slices, and overlapping images improve re-detection in small nodes located at the border of two adjacent non-overlapped images. Different image processing techniques are initially used to capture CT images from the affected area of the lung. After that, clustering algorithms are applied for the segmentation process. This research article paper aims to investigate different methods of distinguishing pulmonary nodules using CT images.

MATERIAL AND METHOD

Identification of the lung nodule involves four stages: The technique begins with pre-processing step of the images to improve image quality by eliminating noise from the actual image. After that, segmentation of pulmonary region followed by extraction and then classification of the features. Pre-Processing: The pre-processing is performed to get better quality of the image files. It is the conversion of the image into a more comprehensible and better level of image quality. Improving image quality, in terms of clarity, improves visualization for humans. A variety of techniques are applied for this process like median filtering, Gaussian filtration, linear filtering, Gabor filtering, and histogram equalization. Median filters are ideal as it reduces distorted image edges than the other filters. Gaussian filter is used to eliminate the noise and thereby smoothing the image. Bilateral filter is useful to enhance the structures like plates. The Gabor filter is specially designed for texture analysis in both spaces and frequency fields, due to its optimal spatial properties. Histogram equalisation is an essential application applied in grayscale image transformation as well as enhancing images.

Figure 1: Phases in determining lung nodule
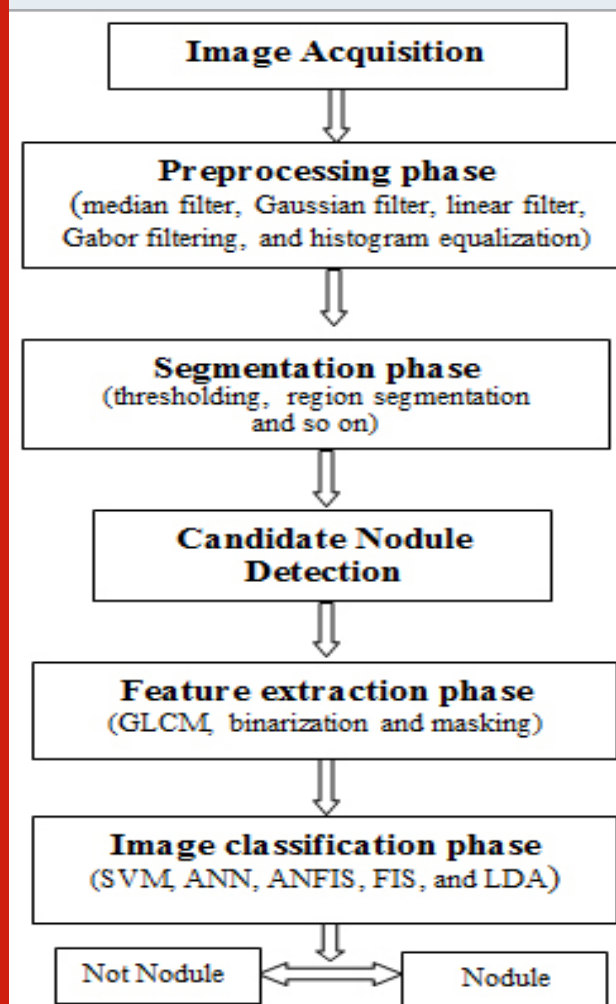
Lung region segmentation: Segmentation of images is the process of splitting the image into a number of segments. Segmentation is useful as it represents an image into more practical and easier to interpret the image. Segmentation of lung images reduces the searching space during the detection of lung nodules. There are many approaches including thresholding method, wavelet transformation, region segmentation and so on. Wavelet transformer is useful to reduce the noise by means of low pass filter. Based on the difference in the pixel value among the image source and the background, the threshold is used to segment the image into two parts, and also it produces a binary image. The region-based growth approach is used for the removal of background and other additional information such as bones and to extract the Region of interest (ROI) from the lung image.

Feature extraction: The extraction feature is derived primarily from the ROI. Gray level co-ocurrence matrix (GLCM), binarization and masking are mainly used here. Primary parameters considered here are, as suggested by Bhagerish Hamid et al, area, diameter, perimeter, circularity, energy, contrast, correlation and entropy. Typically, the statistical texture analysis is measured on the basis of statistical distribution of the experiential combination of intensity points. In a second order the gray-level matrix is a way to extract statistical characteristics. GLCM is a matrix in which the number of rows and columns is equivalent to that of Gray-scale G. The textural attributes considered according to the GLCM are entropy, correlation and so on. The entropy indicates the level of compression required for the image material is needed. Linearity of Gray level in adjacent pixels is measured in correlation. Binarization process, which uses the original image to classify the irregularities by obtaining and checking the number of white pixels, GLCM betters in the feature extracting process as it considers various permutations of pixel intensity values.

Classification: There are several classification strategies employed in the final phase of nodule detection. The most common methods include SVM, ANN, ANFIS, FIS, and LDA. The SVM approach employs two distinct features which improve classification. In terms of accuracy, precision, and sensitivity ANN (BPN) provides better outcome. Using fugitive logic, the fuzzy interference method can map an input space into output space in order to improve classification efficiency. The Nodule and usual anatomical characteristics are classified using the LDA classification.

RESULTS AND DISCUSSION

The key metrics used to measure the performance of image processing technology in the medical analysis can be categorized in the following manner: True Positive (TP), which denotes the number of accurate predictions with positive instance; False Negative (FN), which denotes the number of inaccurate predictions with negative instance; False Positive (FP) which denotes the number of inaccurate predictions with positive instance

and True Negative (TN), which denotes the number of accurate predictions with negative instance. Using the above definition, the following metrics are formulated.

1. Accuracy is the ratio of number samples that are correctly identified to the total count of tests samples which is computed as:

$$Accuracy(\%) = \frac{(TP + TN)}{(TP + TN + FP + FN)} X\ 100$$

2. Sensitivity gives the fraction of actually classified positives which is computed as:

$$Sensitivity(\%) = \frac{TP}{(TP + FN)} X\ 100$$

3. Specificity gives the fraction of accurately identified negatives which is computed as:

$$Specificity(\%) = \frac{TN}{(TN + FP)} X\ 100$$

4. Precision evaluation shows the number of predicted nodules that are really associated to the cancer which is computed as:

$$Precision(\%) = \frac{TP}{(TP + FP)} X\ 100$$

Image processing technology has shown a tremendous innovation in the medical field particularly in lung nodule identification and making conclusive decisions. Wook-Jin Choi et al have applied median, Gaussian, bilateral and CED filters in the pre-processing phase and applied optimum threshold approach during the image segmentation phase. This research has yielded 91% sensitivity and 96.9% specificity. The same authors make use of GLCM and SVM for feature extraction and classification phases respectively which results in 93.9% accuracy and 91.6% precision.(Taruna Aggarwal et al,.2015) make use median filter approach in the pre-processing phase and applied optimum threshold approach during the image segmentation phase.

This research has yielded 97% sensitivity but produced only 53.3% specificity. The same authors make use of GLCM and LDA for feature extraction phase which results in 84% accuracy. (Farahani et al,. 2015) preferred the combination of median filter and histogram equalization approaches in the pre-processing phase and region growing and thresholding approach during the image segmentation phase. This research has yielded 70% to 80% sensitivity and produced 93% to 94% specificity. The same authors make use of GLCM for feature extraction phase while considering MLP, KNN and SVM approaches for classification phase which results around 90% accuracy and 77% precision. (Golan et al,. 2016).

Proposed a trained deep Convolutional Neural Network (CNN) along with the back-propagation algorithm in the extraction phase for lung nodules detection which produced a sensitivity of 78.9% .(Mao et al,. 2016) proposed Local Difference Pattern(LDP) for extracting the features from the images. The authors constructed a single center classifier (SVM) for the LDP images. Since single center classifier is not effective for the complex Lung nodule images, the authors also designed a multicenter classifier by clustering the SURF feature. These two classifiers are integrated in the classification phase. The classification accuracy is obtained as 87% and 91% for LDP+single center classifier and LDP+multicenter classifier respectively.

(Shen et al,. 2017) Proposed a Multi-crop pooling strategy in the conventional neural network(CNN) to replace the max-pool strategy to extract mutli scale features. This method employed a single network effectively rather than the use of multi networks in order to reduce the computational complexity. This work achieved 87.14% accuracy, 77% sensitivity and 93% specificity.(Setio et al,. 2016) applied muti-view Convolutional Networks to reduce false positive rate in the identification of pulmonary nodules. They have combined solid, subsolid and large solid detection algorithms to improve the sensitivity up to 94.4%. (Savitha et al,. 2020) have proposed a novel approach using deep-learning model for the feature extraction phase. To increase accuracy, the prediction system is further more enhanced with the integration of Conditional Random Field algorithm (CRF).

Figure 2: Comparison of accuracy
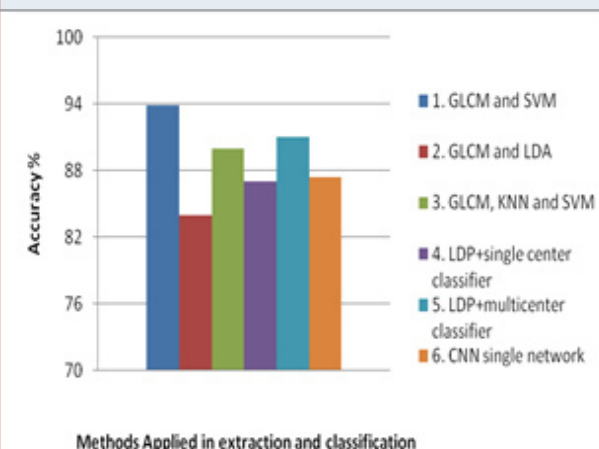
CONCLUSION

A relative investigation on selected literature has been carried out for the diagnosis of lung nodules. It has been found that a good number of research works produces the outcome of high sensitivity and accuracy. But still there are more challenges need to overcome for the

early detection of lung cancer. Professional researchers could make use of Artificial Intelligence, nature inspired algorithms and so many computational algorithms in CAD system to make a perfect lung cancer diagnosis.

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Opportunities in Fruit Disease Identification and Classification with Machine Learning Algorithms

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ABSTRACT

Fruit disease causes a lot of economic loss and significant loss in agricultural production all over the world. The crops are affected by rough climatic conditions. Because of that, diseases on the plant are increased and agriculture yield is decreased. Nowadays, the requirements become worst because of bacterial infections and expanding population burdens farmers to increase yield. Modern agriculture will overcome this type of effect and improves agriculture. This paper focuses on the review of literature which studied fruit disease identification and control. The researchers used various algorithms for image segmentation, feature extraction, training and classification of fruit disease.

KEY WORDS: DISCRETE WAVELET TRANSFORM, FRUIT DISEASE, IMAGE PROCESSING, K-MEANS CLUSTERING, SVM.

INTRODUCTION

In the olden days, people identify fruit disease by their eye observability and made precautions. In this paper, three fruits namely apple, pomegranate, grapes and its diseases, are explained (Al-Hiary et al,. 2011). Plant disease and fruit disease may affect the yield of growth. There are several spectroscopic and imaging techniques are used. Some fruit diseases can be identified by their leaves, which get affected (Vimala Devi and Vijayarekha et al,.2014; Shiv Ram Dubey and Jalal et al,. 2012) . Fruit disease is automatically detected by using an automatic detection method to overcome the spreading of infection to the growing fruit. Pathogens, viruses, fungi attacks and affect the fruit. This will cause several diseases to the people who eat such fruit (Rashmi Pandey et al,. 2013). So, several methods were implemented to identify fruit disease using image processing.

The several algorithms are used with the help of Matlab to this process. Discrete wavelet transform is one of the methods which help to identify in visual form. There are two methods one is a destructive method and the other is a non-destructive method. In the destructive method, the fruit will be removed and the process will be carried out (Rashmi Pandey et al,. 2013; Anshuka Srivastava

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and Swapnil Kumar Sharma et al,. 2010). In the non-destructive method, the dimensions of the fruit will be taken without removing the fruit (Savita N. Ghaiwat and Parul Arora et al,. 2014) . The artificial neural network concept is also used with the two sets of images to be calculated. With the k-means clustering algorithm with the SVM concept, the feature can be extracted with the color, morphology and texture of the fruit.

MATERIAL AND METHOD

Types of Fruit Diseases

Apple Scab: This is the most infectious disease for apple. This disease mainly occurs in apple growing areas. During the cool and wet weather climate it occurs mostly. It does not happen in the summer season. Signs of apple scab are visible on leaves, petals, flowers, husk, fruit, young shoots and bud scales of apple tree (Jayamala K. Patil and Raj Kumar et al,. 2011; Shiv Ram Dubey et al,. 2013).

Figure 1: Apple Scab (Rupanagudi et al,. 2014)
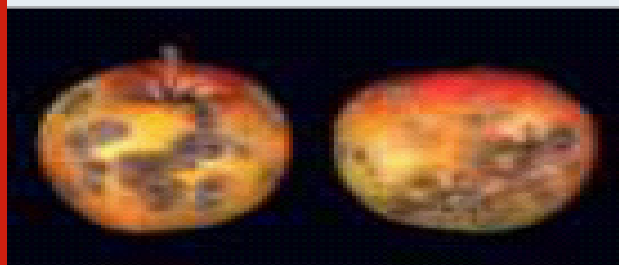
Apple Rot: This is the fungal disease caused due to Botryosphaeriaobtusa. The leaves, barks and fruits of the apple tree get affected by this disease (Monika Jhuria et al,. 2013; Rupanagudi et al,. 2014). It firstly attacks the leaves' outer layer 1 to 3 weeks after petiole fall as small, purple blotch after center turn brown and yellowish brown (Rupanagudi et al,.2014; Hetal N. Patel et al,.2011). After a few weeks, the second stage of apple rot occurs. The leaf will drop from the tree when it highly gets affected. Apple rot disease occurs in three forms: 1) leaf blotch on apple trees, 2) fruit rot on apple trees 3) limb canker on the apple tree.

Figure 2: Apple Rot (Rupanagudi et al,. 2014)
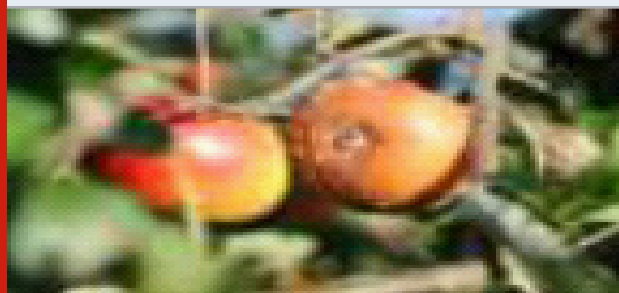
Apple blotch: This mainly occurs in the northeast during the summer season. This disease majorly occurs in two organisms. Due to the economical and commercial quality of fruit, the disease easily occurs in the fruit (Shiv

Ram Dubey et al,. 2013; Abraham Gastelum-Barrios et al,.2011). The symptoms of the fruit occur as the greenish-blue spot on the contaminated fruit. The disease will appear like colonies. By going day by day, the colony becomes larger and larger (Rupanagudi et al,. 2014).

Figure 3: Apple Blotch (Rupanagudi et al,. 2014)

Pomegranate:

Bacterial Blight: In Delhi, this disease was identified in 1952. This disease is a lower economic threat until 1998, but nowadays, this disease occurs all over wide, mainly pomegranate growing areas (Shiv Ram Dubey et al,. 2013; Rupanagudi et al,. 2014). The pomegranate areas like Maharashtra, Karnataka and Andhra Pradesh. This disease mainly occurs like a black spot surrounded by bacterial lime. The cracking of fruit will occur due to this disease (Savita N. Ghaiwat and Parul Arora et al,. 2014).

Figure 4: Bacterial Blight (Rupanagudi et al,. 2014)
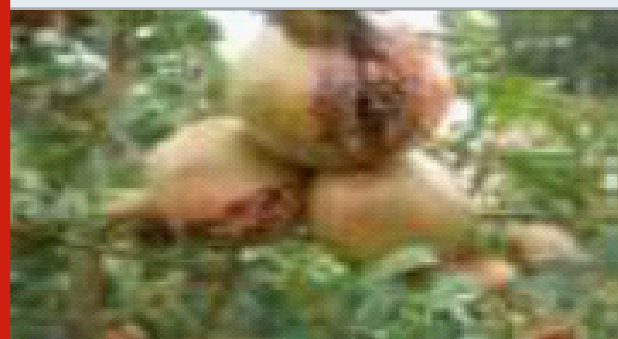
Aspergillus Rot: This disease mainly occurs in the rainy season when the flower opens up its petals. There will be not any external infection. The fungus will grow inside the fruit (Vinita Tajane and N.J. Janwe et al,. 2014).The fruit will be in less weight so this may signs that it may get affected. Mostly, infected fruit show some yellowish to brownish-red discoloration and are slightly off-color such as a pale red (Monika Jhuria et al,. 2013).

Gray Mold: Gray mold is also called as Botrytis cinetea. At the time of post-harvest wash, this disease becomes more active and at the room temperature, it spreads to all other fruits (Monika Jhuria et al,. 2013). Gray Mold damages the flower part of pomegranate and affects the fruit until its ripening. The grayish coating will be

formed outside the affected fruit (Jayamala K. Patil and Raj Kumar et al,. 2011).

Figure 5: Aspergillus Rot (Rupanagudi et al,. 2014)
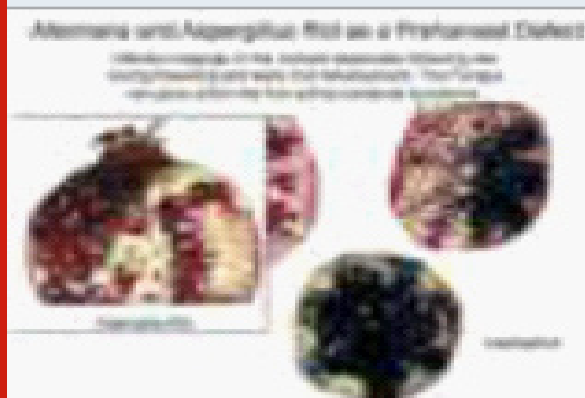
Figure 6: Gray Mold Rupanagudi et al. (2014)

Grapes:

Black Rot: Black rot is the most severe and dangerous disease. It is a fungal disease that affects canes, tendrils, leaves and it occurs mainly in hot and moisture areas (Shiv Dubey and Anand Jalal et al,. 2012; Mrunmayee Dhakate et al,. 2015). By using some pesticides, fungicides and some methods, black rot can be controlled. The first defect of black rot firstly appears on the border of leaves and forms a yellow spot at the center of the leaf (Manisha et al,. 2015). The fungus will appear like a black dot and ring-like structure outside the fruit. Only after the half growth of fruit, the disease occurs.

Figure 7: Black rot (Rupanagudi et al,. 2014)
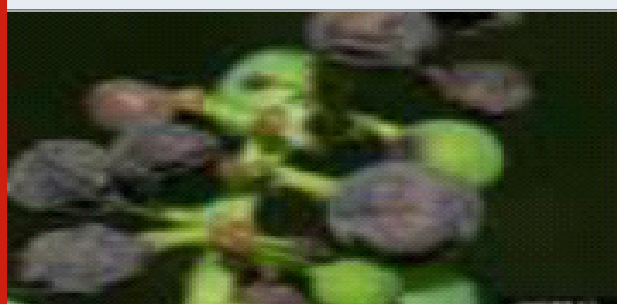
Powdery Mildew: It is originated by fungus Uncinulanecator, it is also called as Oidium. This disease mainly occurs in grapes and grape related fruits. This disease occurs mostly at the underneath of the leaves. The powdery mildew is greeny or whitish patches form like structure (Abraham Gastelum-Barrios et al.,. 2011). The severely infected leaves will get curled and withering along with bloch. The old infected leaves will appear as reddish brown. The powdery meldew which is premature will have less sugar content. The sugar content in it is less and the size will be like berrys. Sometimes it becomes useless to use when it gets affected by the disease (Ashwini Awate et al,. 2015).

Figure 8: Powdery mildew (Rupanagudi et al,. 2014)
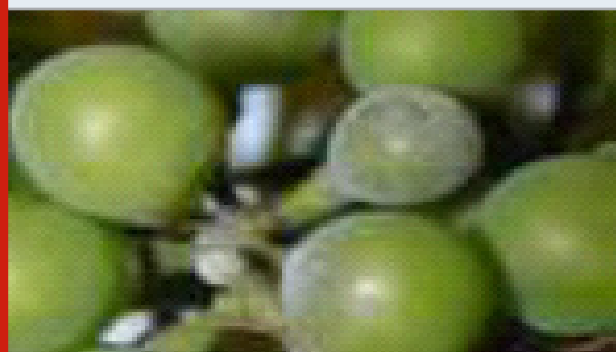
Downy Mildew: Downy mildew mostly affects on the grape vine. This occurs in the climatic conditions like summer, bloom and if the temperature goes to 10°C in the grape growing areas downy mildew occurs (Sherlin Varughese et al,. 2016). Once if the plant gets affected, the sign of this disease can see on the leaves after 6 to 7 days (Ashwini Awate et al,. 2015; Khot et al,. 2016). Plasmoparaviticola causes this disease. The affected part will be in yellow circular spots and surrounded by a brownish-yellow halo. Downy mildew name comes because of its downy growth (Ashwini Awate et al,. 2015).

Figure 9: Downy Mildew (Rupanagudi et al,. 2014)
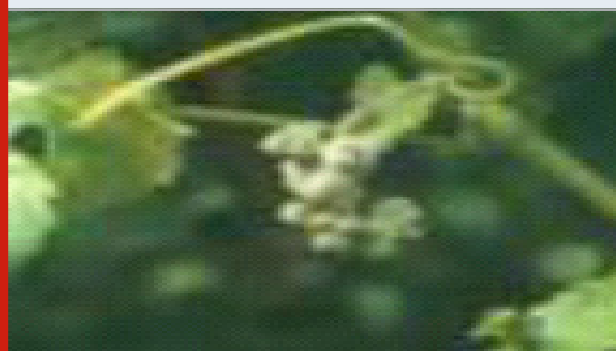
RESULTS AND DISCUSSION

Image Processing Algorithms
Image Processing Techniques: Cedric Okinda et al. (2018) developed a contactless, stress-free method of swine

live weight estimation by machine vision technology. Adaptive Neuro-Fuzzy Inference System (ANFIS) is used for modelling where feature extraction is done through image processing. The quality analysis of meat and fish, fruits, vegetables and bread were carried out by Computer vision techniques. In the fruits and vegetables, the quality inspection can be done application of computer vision technology and image processing techniques (Santosh Chopde et al,. 2017). (Dubey, S.R. and A.S. Jalal et al,. 2016).

Introduced the approach for the disease classification of the apple using color, texture and shape. K-means clustering method has been used for infected fruit part detection and support vector machine is used for classification of healthy and un-healthy apples.(Kumar Jaiswal et al., 2019) used digital image processing techniques for finding the average rate of sedimentation in Kharkhara reservoir. (K. Radhika and D. Madhavi Latha et al,. 2019) also used Linear Discriminant Analysis (LDA) for the soil texture classification and developed a machine learning model to find out the physical and chemical properties of the soil. The block diagram of image processing technique which can be used for fruit disease identification is as shown in the Figure 1.

Figure 10: Block Diagram Jayamala K. Patil and Raj Kumar (2011)
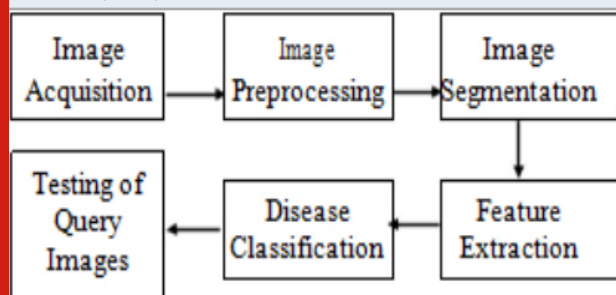
Image Acquisition: This is the process in which the image is captured and stored in digital media in digital format (Anand H. Kulkarni and Ashwin Patil et al,.2012).

Image Preprocessing: It will resize, smoothen and remove the noise signals present in it. This will helps in converting the RGB image to a grey image. The contrast of the image will also be increased at a certain level (Anand H. Kulkarni and Ashwin Patil et al,. 2012).

Image Segmentation: There will be several categories in the image. They will be classified according to their classes by this segmentation process (Pradnya Ravindra Narvekar et al,. 2014).

Feature Extraction: The features will be color, texture and shape. This will be obtained by this step (Tejal Deshpande et al,. 2014)

Classification: The numerical property of the image will be analyzed and they will be categorized.

Segmentation using boundary and spot detection algorithm: The image obtained will be an RGB image and it has to converted to the HIS model for the segmentation process. To find the infected parts, two methods will be used, one is boundary detection and another one is spot detection. The pixels with eight connectivity are considered for the boundary detection and boundary detection algorithm is used (Pujitha N et al,. 2016).

Threshold Algorithm: The process of converting gray level images to the binary image is thresholding. The pixels below the threshold will be zero and pixels above will be one (Bhavini et al,.2016).

K–Means Clustering: The clustering is used to convert objects into classes with K number. The object classification is obtained by squaring the distance between them and summing them. The algorithm for K –means Clustering: i) Pick a center of K cluster, either randomly or based on some heuristic. ii) Assign each pixel in the image to the cluster that minimizes the distance between the pixel and the cluster center. iii) Again compute the cluster centers by averaging all of the pixels in the cluster. Repeat steps 2 and 3 until convergence is attained.

The comprehensive study of machine learning algorithms such as random forecast, K-means clustering, partition algorithm etc. revel each algorithm has its own characteristics. The authors also reported that based on different medical records the algorithm efficiency also varies (Balajee and Venkatesh et al,. 2019). K-means clustering algorithm had been used for the storage of RGB color images and it saved 33% memory space compared with other selected methods. About 98.5±0.5% information of the original image was retained while reconstruction and it can be used for storing any RGB images (Santanu Halder et al,. 2014).

CONCLUSION

This paper gives the survey on fruit disease detection and classification techniques by using image processing. The paper discusses the methodology, results in each of the research work. Different researchers used different algorithms for image segmentation, feature extraction, training and classification of fruit disease. Among different methods, K-means clustering provides high accuracy and are widely used. All methods in this paper provide efficient results and also save time.

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Customer Classification of Discrete Customer Assets Data and CR-Re-Ranking of Classified Data

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ABSTRACT

It is very essential to perform classification and extraction of the customer trends from the big data is more important for business support and making a decision. Discovery of latest emerging trends is more vital in the business process. Outlier data that includes the customer facts. To study classification of customer problem based on the data concerning of customer asset data, the classification model based on the cross reference re-ranking method is constructed successfully. Customer classification model is based on variables in five dimensions that includes frequency of transaction, product types, amount of transaction, age of the customer and location of customer. To enhance the effectiveness of retrieving data, the new technique was introduced called as CR-Re-ranking. Providing excessive exactness on the high-positioned results, multi model re-positioning methodology is utilized. Test results described the quality, especially on the top positioned results, is increased impressively.

KEY WORDS: DATA MINING, CUSTOMER CLASSIFICATION, RANKING AND I-MINER.

INTRODUCTION

In the practical applications, with the appearance of the era of huge data records, organization records has formed within the area of marketing. Traditionally, marketers should initial determine client cluster employing a mathematical mode so implement Associate in Nursing economical campaign attempt to target profitable customers.. Classifying customer is major issues of overall operation in the marketing management. Gaining the magnificent customer and maintaining the customers in a selective manner and reduce the risk of blind marketing. The data that are generated by the customers and endeavor at the contact end, the powerful client no longer only filter the records interference of clients and customer classification do not have proceeding relationship with companies in the market, and also avoids the legal risk of infringing customer policy.

The outlier data are experienced in the process of customer classification. The intervals are freed and noise data or abnormal data that are considered to be eliminated. Therefore, familiarity about how to filter data from the era of big data and the use of data mining algorithm and difficulties to find the more important customer that are the important problems to be solved in advertising field under the era of big data. Basic relevant research,

the model is developed in this paper based on the Cross reference Re-ranking and similar marketing strategies are used for independent customers. Depends on the RFM classification model, region or location is added to the four dimension. The Re-ranking method improves the quality of searching by initializing the result list. After Re-ranking the overall number of similar document are fixed and customer classification is carried out. The Re-ranking method improves the quality of searching by initializing the result list. After Re-ranking the overall number of similar document are fixed and customer classification is carried out.

Related Work: Yuhua Peng et al., (2018) have suggested to assess and make use of data records and facts with more accurately and proficiently, the clustering algorithms are further studied to a certain extent, especially inside the process of clustering. in addition to analyses and refine the processing data. In the field of feasibility of prior clustering of statistical records such as sample pattern recognition, perform some reference, especially in the ant colony clustering, set of rules in data records aggregation is proposed based on the principle of solving enterprise choice support device to deal with data in the huge data records processing result is not best problem. The facts processing steps of data mining are studied.

Through selective information and ant colony clustering set of rules to achieves this manner, the original statistics for reasoning and verification is also used and the effect before and after the enhancement are compared. At the similar time, this investigate provides powerful selection support for website building in present day e-commerce field. Taking e-commerce website searching path as an example, applying the purpose of ant colony clustering algorithm based on facts entropy to perform route analysis, five types of course kinds are got. This study may be used as a reference for the production of other different e-trade websites.

In Li Ju et al.,(2013) outlined a reduction system to handle the incompatible policy-making. They investigated client classification forecasting model using the rough set theory, to obtain the statistics from the CRM system, and renovate them into suitable decision table. Then discretization of the data has been processed. After shrinking the attributes as well as value, they could determine decision rules and create logic ratiocination method. This research has been useful in validating and evaluating the viability of consumer classification forecasting system. As per the quotes of Philip Kotler, customer-centric activities not only need to develop products, but also to build its clients. The rough set theory is also used by Jackson et al.,(1998) and by Pawlak(1997).

Nowadays the CRM system is hugely based on artificial intelligence used by Pomerol (1997), neural networks, association rules, knowledge detection decision trees, clustering, and other types of algorithms such as genetic algorithms used by Yu et al.,(2002). Jyoti et al.,(2017) have recommended a sceme using KNN classification algorithm. Ghogare (2019) has proposed a method to investigate the data sets using RandomForest and Hoeffding Tree. These algorithms contain a number of problems like coding difficultly, obtaining a fair solution rather than the optimized solution and so on.

MATERIAL AND METHOD

Building a proposed model: The proposed model presents a technique called as Cross Reference-Re-ranking, to enhance the retrieval of data effectively. To supply excessive accuracy at the top-ranked outcomes, CR-Re-ranking employs a citation (CR). just like the existing device, the statistics are classified however low, medium and excessive selection is given for a) amount of transactions, b) product sorts, c) frequency of trans-actions and d) age of purchasers and e) region of consumers. In particular, multi modal capacities are first used independently to re-rank the fundamental returned impacts on the bunch level, and afterward the entirety of the positioned groups from particular modalities are helpfully used to conclude the photos with over the top importance. The test result shows that the pursuit quality, especially on the high positioned results, is advanced significantly. The new machine is being to develop to try and do away with the drawbacks within the existing device.

Cross referencing

In this Cross Referencing,

a) Transaction Amount with value '1 to 500' are taken as low, '501 to 1000' as medium and '>1000' are taken as high.

b) Product Types with value 'Low', 'Medium' and 'High'.

c) Frequency of Transactions with value '1 to 50' are taken as low, '51 to 100' as medium and '>100' are taken as high.

d) Age with value '<18' are taken as low, '18 to 40' as medium and '>40' are taken as high.

e) Location with value 'Village' is taken as low, 'Town' as medium and 'City' as high.

All the clusters are spitted into three sub groups as High, Medium and Low for every cluster.

CONCLUSION

This venture presents another re-positioning technique that consolidates multimodal highlights through a cross-reference procedure. In particular, the underlying list items are first isolated into a few groups separately in various element spaces. Given the positioned bunches from all the element spaces, the cross-reference procedure can progressively meld them into an exceptional and improved outcome positioning. Test results show that the viability has improved effectively. As investigated beforehand, the proposed re-positioning strategy is delicate to the quantity of bunches because of the constraint of group positioning. The difficulty in re-ranking of customers is eliminated as it reduces the re-ranking overheads especially when the number of

documents is more. The user interface assists accurately relevant customers' transactions searching. In future, this project may predict the missed values in the transactions.

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Highly Proficient Dual Audio Transmission Using Li-Fi Technology

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ABSTRACT

Li-Fi embodies light fidelity. The Visual light communication is the forthcoming technology and this can transmit the information using visual light at prominent speed as compared to the present wireless communication technology. The Li-Fi technology can transfer the dual audio through LEDs. It is a high speed and low cost visual light communication system, compared to present wireless communication system. This system designed with low cost, it provides high security and large bandwidth for transmitting the audio signal. A parallel audio transmission system uses a groups of LEDs, where each LED can transmit a different audio signals. This paper describes the design of modulation based highly efficient Li-Fi dual audio transmission system and analyzing its performance.

KEY WORDS: LIGHT EMITTING DIODE (LED), PHOTO DETECTOR, VISIBLE LIGHT COMMUNICATION (VLC), PHASE LOCK LOOP (PLL), RADIO FREQUENCY (RF), MODULATION AND DEMODULATION.

INTRODUCTION

The Term Li-Fi system basically represented visible light communication system. This technology can transfer the data, audio and video signals through LED devices. The LEDs continuously ON and OFF millions of time cycles per second. The illumination level of the LED varies rapidly than human eyes, so human eye cannot be notice that variation, so the outputs appears constant (Jyoti et al,. 2012) . Li-Fi technology provides to encode data in the light by varying the rate at which the LEDs flicker on and off to give dissimilar strings of 0s and 1s. The visible light spectrum is decade thousand times larger than the radio frequency spectrum. The Researchers have grasped the data rates of over 10 Gbit/s, This is more than two hundred fifty times faster than superfast broadband. But according to the cost, Li-Fi technology is ten times cheaper than Wi-Fi technology(Bharath et al,. 2016).

Visible light communication (VLC) methodology uses visible light between 400 and 800 THz (780–375 nm) for data communication in wireless platform. It is comparable to optical wireless communications technology. The fluorescent lamps have the ability to transmit the signal up to 10 kbit/s and LEDs can capable to transmit the signal up to 500 Mbit/s.In electronic systems, the photo diode received signal from the transmitter such as light source, cell phone camera or a digital camera. Visual light communication is used as a environmental medium for software engineering domain (Hashwanth et al, 2019). The light producing sources such as lamps, traffic signal LEDs, Televisions, commercial displays and vehicle head lights are used. This technology is more suitable for high power applications, because it is free from radiation and also it will not affect human eyes (Rahul et al,. 2015). Figure 1 shows the block diagram of Li-Fi system.

Figure 1: Li-Fi system
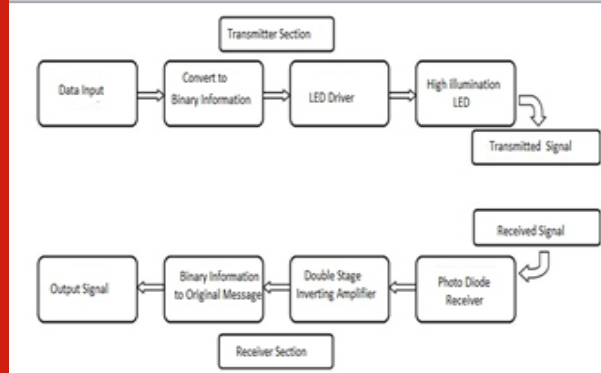
Li-Fi technology is more applicable environment such as in hospitals, aircraft cabins and nuclear power plants without causing electromagnetic interference. Similarly like Wi-Fi the Li-Fi also transmits the data over the electromagnetic spectrum, but Wi-Fi uses radio waves and Li-Fi uses visible light. (Samuel et al,. 2015).

MATERIAL AND METHOD

Li-Fi Dual Audio Transmission

A. Dual Audio Transmission: Figure 2 shows the proposed block diagram for dual audio transmission system. In Dual Audio transmission, Audio input1 and Audio input2 are given to Audio amplifier circuit 1 and 2. The outputs of the audio amplifiers are given to LED Driver Circuit. The LED Diver circuit drives the high illumination LED. Photo diode receives the original audio information and gets amplified and given to the audio amplifier and its given to the Speaker. By changing the position of Receiver Circuit, we can receive the different range of audio signals.

Figure 2: Block Diagram for Dual Audio Transmission
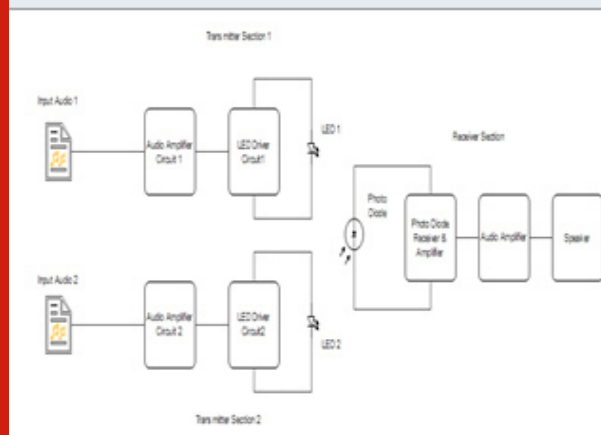
B. Dual Audio Transmitter: Figure 3 shows that transmitter circuit for dual audio transmission. The Audio input signal is given to CA3130 Operational amplifier. The audio signal is getting amplified by the Operational Amplifier. Then the output of the operational amplifier is given to the high frequency transistor (BF359). The

Emitter terminal of this transistor is connected to ground and collector terminal is connected to LED cathode terminal. LED anode terminal is connected to Positive power Supply.

Figure 3: Dual Audio Transmitter Circuit
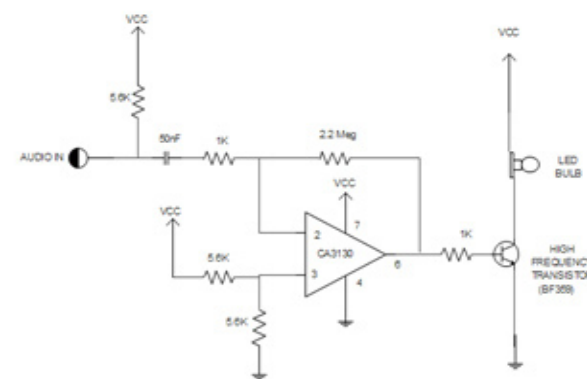
Figure 4 shows that hardware model of Li-Fi Audio Transmitter. The RED LED indicate power supply sources presents in the Board.

Figure 4: Hardware model of the Li-Fi Dual Audio Transmitter
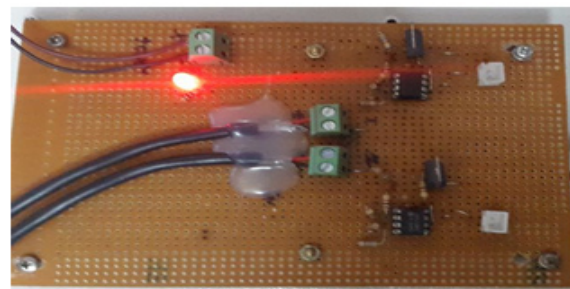
C.Dual Audio Receiver: Figure 5 shows that Receiver circuit for dual audio transmission. The photo detector detects the audio signal and given to CA3130operational amplifier. Then this signal gets amplified by LM386 audio amplifier and given to the Speaker.

Figure 5: Dual Audio Receiver circuit
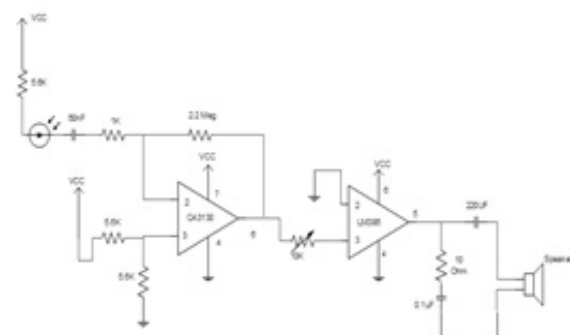
Figure 6 shows that hardware model of Li–Fi Dual Audio Receiver.

Figure 6: Hardware model for Li–Fi Dual Audio Receiver
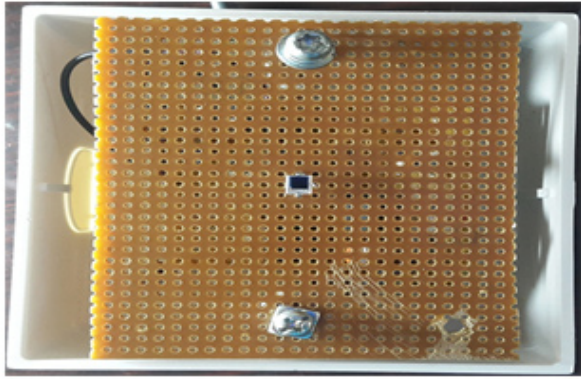
Modified Dual Audio Transmission: The Modified dual audio transmission system is the proposed design 2 for dual audio transmission, which is using the modulation and demodulation techniques. The input audio signal is given to modulated circuit and it's transmitted along with carrier signal. The photo detector receives the audio signal and given to the demodulator circuit. The audio signal and carrier signal can be separated by demodulator circuit. Finally the audio signal is given to the speaker.

A. Modified Transmitter Circuit for Dual Audio Transmission: Figure 7 shows the modified transmitter circuit for audio transmission. The CD4046 is the major component in modified design. The CD4046 micro power phase locked loop (PLL) consists of a low power, linear, voltage oscillator, a source follower and two phase comparators. The audio signal is given to the CA3130 operational amplifier. The amplifier signal is given to the CD4046 Phased locked loop IC. It transmits the audio signal along with carrier signal.

Figure 7: Modified Transmitter Circuit for Dual Audio Transmission
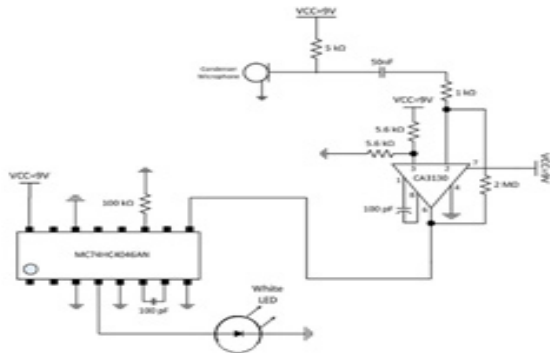
B. Modified Receiver Circuit for Dual Audio Transmission: Figure 8 shows that modified receiver circuit for audio transmission. The audio signal received by photo detector and getting amplified by CA3130 operational amplifier.

The amplified signal is given to CD4046 Phase locked loop IC. The PLL can separate the audio signal and carrier signal and given to the speaker.

Figure 8: Modified Receiver Circuit for Dual Audio Transmission
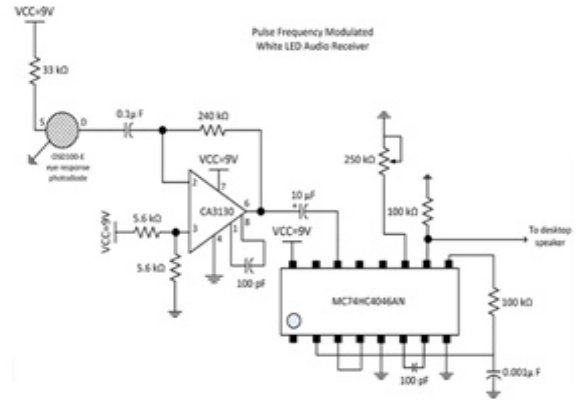
RESULTS AND DISCUSSION

Figure 9 shows that simulation output for the Audio transmitter. The input audio signal is captured by CRO. The voltage level is very less during check in and so the output audio signal cannot capture with proper level. So the signal is getting amplified by the CA3130. The probe can locate the output of CA3130 operational amplifier at the transmitter side.

Figure 9: Simulation output for the Audio Transmitter

Figure 10: Simulation output for the Audio Receiver

Figure 10 shows that simulation output for the Audio Receiver. The voltage level is very less during check in and so the output audio signal cannot capture anything and it is getting amplified by LM386. The probe can locate the output of LM386 Audio amplifier at the Receiver side.

The figure 11 shows that Real Time Implementation of the Li-Fi Dual Audio Transmission.

Figure 11: Real Time Implementation of the Li-Fi Dual Audio Transmission
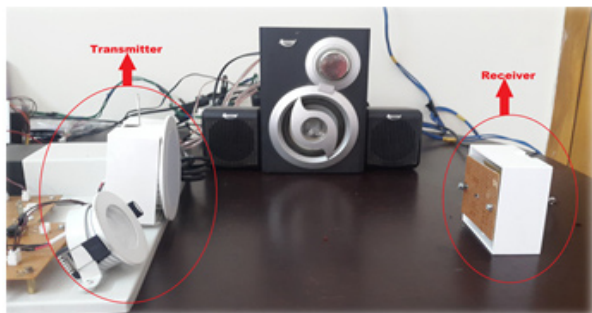
CONCLUSION

Li-Fi technology has great potential in the field of wireless communication. This design concludes that audio signals can transmit and receive effectively. This paper describes two method of dual audio transmission system. The first method described the transmission system designed using operational amplifier, and this system prototype has developed and it is tested in real time. And the second method is focused on dual audio transmission system design using modulation and demodulation techniques. And also and the system prototype has developed and it is tested in real time. The proposed methods are more reliable and efficient for audio transmission in Li-Fi technology. This is concluded that the Li-Fi communication is a promising replacement to conventional methods of wireless communications methods and it will become a greener and safer future.

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Detection of Plastics Using Convolutional Neural Network

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ABSTRACT

Recycling is a process that is considered to be beneficial in terms of both environmentally and economically; especially in the case of a 'double-edged sword' material like plastics, recycling becomes a necessity to guide a better and sustainable environment. Thus, a reliable and efficient way of sorting and processing the materials to be recycled has to be deduced. An automated system that can provide efficient and faster ways of detecting and categorizing the materials without sacrificing its throughput is required. In this system, the two categories of waste are sorted namely, Plastic and Non-Plastic wastes. To achieve this, the proposed work employs three step processes: initiate transfer learning, capture and load the image, and obtain classification results.

KEY WORDS: PLASTIC IDENTIFICATION, CONVOLUTIONAL NEURAL NETWORK, CLASSIFICATION, INCEPTION.

INTRODUCTION

Plastic Detection involves the implementation of areas such as Machine Learning and Neural Networks which are used to detect almost all kinds of plastic objects when images of those plastic objects are given as input to a trained model. Deep learning (LeCun et al.,2015) is a branch of artificial intelligence inspired by psychology and biology that deals with learning from a set of data and can be applied to solve a wide spectrum of problems. A supervised learning model is given instances that are data specific to a problem domain and an answer that solves the problem for each instance. When learning is complete, the model is not only able to provide answers to the data it has learned on, but also to yet unseen data with high precision.

Neural networks (Simard et al., 2003) are learning models used in deep learning. The main motive is to find the learning process that occurs in the neural system of human or an animal. Since it's been one of the most powerful learning models they are used in automation of tasks where human being takes a lot of time to make a decision. Results can be delivered very fast by using neural networks and may identify relationships within already studied data. This paper is intended to implement a Neural Network Model that will be trained by a dataset of images and this model will be used to detect any plastic object images that are being inputted.

Literature Review: (Razali et al., 2012) proposed a system that uses computer vision enabled image processing techniques which are used to develop an automated system for handling mixed household waste. The main goal of this work is to segregate plastic and paper wastes which are the primary step in recycling. . The experiments were conducted with different shapes and sizes of paper and plastic objects.

(Scavino, Edgar et al,. 2009) presented a liable automated system for the plastic bottle waste sorting system. This system carries out several pre-processing steps to extract the plastic bottle from the given image. Then a pixel-wise feature vector of the pre-processed image is extracted using statistical feature extraction methods such as Principal Component Analysis (PCA), Kernel PCA, Support Vector Machine(SVM), etc. Successively, after performing these steps the results of the mentioned classifications are equally weighted that is., a majority voting mechanism is equipped in this technique in deciding the type of object.

(Yi et al,. 2014) proposed a work in that they applied Convolutional Neural Networks (CNN) to a system to learn and estimate the age of people directly from image pixels. Multi-Scale Convolution Networks is used over the traditional CNN to improve performance of the system substantially. (Nguyen et al,.2017) proposed a classification of different species of animals using the open source model Inception-v3 developed by Google. In this system, a transfer learning mechanism is performed to retrain the Inception model on the animal species dataset.

(Simard et al,. 2003) proposed a work to improve the performance of MNIST data set by applying elastic distortion and CNN. The authors believed that the quality of a learned model mainly depends on the quality and size of the training dataset. They have used the elastic distortions technique to expand the size of the dataset and CNN for classification which reduces computational time. (Turaga et al,. 2010) proposed CNN based approach to compute the affinity graph instead of segmentation algorithms. The affinity graph, they derived can be used in combination with other standard partitioning algorithms to improve the accuracy. They have taken 3D segmentation problem of volumetric electron microscopy (EM) and proved that their method learned a better affinity graph from the given EM images.

MATERIAL AND METHOD

The proposed system employs three major steps to identify the plastics. They are learning, capture, and load image, and obtain classification results. First of all, the photographs of the plastic objects are taken and several steps of processing are carried out. In the first step, the transfer learning process is initiated with an existing model called Inception that re-trains the model which classifies objects as either Plastic or Non-Plastic. The Inception model is a pre-trained model for the Image Net Dataset which correctly classifies more than 1000 different classes of objects. The next step involves the execution of a generic program that uses Google's Machine Learning Library, Tensor Flow (Amita Kapoor et. al., 2019) which takes an image as an input. After inputting an image, the given image will be classified using the trained model by the program, and a percentage of similarity with the existing classification of training data is given as output. Based on this percentage of

similarity, the given image is classified as plastic or non-plastic.

Google Net Architecture: Google Net Architecture is a convolutional neural network which is pretrained and consists of 22 layers. Inception is the third version Deep Learning Convolutional Architectures. Inception V3 (Xia et. al., 2017) was trained on Image Net data set having images of 1000 object categories, such as keyboard, mouse, pencil, plastics, and non-plastics. It uses a combination of inception modules, each including some pooling, convolutions at different scales, and concatenation operations. The network uses CNN inspired by LeNet Architecture but implemented as a novel element that dubbed an inception module. The principles used are Image distortions, batch normalization and RMS prop. For the purpose of reducing the number of parameters, the above-mentioned inception module considers multiple smaller convolutions. The Inception-v3 Model which is a Google Net CNN is depicted in Figure 1.

Figure 1: Inception Model v3
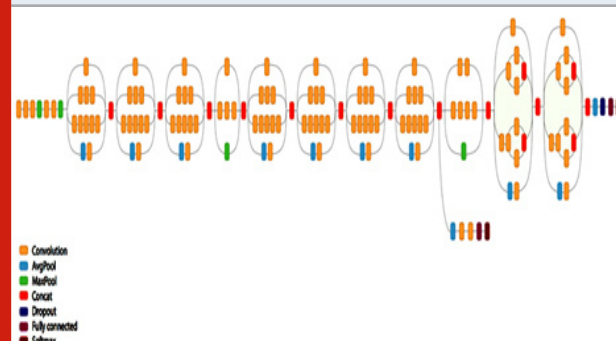
Convolutional Neural Network (CNN): CNN is a kind of neural network widely used for classifying images. CNN shares weights between receptive fields in comparison to the other conventional network that has tightly connected layers. This reduces the number of parameters, and with filters, CNN uses the convolution method. CNN uses many filters for feature extraction. CNN applies a weighted sum over the processed input and performs a non-linear mapping function to derive an intermediate state. These three phases form a layer. CNN reflects a mixture of these three layers.

Convolution Layer: This is the first layer in processing the input image which extracts features from the given image. This layer search and establish a relationship between the different pixels in the given image and is done by applying a mathematical operation on the two inputs: filter (or kernel) and image matrix. This layer contains several filters, and each filter has created an image that contains a specific feature. The convolution layer output is an array of images named as Tensor.

Maxpool Layer: This layer's role is to reduce the input image size by picking out the maximum value among the neighboring elements. A two-dimensional window

is used for this process. The highest value is chosen from the obtained values of each step and finally, a matrix of chosen values will be obtained after all steps and the dimension of the matrix is reduced. This layer not only reduces the number of parameters but also effective computation time.

Fully Connected Layer: This layer uses many activation functions. An activation function main used to convert the input image into a higher dimensional. High accuracy is achieved when there is an increase in dimension. ReLu (Rectified Linear activation Unit) is the commonly used activation function.

Classification: In the classification step, the output of a fully connected layer is sent through a sigmoidal activation function which gives output 0 for plastic image and 1 for non-plastic. Currently, an extensive set of supervised learning algorithms are used for many applications. In supervised learning, the input data is labeled and the algorithm learns an inherent structure from it, and based on that learned knowledge, it predicts the output for the given test data. Traditional supervised learning algorithms depends on feature engineering and feature selection methods, but it needs good domain knowledge.

Recently, deep learning algorithms have done well in numerous longstanding intelligence activities relevant to computer vision, natural language processing (NLP), etc. in contrast to conventional machine learning. Deep learning algorithms have the capability of learning optimal features from the raw input images. the given input data is passed across several hidden layers which tries to learn the abstract features. The convolutional Neural Network is a kind of deep learning algorithm. Many researchers have applied CNN in a variety of computer vision tasks and proved that CNN is one of the best classifiers. So, in the proposed work, we have employed the CNN for identifying plastic images.

RESULTS AND DISCUSSION

Dataset description: The dataset used to train the model consists of two classes of images namely, plastics and non-plastics. A total of 2632 number of images are considered in this work. The number of plastic and non-plastic images is given below in Table 1.

Table 1. Image Dataset	
Number of Plastic Images	Number of Non–Plastic Images
671	1961

The experiments were conducted by two different training and testing sizes. They are 80-20 and 70-30 ratio. Initially, the system is trained with the training dataset. Based on that knowledge, it predicts and outputs the percentage of similarity of the given test images. If the difference between the expected output and the actual output is less than or equal to 0.05%, it is taken as correct classification, otherwise, it is misclassification. From the experiment conducted, the percentage of accuracy is calculated by equation 1.

$$Accuracy \ (\%) = \frac{No. of \ correctly \ classified \ images}{Total \ No. of \ test \ images} \ X \ 100$$

In 80-20 ratio, the number of training and testing images is 2106 and 526 respectively. Out of these 526 images, 482 images are correctly classified. The result in the form of a confusion matrix is given in Table 2.

Table 2. Confusion matrix (80-20 ratio)		
No. of test images =526	Predicted as Non–Plastic	Predicted as Plastic
Actual Non-Plastic	340	8
Actual Plastic	28	142
	Accuracy = 91.64 %	

Similarly, in 70-30 ratio, the training and testing images considered are 1842 and 790 respectively. Out of these 790 test images, 698 images are correctly classified and the confusion matrix is given Table 3.

Table 3. Confusion matrix (70-30 ratio)		
No. of test images =790	Predicted as Non–Plastic	Predicted as Plastic
Actual Non-Plastic	433	75
Actual Plastic	17	265
	Accuracy = 88.34 %	

CONCLUSION

In the proposed work, a model to detect plastics in an efficient and cost-effective manner has been presented. This work can be implemented in real-time and this automated system can categorize materials as either plastics or non-plastics. The performance was calculated based on the accuracy of the correct classification for the given input images. This study uses convolutional neural network model for the detection of plastic objects.

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Advanced Ultrasonic Sensor Based Security System

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ABSTRACT

The microwave which detect the things using radar system. Radio waves are called as micro waves, it's used to detect the altitude and direction or speed of objects. This project focus to make an efficient ultrasonic sensor, which is cheaper and exhibit all the technique of radar. The ultrasonic sensor contains both transmitter and receiver which is placed on the rotating motor. The rotating motor is used to cover wide range. This paper is particularly about the ultrasonic sensor system controlled by using Arduino. Here radar play a main role and thus the radar contains ultrasonic sensor and motor, and these are the most components of the system. The essential principle of the system is it got to detect the thing especially range. When it startsto processing it gives the knowledge about the angle or position of the thing and thus the space of the thing was also shown and this technique system was controlled by Arduino, Arduino uno is employed to regulate the ultrasonic sensor and to interface the sensor and display devices. We will see all the updates in our smart phone. It'll also give intimation to close by region. When the thing has found the liquid will spray and therefore the LED will start to glow and therefore, the information is going to be found in LED display. The appliance of radar is found in several field like mapping, spying, object identification, navigation and tracking. It's also suitable for indoor application.

KEY WORDS: MICROCONTROLLER UNIT, TRACKING SYSTEM, ECHO SIGNAL, FREQUENCY, ULTRASONIC WAVES.

INTRODUCTION

Ultrasonic sensor system is an object detection system it's also called as tracking system. It's also decided the peak, range, heading and therefore the speed of the thing. There are alternative ways to point out the ultrasonic working data. There is different ultrasonic system are available with different technology. The modified system gives the precise and accurate result. Ultrasonic system is available sort of size and different performance features. A number of ultrasonic sensors are utilized in air- control at airport.

Ultrasonic sensor is that the heart of tracking system and it are often operated by one person. Ultrasonic sensor was developed by several national during world war-2.

High tech ultrasonic sensor is used with digital processing. Our proposed system contains the following component, the ultrasonic sensor is connected to the digital input and output pins. Both the ultrasonic sensor and servo motor are connected simultaneously, the servo motor rotate from 0 to 180 degree. This technique is named "processing development environment". The microcontroller unit [MCU] will constantly check for receiver output. TTL driver are wont to connect the Arduino uno and the node MCU it provides the data facility to the Arduino CPU board. MCU check whether the thing was during a particular region. The ultrasonic sensor wants to detect the obstacle are during a particular region.

MATERIAL AND METHOD

Existing Method: CCTV (Closed Circuit Television) is also a TV system throughout that signals are not in public distributed however area unit monitored, primarily for police investigation and security functions. CCTV depends on strategic placement of cameras, and observation of the camera's input on monitors somewhere. CCTV is sometimes used for a variety of functions as well as, maintaining perimeter security in medium to high secure areas and installations. perceptive behavior of incarcerated inmates and doubtless dangerous patients in medical facilities. Overseeing locations which may be risky to somebody's, as an example extremely harmful industrial environment. Getting an evident record of activities in things wherever it's a necessity to require care of correct security or access controls.

RESULTS AND DISCUSSION

Proposed Method: The Ultrasonic sensor will help to seek out theft activity in the dark time of jewelry shop and bank lockers or the other secret places where this security needed. This Ultrasonic sensor sense the environment periodically, so at normal condition we'll get constant echo signal from closed room environment, that echo signal read by micro controller. When there's any abnormal echo signal aside from normal signal which will be treated as abnormal action happening within the environment, which will be thief or other moving object. This case taken as alert and SMS or involve this alert will send to the user via Node MCU and therefore the motor is going to be on at an equivalent time the alarm is going to be on. By this method when thief enter in room, its detected by the sensor and therefore the electric shock also will be provided on the steel walls.

Block Diagram

Figure 1: Block Diagram for proposed system
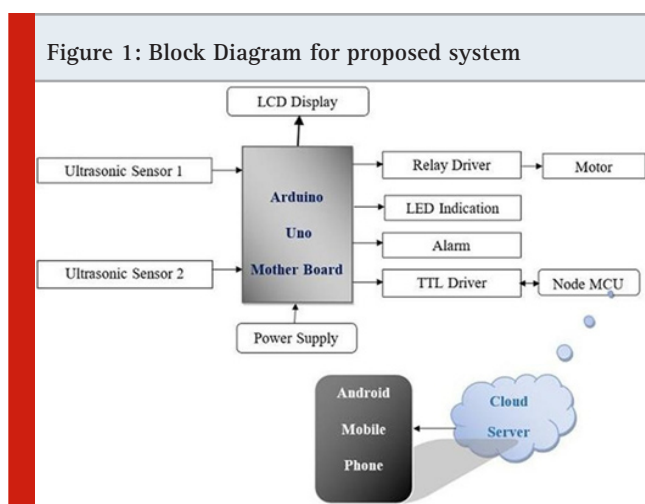
Arduino Mother Board: Arduino is employed to sense and control physical devices. The Arduino project is predicated on programming language it also supports the language C, C++, java, python. The microcontroller is predicated on ATmega328p. It's totally 14 pins 6 pins are

analog and 6 pins are digital pins. It contains everything that is employed to regulate the microcontroller. it had been powered by AC to DC adapter. Arduino has number of facilities to speak with the pc. It's an electronic platform contains hardware and software. The hardware is programmed by using the software and it's almost utilized in every task. The Arduino make everyone to possess interest in electronics and make person to code easily withoutknowing the algorithm and sophisticated code. The hardware will have predefined function and therefore the rest are going to be handled by wiring software.

Atmega328 contains three sorts of memory like 32KB,2KBand 1kb. 32KB is employed to revive the deleted to data. 2KB is employed to store the variable data. 1KB is employed to store the info when the device is powered down and powered up again. The pins usually hook up with the circuit having 3.3V. Serial in and out port is wont to send and receive data from GPS, WIFI module, Bluetooth. Digital pins are wont to change the logic between input and output in software.

Ultrasonic Sensor: Ultrasonic sensor is wont to convert electricity into energy. The energy is within the sort of ultrasonic waves. it's wont to measure distance from the target object. The acoustic wave which is above 20,000hz is named ultrasound. Piezoelectric sensor is used for the generation of ultrasonic waves within the frequency range of 1- 20MHZ to 2-40KHZ. The sensor contains ceramic transducer when the electrical signal is applied to them. The sensor offers maximum sensitivity and efficiency. The performance of the ultrasonic sensor is measured include bandwidth, attenuation, dynamic range. a number of the opposite parameters are normal frequency, peak frequency, bandwidth, pulse width.

Buzzer: Buzzer uses a relay with an audio transformer and speaker. When the switch is pressed the relay will

operate through the transformer. the traditional value of the capacitor utilized in the system is 0.001uf, when the capacitance increases the buzzer tone will get decreased. Piezo buzzer is usually supported the inverse principle of piezo electricity. it'll produce electricity when the mechanical pressure is applied on certain materials. Dc voltage is applied to the input pin, it converts the oscillating signal with the assistance of resistor and transistor. When high voltage is applied within the piezo disc it'll cause a mechanical explosion. When the metal plate bend it'll produce acoustic wave in air.

LED: Light Emitting Diode [LED] light varies from visible to infrared or ultraviolet region. They operate low voltage power supply. it's one among the foremost commonly used device used for indication purpose in circuits. They also used for optoelectronics application. The forward voltage is low than the availability voltage. Current limiting LED are utilized in series with the LED. Low input voltage also can drive the LED.

DC Motor: DC motor is a device that convert electricity into energy. the foremost common type relay produces magnetic flux. DC motor are the primary type to be used widely. The speed of the motor is calculated by the shaft per minute and it's termed as RPM. Small type Dc motor are utilized in various application like toys and tools. Universal motor is often operated by direct power and it's also light weight and it's considered one among the simplest portable device.

Hardware Result

Figure 2: Hardware Result for security system
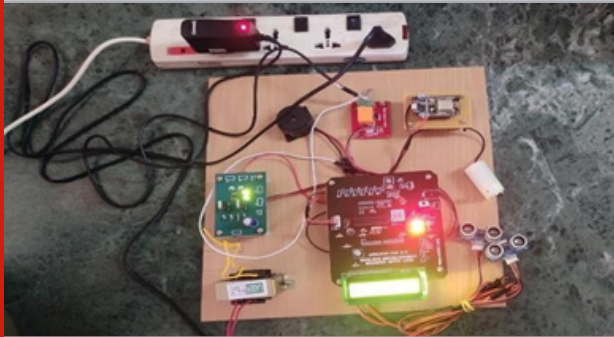
The ultrasonic sensor will detect the object in a particular range, when the object has detected the buzzer will make sound and the LED will glow LCD will show the accurate time of obstacle crossing.

CONCLUSION

The paper we presented a fanatical study aimed toward surveillance applications. especially it presents an in-depth comparison between the QMS and therefore the NFS acquisition geometrics typically encountered in such scenarios. The comparative analysis spans from theoretical and experimental detection performance, up to the specified sensor complexity. Incidentally we observe that the experimental analysis has been performed under specific observation geometrics that were carefully selected to isolate the effect of the target response on the ultimate results. This approach allowed an immediate and fair comparison between the two considered sensors configurations. Indeed, an in-depth geometry would be desirable to supply a generalization of the reported results.

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A Review on Context Awarness for Trust Management Systems

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ABSTRACT

In this generation, a major challenge for web services trust management is the continuous changing running environments. In such situations, Web services have difficulty guaranteeing the trust of services. In this paper, we propose a Bayesian Network Model can be trust management model for context-aware web services. The novelty of our trust model lies in leveraging the acyclic dependency relations among the quality of service metrics and context environments. The Principle of these trust based model determines the quality of services and their service level agreements. They will ensure the original values of the web services. The reputation based trust learning models using Bayesian Network to predict the behaviour of web services based on QoS data history of direct interactions between web services and users given the environmental context information capitalizing on Bayesian Network. Our approach uses trust to predict the probability of delivering a satisfactory service level to the services uses under context variables. This paper investigates the problem of trust management for context aware web services. Existing approaches did not consider the cyclic dependency relations among qos values and context variables. Our experiments conducted with real time examples and demonstrate the capability of our trust model compared to Dependency Network-based trust model.

INTRODUCTION

Nowadays, online services provision has been implemented through self-contained applications known as web services. In addition, web services facilitate loosely-coupled distributed business integration which promotes the research to attract increasing attention. In this paper, we are concerned with trust management for context-aware web services. Trust is defined and differed with many behaviors, the authors classify trust research into four ways. (1) Policy based trust, (2) Reputation based trust, (3) General models of trust, and trust in information resources. Further, the authors classify different computational trust models into four categories: (1) Feedback based models, (2) Statistics based models, (3) Fuzzy logic based models, and (4) Data mining based. This work extends reputation based trust learning models to predict the behavior of a web service.

Web services run in context environments where service-level agreement (SLA), which is a commitment between a service provider and a service user to define the level of service expected from the provider, could be violated. To tackle this dynamism and unpredictability, specific

kinds of services, namely context aware services, are designed to continue offering this functionalists without compromising their following operational functions. For instance, value mindfulness setting variable, client side, is actuated by conveying low QoS qualities to the client which on its job will initiate benefit mindfulness setting variable, supplier side, prompting more QoS debasement. Bayesian Network is a graphical model that approximates the full joint probability distribution over the corresponding domain by means of Gibbs sampling. Bayesian Network is similar to Dependency Network can represent the mutual dependency or cycle among domain variables.

The graphical structure is a directed graph where each nodes represents a variable in the problem domain and contains a conditional probability given its parents in the network. Edges represent the global constraints among nodes and their absence means the independence of the nodes. Most current statistical trust models, particularly Dependency Network based models describe the relations among QoS services to estimate the probability of a delivering a satisfactory QoS values. But, they ignore the context environments of web services, that causes the result of inaccuracy. For simplicity, we consider feedbacks of the group of users as context variables. Customer side is a user side context variable whereas other group of users is a provider side context variable. In other words, the customer side will received QoS values of the service. Hence, QoS degradation may change depends upon the feedback of the users.

Related work: Trust among portable hubs is pivotal for group coordinated efforts with new alliance accomplices without earlier collaborations for strategic gathering correspondence frameworks in front line circumstances. What's more, guaranteeing a specific degree of trust is likewise basic for fruitful crucial. Our work tries to recognize the ideal length of a trust chain among peers in a trust web that produces the most exact trust levels without uncovering hazard dependent on a tradeoff between trust accessibility and way unwavering quality over trust space. We characterize a trust metric for strategic gathering correspondence frameworks in portable impromptu systems to appropriately reflect special attributes of trust ideas and show that an ideal trust chain length exists for producing the most exact trust levels for trust-based cooperation among peers in versatile specially appointed systems while meeting trust accessibility and way unwavering quality prerequisites. Versatile impromptu and sensor arranges frequently contain a blend of hubs, some of which might be narrow minded and non-helpful in giving system administrations, for example, sending parcels so as to ration vitality.

Existing trust the board conventions for Mobile ad hoc networks (MANETs) advocate separating narrow minded hubs when they are identified. Further, charitable practices are empowered with motivating force components. Right now, propose and break down a trust the executives convention dependent on the interest and valuing hypothesis for overseeing bunch correspondence frameworks where framework survivability is exceptionally basic to mission execution. Instead of continually promising charitable practices, we think about the tradeoff between a hub's individual government assistance (e.g., sparing vitality for survivability) versus worldwide government assistance (e.g., offering support accessibility) and recognize the best plan condition with the goal that the framework lifetime is boosted while the mission prerequisites are fulfilled.

Literature Survey: A survey of trust in computer science and the semantic web: Artz, D says that Trust is a basic segment in numerous sorts of human association, permitting individuals to act under vulnerability and with the danger of negative results. For example, exchanging money for a help, offering access to your property, and picking between conflicting wellsprings of information all may utilize some sort of trust. In software engineering, trust is a broadly utilized term whose definition contrasts among scientists and application regions. Trust is a fundamental part of the vision for the Semantic Web, where both new issues and new uses of trust are being examined.

This paper gives a diagram of existing trust look into in software engineering and the Semantic Web. Trust is a vital segment in numerous sorts of human communication, permitting individuals to act under vulnerability and with the danger of negative outcomes. For instance, trading cash for assistance, offering access to your property, and picking between clashing wellsprings of data all may use some type of trust. In programming designing, trust is a by and large used term whose definition contrasts among pros and application regions. Trust is a fundamental part of the vision for the Semantic Web, where both new issues and new uses of trust are being contemplated. This paper gives a review of existing trust look into in software engineering and the Semantic Web.

Trust management for soa-based and its application to service composition: Chen, I says that A future Internet of Things () framework will associate the physical world into the internet all over and everything by means of billions of keen articles. From one viewpoint, gadgets are truly associated by means of correspondence systems. The administration situated engineering (SOA) can give interoperability among heterogeneous gadgets in physical systems. Then again, gadgets are for all intents and purposes associated by means of interpersonal organizations. Right now propose versatile and adaptable trust the board to help administration structure applications in SOA-based frameworks. We build up a procedure dependent on appropriated synergistic separating to choose input utilizing similitude rating of fellowship, social contact, and network of intrigue connections as the channel. Further we build up a novel versatile sifting procedure to decide the most ideal approach to consolidate direct trust and backhanded trust progressively to limit union

time and trust estimation predisposition within the sight of noxious hubs performing astute assistance and agreement assaults.

For versatility, we consider a structure by which a limit constrained hub just keeps trust data of a subset of hubs of intrigue and performs least calculation to refresh trust. We show the adequacy of our proposed trust the executives through assistance organization application situations with a similar presentation investigation against Eigen Trust and Peer Trust. An Internet of Things () framework associates the physical world into the internet by means of radio recurrence recognizable proof (RFID) labels, sensors, and cell phones. frameworks challenge trust the executives in the accompanying angles. Initial, an framework advances with new hubs joining and existing hubs leaving. A trust the executive's convention must deliver this issue to permit recently joining hubs to develop trust rapidly with a sensible level of exactness. Second, the structure squares or elements of frameworks are generally human conveyed or human worked gadgets, so trust the executives must consider social connections among gadget proprietors so as to amplify convention execution. In conclusion, a social framework basically comprises of uncensored gadgets giving a wide assortment of administrations. Naturally, a considerable lot of them (the proprietors) will be noxious for their own benefit. A trust the board convention for must be versatile to pernicious assaults to get by in unfriendly situations.

Modeling and analysis of trust management with trust chain optimization in mobile adhoc net– works: Chickering, M says that we create and break down a trust the board convention for crucial gathering correspondence frameworks in portable impromptu systems utilizing various leveled demonstrating methods dependent on stochastic Petri nets. Trust among portable hubs is essential for group joint efforts with new alliance accomplices without earlier collaborations for strategic gathering correspondence frameworks in war zone circumstances. What's more, guaranteeing a specific degree of trust is additionally basic for effective strategic. Our work tries to distinguish the ideal length of a trust chain among peers in a trust web that creates the most exact trust levels without uncovering hazard dependent on a tradeoff between trust accessibility and way unwavering quality over trust space.

We characterize a trust metric for crucial gathering correspondence frameworks in versatile specially appointed systems to appropriately reflect novel attributes of trust ideas and show that an ideal trust chain length exists for creating the most precise trust levels for trust-based cooperation among peers in portable impromptu systems while meeting trust accessibility and way unwavering quality necessities. Portable specially appointed and sensor arranges frequently contain a blend of hubs, some of which might be egotistical and non-helpful in giving system administrations, for example, sending bundles so as to ration vitality. Existing trust the executive's conventions for portable specially appointed

systems (MANETs) advocate segregating narrow minded hubs when they are distinguished.

Further, selfless practices are supported with motivating force systems. Right now, propose and investigate a trust the executive's convention dependent on the interest and valuing hypothesis for overseeing bunch correspondence frameworks where framework survivability is exceptionally basic to mission execution. As opposed to continually reassuring charitable practices, we think about the tradeoff between a hub's individual government assistance (e.g., sparing vitality for survivability) versus worldwide government assistance (e.g., offering support accessibility) and distinguish the best plan condition with the goal that the framework lifetime is expanded while the mission prerequisites are fulfilled.

MATERIAL AND METHOD

Methodology: Bayesian systems are a kind of probabilistic graphical model that utilizes Bayesian derivation for likelihood calculations. Bayesian systems plan to display contingent reliance, and in this way causation, by speaking to restrictive reliance by edges in a coordinated chart. Through these connections, one can productively lead deduction on the irregular factors in the diagram using factors. Before going into precisely what a Bayesian system is, it is first helpful to survey likelihood theory. First, recall that the joint likelihood appropriation of irregular factors $A\_0, A\_1, \ldots, A\_n$, signified as $P(A\_0, A\_1, \ldots, A\_n)$, is equivalent to $P(A\_1 \mid A\_2, \ldots, A\_n) * P(A\_2 \mid A\_3, \ldots, A\_n) * \ldots * P(A\_n)$ by the chain rule of likelihood. We can look at this as a factorized portrayal of the dissemination, since it is a result of N factors that are confined probabilities. Next, review that restrictive autonomy between two arbitrary factors, An and B, given another irregular variable, C, is equal to fulfilling the accompanying property: $P(A,B|C) = P(A|C) * P(B|C)$.

$$P\left(\bigcap_{k=1}^{n} A_k\right) = \prod_{k=1}^{n} P\left(A_k \,\middle|\, \bigcap_{j=1}^{k-1} A_j\right)$$

As such, as long as the estimation of C is known and fixed, An and B are free. Another method for expressing this, which we will utilize later on, is that $P(A|B,C) = P(A|C)$.

Feedback–Based Modules: It is hard to keep up trust input because of dynamic nature of cloud and flighty number of cloud clients for administration. In spite of the fact that it is critical to discover the unwavering quality of trust inputs in light of the fact that untrustworthy trust input can create off base trust results. This paper presents the difficulties and dangers that can bargain the trust framework. We proposed the trust the board system that can viably sift through the questionable criticism dependent on the conduct of cloud clients, maturing factor, lion's share inputs and exogenous strategy and measure the dependability of specialist organization. This proposed structure can deliver precise trust results and

valuated and contrasted and existing framework.

Statistics–Based Modules: The far reaching utilization of the Internet flags the requirement for a superior comprehension of trust as a reason for secure on-line communication. Notwithstanding expanding vulnerability and hazard, clients and machines must be permitted to reason viably about the reliability of different elements. Right now, propose a trust model that helps clients and machines with dynamic in online associations by utilizing past conduct as an indicator of likely future conduct. We build up a general technique to consequently register trust dependent on self-experience and the proposals of others. Besides, we apply our trust model to a few utility models to expand the exactness of dynamic in various settings of Web Services.

Fuzzy–Logic–Based Modules: The Fuzzy Trust Module settles on trust choices dependent on sources of info, for example, the client's record as a consumer and the cost of the merchandise. The Cost Evaluation Module takes the yield of Fuzzy Trust Module, just as other data, to assess the standardized combined expense of the exchanges. In view of the cost, the Parameter Tuning Module improves the presentation of the framework by changing the basic parameters of the Fuzzy Trust Module. With this new methodology, progressively reasonable trust choices can be reached.

Data Mining–Based: Data is just as important as one's capacity to get to it. There is an abundance of data about your aggravating practice held in The Compounder. The new Data Mining module encourages you open that data and present it in a manner that can assist you with developing your exacerbating practice proficiently and rapidly.

CONCLUSION

The trust model for overseeing setting aware Web administrations dependent on the Dependency Network. The proposed model can be fit for evaluating the administration trust, for example the chances of conveying a palatable assistance level, under setting conditions. To upgrade the expectation exactness, we utilized reliance connection among QoS measurements and setting factors. Utilizing a genuine dataset, we investigated new relations among them than the utilized by the best in class. Our outcomes exhibit the out-execution of the proposed approach contrasted with Bayesian Network-based trust model.

DN fundamentally beats BN by decreasing the learning time and improving the expectation exactness. It merits referencing these out-execution produces results in a huge scope setting. In future, we will broaden our model by considering more trust sources, for example, target trust. We scale the model to deal with circulated composite Web benefits in open powerful conditions where they face noxious clients notwithstanding setting factors.

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Hyperbaric Oxygen Therapy Using Electrolysis Process for Treatment of Medical Illness

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ABSTRACT

Hyperbaric oxygen therapy is a treatment for various clinical problems like curing of wounds, diabetic ulcers and other chronicle problems in humans. This Hyperbaric oxygen therapy is a treatment in which 100% of oxygen is supplied to the human body with increased atmospheric pressure. The pressure which oxygen is supplied is 2-3 times the normal atmospheric pressure. This therapy improves the natural healing system of the human body. The proposed project deals about controlling the pressure (250 – 280 kPa) inside the oxygen chamber where the patient is able to acquire the treatment of acquiring pure oxygen which helps in healing process. Here oxygen is produced from the electrolytic process, oxygen and hydrogen is separated from water using catalyst. The pressure and oxygen inside the chamber is monitored continuously and can be viewed in the doctors webpage. This system is widely used to cure many diseases and also this system is simple and safe to use.

KEY WORDS: ELECTROLYSIS, HYPERBARIC OXYGEN THERAPY, NATURAL HEALING, OXYGEN CHAMBER, MEDICAL ILLNESS.

INTRODUCTION

Hyperbaric Oxygen therapy has been delineated as a brand new application of associate older and a competent technology. British physician Nathaniel Hen Shaw was the primary person to use compressed gas chamber referred to as a domicillium to attain a Hyperbaric Oxygen therapy setting. The primary documented use of hyperbaric oxygen therapy occurred was in 1662. Once a British physician created associate airtight chamber referred to as a 'domicilium' during which the atmosphere may be compressed and decompressed exploitation gas bellows and values. Hyperbaric oxygen therapy is subjecting the entire human body inside the chamber supplied with 100% pure oxygen for a specific time and for various treatments. The chamber pressure should be more than the atmospheric pressure, the atmospheric pressure for clinical treatment inside the chamber should be1.4 atmospheres absolute. This treatment is useful in the treatment of diseases like healing wounds, diabetic foot ulcers and other diseases like sports injuries, cerebral palsy, brain and head injuries, dermatological conditions, stroke, and more.

MATERIAL AND METHOD

Proposed System: The proposed system is designed to supply a pure oxygen to the persons who are suffering from various diseases, also it provides natural healing for the body. The system consists of the oxygen chamber

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which is supplied with a 100% pure form of oxygen with the pressure. This system ensures the pressure inside the chamber is of the prescribed level. The normal atmospheric pressure level is 157mmHg and when it increased level within the chambers can range from 988mmHg to 1,824 mmHg 7. The patient can be exposed to the system number of times depending on the nature of the disease. The pressure inside the chamber is monitored continuously. This system eliminates the cause of oxygen poisoning in the chamber. This eradicates the risk of death of the patient inside the chamber. The pressure control inside the chamber also ensures the effective treatment of the patient. The system also helps the doctors to remotely control and monitor the patient's heart rate and the pressure and temperature inside the chamber. This system also monitors the temperature and heartbeat of the patient inside the chamber. Thus, the proposed system helps in eliminating the risk involved in the treatment.

Block Diagram

Figure 1: Block diagram of the proposed system
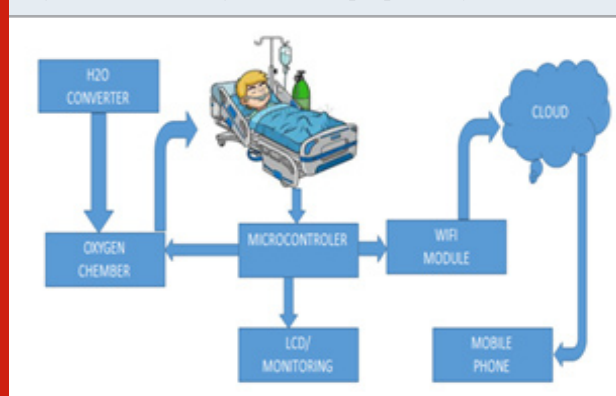
Figure I shows the block diagram of the proposed system is a hyperbaric oxygen therapy, which is employed for reinforcing the body's natural healing process. This helps in easy and better way of healing our body in natural way. The proposed system consists of chamber, micro-controller, Liquid display crystal, NODEMCU, pressure, temperature and heart beat sensor.

Figure 2: Electrolysis Proces
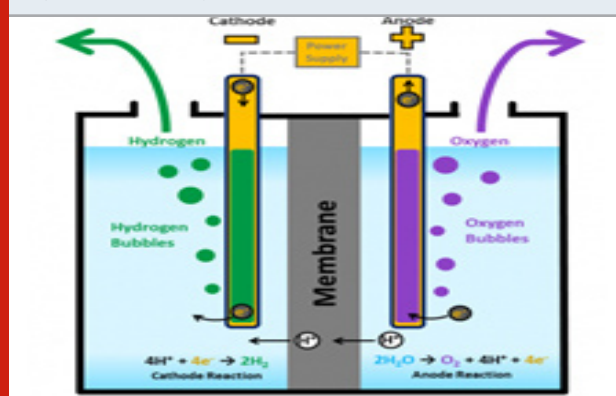
The patient to be treated is made to lie down or be seated inside the chamber, the patient's body temperature and heart beat rate is monitored using the temperature sensor and heart rate monitoring sensor. The oxygen separated from hydrogen by electrolysis process is supplied to the chamber, with the pressure from the air compressor. The microcontroller controls the pressure and oxygen level inside the chamber. the data's are displayed in the LCD monitor which is fixed on the system and also the data's are sent to the mobile phone of the doctor through the wifi module.

Electrolysis

Figure II shows the Electrolysis process of water. Electrolysis process is the decomposition of water(H_2O) in to hydrogen(H_2) and oxygen(O_2) from water. This electrolysis kit consists of stainless steel as electrodes and normal water as electrolyte in a container. When 12v DC supply is passed to electrodes, the negative electrode produces the hydrogen and the positive electrode produces the oxygen. The electrodes are covered with small Cases to obtain the separated gases. Naturally this process consumes more time. To reduce the time consumption Sodium hydroxide is added. It acts as a catalyst to speed up the process.

Arduino: Arduino is an electronic board which is used for the application of both the hardware and software. It has an ability to do the commands like reading inputs, switch on any device or send a message and switch on a motor or turn on a LED. In the proposed system Instructions are given to the micro-controller for controlling the pressure conditions, verifying and monitoring of the patient's condition. In the proposed system arduino is used to give command to the pump to start the electrolytic process which helps in separation of hydrogen and oxygen from water.

Air Compressor: Air compressor is a device which is used to convert the electric power into potential energy (i.e., pressure) to form compressed air. The oxygen therapy needs to maintain the higher pressure inside the oxygen chamber. In the proposed system the air compressor plays an important role in increasing the pressure of oxygen from the oxygen converter to 230 to 280psi (which is the pressure of oxygen needed inside the chamber).the pressure inside the chamber is continuously monitored by a pressure sensor which is kept inside the chamber.

Power Supply Unit: Power supply unit converts the AC power from the supply to low-voltage regulated DC power which is supplied for all the internal components of the circuit. powersupplies are classified in to manually operated which has switch for selection of input voltage, and other is automatically adapt to the supply voltage. The DC voltage is supplied to the pump, compressor and the Development board.

Liquid Crystal Display: Liquid crystal display (LCD) is the display system works with the solid and liquid states.

Liquid crystal displays have some applications like TVs, laptop computer screen, cell phones and video games.

Liquid Crystal Display is an electronic display. A 16x2 display is a basic module and is utilized in various applications. The display has two registers, they are, Command and knowledge. The command register registers the commands given to the digital display. A command is an instruction sent to digital display to perform a predefined operation like initializing, clearing, setting the position and dominant show etc. the information is displayed using information register. Thus, we have used the liquid crystal display for the conformation of the pressure inside the chamber is within the limit.

Oxygen Chamber: The Oxygen chamber used in the proposed system helps to carry the patient for treatment. It is fully enclosed with a lid which does not allow the atmospheric air into the chamber. The chamber is supplied with the 100% pure oxygen with increased pressure. The chamber is made of strong plastic material which is rigid. The oxygen from the electrolysis process is stored in a container and supplied to the chamber. The supplied oxygen and pressure inside the chamber is to be monitored continuously using sensors.

Node MCU: NODE MCU delivers highly integrated Wi-Fi SoC solution to meet the continuous demands for efficient power usage, compact design and reliable performance in the industry. In the proposed system we have used ESP8266EX module where it is connected to enable the doctors for verifying the patient's heart rate, pressure and temperature inside the chamber.

RESULTS AND DISCUSSION

Implementation: The prototype model of the proposed system has been developed and the model has an oxygen converter where the water is converted to oxygen. The oxygen is then supplied into the compressor through a tube. The compressor increases the pressure of oxygen rapidly. At a certain limit, the pressured oxygen inside the chamber is controlled by using the sensors. The ESP 8266 module is used for the access of the patient's heart rate, pressure and temperature inside the chamber by the doctors remotely. Thus, the pressure inside the chamber can be controlled and the patient's safety is ensured.

Figure 3: Prototype Model of Hyperbaric Oxygen Chamber
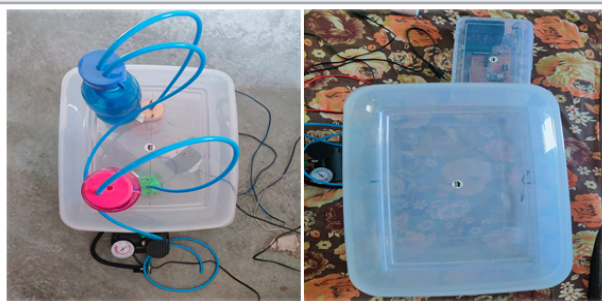
The above system of hyperbaric oxygen therapy is used to supply a pure form of oxygen to the chamber with the pressure 2-3 times higher than the atmospheric pressure.the pressure and temperature of the chamber is continuously monitored using the temperature and pressure sensor and is displayed in the LCD display of the chamber which is shown in Figure. the patient can be exposed to the chamber for a time specified by the physician, according to their illness.The chamber conditions are continuously sent to the doctors mobile through Wifi module.so that the treatment is made simple and safe.

Figure 4: Display of pressure and temperature

CONCLUSION

Thus, the above proposed hyperbaric oxygen therapy system would be useful for humans body's natural healing process. A long term care can be made by using the proposed system. This system also limits the pressure inside the chamber to an extent where the patient is free from oxygen poisoning. Therefore, the proposed system ensures the patient's safety and cures the diseases fast.

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A State of Art in Designing Autonomous Unmanned Aerial Vehicle (UAV) for Post Disaster Management

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ABSTRACT

In recent years, the world is facing many natural calamities owing to nature and human-made disasters such as floods, earthquakes, tsunami, gas leaks, chemical explosions, etc. As a result, it's hard to risk the lives of others while saving victims due to unstable infrastructure. Post-disaster management deals with saving the lives of victims of disasters. Our proposed work is to design and develop an Unmanned Aerial Vehicle (UAV) with autonomous behavior, on-site image processing, dynamic path planning, and obstacle detection and avoidance using near field communication (NFC). Dynamic path planning is used for getting into indistinct areas where there is debris all over the place, allowing the UAV to maneuver and escape debris falls. The detection of the alive and dead is done using a thermal image sensor. Two-way communication between the off-site console and the UAV is carried out using near field communication such as nRF24L01. Autonomous behavior not only controls the UAV but also quickly analyses the disaster site and transfers the processed image information to the off-site console using NFC without any human intervention. In the proposed system on-site processing is more accurate, transferring the data without any loss in a prioritized manner.

KEY WORDS: UAV, DYNAMIC PATH PLANNING, ONBOARD IMAGE PROCESSING, NFC, ESCAPE PLANNING.

INTRODUCTION

The construction of UAVs during World War II, the American Air Force used small remote-controlled planes to spy on the Nazi German troops with the capability to return. Then, with the improvement in the electrical field during the 60s and 70s, the American Air Force Engineers developed UAVs with a better electric system managing medium-range flying without pilots to observe enemies moving faster and with high precision. Later,

between the 1980s and 1990s, the usage of sophisticated computers, high-resolution digital cameras, advanced electronic controlling systems, etc., improvised the UAV's development. Finally, from 2000 to 2017, the UAVs system performance has grown geometrically in quality and quantity. These UAVs are being used in various fields, from military to private use by consumers around the world by Estrada et,al (2019).

UAVs play a crucial role in post-disaster management missions. When a disaster hits an area, it is dangerous to send in the responders first, as it puts their own lives under risk to save the victims. This is because nobody knows about the exact situation in the disaster-struck area due to improper or lack of communication. In such circumstances, drones are very much useful for disaster response and humanitarian relief aid. But most of them

require a human host to fly the UAV using a remote control.

This has led to crashes and limits on how promptly rescuers could get a view of the entire affected area, which delays the aid from reaching the victim on time, or possibly they may leave out some victims. Another drawback of the existing UAVs is that they process the data in the off-site console, which may encounter data loss problems during communication. Indoor navigation is yet another challenging task for the existing drones. To overcome all these shortcomings, we have proposed to develop an autonomous UAV that analyzes different parameters to attain maximum accuracy in asset detection, communication, and dynamic path planning that could nullify the limitations of the existing models.

Table 1. Performance of the proposed design	
Earlier UAV Designs	**Proposed UAV design**
The UAVs are mostly remote controlled. Detect and avoid only static obstacles. Path planning is based on reconstructed 3D maps using sparse 3D or Dense 3D techniques.	The proposed UAV can fly autonomously. Detect and avoid both static and dynamic obstacles. Path planning is based on a dynamic path planning algorithm with information from Pi camera and ultrasonic rangefinder.
Require additional storage capacity and computation power. Assets are detected using Histogram of Gradients classifiers & OpenCV contour tracing function, etc.,which are not accurate.	No need for additional storage capacity and less computation power. Assets are detected using OpenCV and Deep learning that is more accurate.
Most UAVs perform slow, off-site processing of the data acquired from the disaster zones. Most UAVs encounter data loss problems.	Proposed UAV does faster, on-site processing of data acquired from disaster zones. There is no data loss problems also data is prioritized and sent to off-site console.
Communication through wireless sensor networks, public safety networks, LDMAC protocols, etc..	Communication done using Cognitive Radio rely on any infrastructure, thus making it robust, inter-operable, reliable and avoids data traffic.

The novelty of the proposed UAV take decisions to maneuver on itself without any remote controller, GPS, an external slave microcontroller such as PX4, NAVIO, MULTIWII, Arduino etc. An Open CV model with a neural network with custom dataset for detection of

parameters such as person, doors, windows, pathways etc. The model will run on raspberry pi alongside general UAV functional program. The PID for stabilization of the UAV will be manually prepared to adapt different disaster zone environments. The path planning algorithm for the UAV will be working on indoor navigation as most of the damaged infrastructures which cannot be reached are indoor areas.

MATERIAL AND METHOD

Design of Unmanned Aerial Vehicle: The earlier design models of UAVs for disaster zone surveillance from top view using GPS navigation and controlled by the user in the ground control station. System supports surveillance of disaster zones from the top view, but there is no indoor searching, which is a drawback, as people may get stuck inside or under debris and cannot be seen from the top view. Processing of the data is done at the console side, which may lead to data loss from on-site UAV. Important images captured should be processed then and there, so that while sending it to the console, it will have high priority. A swarm that is controlled using a single Host can be of E-waste when each of it sacrifices on saving things.

The network topology may subject to change based on different situations under different zones. If one is critical, there may be a huge change in the planning of their management. Managing altogether requires high computing power and data recording devices. Also requires maps to navigate through the zone, which sometimes may not be accurate when GPS does not work in the zone because of tower failures. In such situations, there might not be an efficient transfer of data in some specified ranges.

Support for different conditional hazards is also required to be modified to satisfy the needs of every situation. The path planning with an analysis of a different kind of data is needed to work accurately in all situations. The existing system does not improvise a pathway for the rescuers to safely enter the debris and rescue the lives.

Manually controlled UAV may crash due to human mistakes or unknown environmental behaviors like debris fall from rooftops, which the human controller may not be able to notice. Therefore, the UAV should be able to analyze the surroundings and have to maneuver based on the data analyzed. Manual control does not support analyze and move strategy as the user only knows what he/she sees directly and does not know what he/she might have behind. The remote control needs to be in contact with the UAV, and when it's not, the UAV may get crashed. If provided with a set of constraints such as different environmental impacts on fire, underwater, under debris, users may not subject to categorize things. Sometimes the mistakes of the users will lead to danger for another life, as it may crash directly on a human and cause damages or saying in another way, during the maneuver users can mistakenly bring a debris fall and block passages. It is very hard to control the UAV

in indoor areas without crashing as it requires highly qualified skills.

The proposed UAV design have the following objectives:

Dynamic path planning using multiple parameters to meet maximum accuracy in maneuver and escape from obstacles and reach the asset in any situation.

Obstacle avoidance and escape planning using image data and range data finding obstacles in real-time.

Analyze the thermal images to find the body temperature of the life form and decide the status.

Standardized communication using NFC device nRF24L01 and CRN

RESULTS AND DISCUSSION

Proposed House Fly Autonomous UAV Architecture: The proposed model illustrated in Fig. 1 consists of the quad copter with sensors, 64-bit quad-core Cortex – A72 processor, nRF24L01 transceiver in it, and the off-site console. It analyzes different parameters for attaining maximum accuracy in dynamic path planning. It consists of several sensors, a microcontroller, and a communication device that can transfer data at a speed of 2Mbps using ISM band of 2.5 GHz. It does not need any GSM or GPS to work on as it may sometimes not function in the disaster-prone zone due to the lack of proper tower working. The microcontroller uses a 2GB RAM for quicker processing, hand in hand analyzing different data in parallel, i.e., processing images of the zone site, and also the on-site processing involves image recognition using computer vision where two types of images namely, normal camera image and thermal image are being processed.

The Pi camera image can be used at night using the night vision, and the thermal camera is used to capture temperature data of substances or lives. Both types of images are necessary for use in different situations as the disaster zone can have many types of environments like submerged, dark, set ablaze, etc. The UAV uses a gyroscope with an accelerometer (MPU6050), which is used to stabilize the UAV when stuck by an external force. The accelerometer is used to maintain the speed in congested areas. To detect range between an obstacle and the UAV, an ultrasonic range finder with a range of 100 meters is used. This range varies from time to time, and a quicker variation depicts that the UAV is going to be in interference with an obstacle. The path planning method involves escape planning to escape from the obstacle interference.

This sensor is also used to find the depth of indistinct zones, which cannot be seen by the camera. The communication device used can have two-way communication when necessary, like sending backup commands from the console. The off-site console is used

for image streaming, which can also be seen as a video. It gives information about human lives if detected and gives an alert. Status of the UAV and assets are sent as quickly as possible without a loss in the image.

Figure 1: Housefly Autonomous UAV Architecture
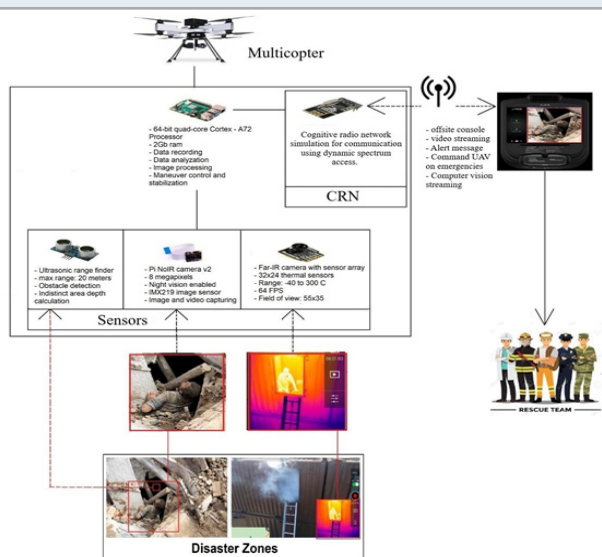
The workflow and the functioning of the UAV in the disaster zone. We deploy the UAV initialized with the area coverage at the disaster affected zone. Then the UAV finds a suitable path to enter into the zone and analyzes it to find obstacles or assets. If an asset (human being or animal) is found, then the rescue team is informed about its status or in case, if an obstacle is detected, then the UAV avoids dashing on it using obstacle avoidance and escape planning. If no asset is detected, then the UAV keeps analyzing the environment. The coverage area status is checked by the UAV during its flight. If fully covered, the UAV returns to the rescue team and lands, else continues its flight and analyzes the environment until the area is completely covered.

Figure 2: Functional diagram
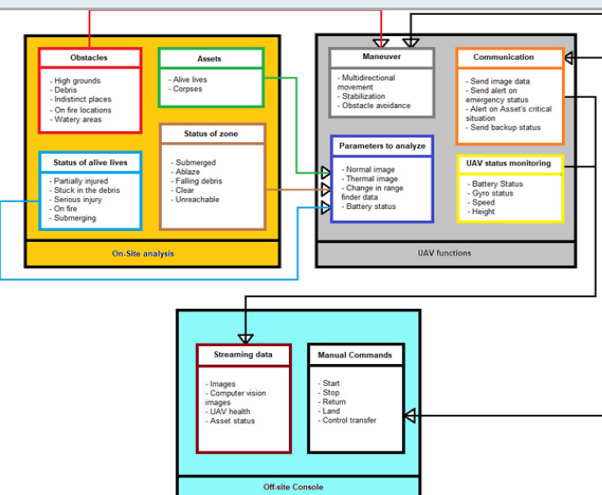
The functional diagram in figure 2 depicts the functions of UAV, explaining all the aspects of each space to be analyzed and monitored. It is categorized into three sections that include on-site analysis, UAV functions, and off-site Console.

On-site analysis incorporates obstacle detection, the status of lives, and the status of zones and assets. The site contains obstacles of different types, like improper grounds, debris, flooded areas, indistinct places, and places set ablaze. Each needs a different path planning or a different view of analysis. So, the system identifies the type of obstacle, using the image analysis which it has processed. The assets are to be analyzed as top priorities and informed to the rescue team. A corpse is too considered as an asset as the temperature is not the only factor by which we can say about the condition of a life form. Sometimes the cold body also needs to be taken care of quickly. Status of assets is a parameter of the life form. Status of the assets is a parameter of the life form. Each situation can be identified using the computer vision, and the image data is sent to the console in the hands of the rescue team. The alert messages what kind of situation the asset is facing at present. While sometimes, one cannot see what a person is going through with a single image. The status of the zone decides what to use there and what not to use. For instance, normal imaging in a flooded area underwater cannot do search and rescue. But using a thermal camera sensor, we can identify temperatures underwater. These kinds of situations are analyzed in the proposed system for greater efficiency.

The UAV functions include maneuver, communication status monitoring, and parameters to analyze. The maneuver is based on obstacle and asset detection, it is like, away from the obstacle and close to the asset, a general sense of autonomous behavior. Different parameters are analyzed for greater accuracy of the autonomous behavior. The communication from UAV to console and console to UAV is made standard as tower failures lead to back off for the rescue teams. Data packets to be sent are of high priority, each image consisting of some important things to be noticed by the rescue team. The different parameters analyzed by the UAV subject to be a part of the overall plan in movement, as movement is the basic necessity. Each parameter is analyzed in parallel so that the movement due to one parameter does not affect another parameter. The status of the UAV is also sent to the console using the communication device. Self-monitoring of the UAV is also a part of the overall plan. The UAV should make backups before it gets its life done.

The off-site console consists of image streaming capability and manual controls to get backup of the drone. The console is used to define the area in square meters for searching, and commands given can be changed. There will be no processing in the off-site console as the image streaming should be faster, thus not using the memory for processing again.

CONCLUSION

Post-disaster management involves risking lives to save others by getting into debris areas for searching. Some main issues of existing systems are flight crash due to the human controller, improper analysis of the environment in manual control, there is no dynamic path planning in existing systems. By analyzing the current state of the art in the existing applications of UAV in the domain of disaster management, we aim at envisioning the future system that will tackle the identified issues and challenges and thus push the state of the art one step forward in the definition of a complete disaster management system.

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A Novel Approach for Boundary Line Detection using IOT During Tennis Matches

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ABSTRACT

Tennis is an interesting game, where it tests the durability, skill, and endurance of the player globally, there are huge fan followers for this lovely game. During the match, fans are greatly involved and they feel that they play in the field. Since we are being die-hard fans of the tennis game we propose a novel approach for a few of the recurring problems. In this paper, we propose an idea to detect the balls landed on the boundary line during the match instantly. Our primary motto is of Boundary Line Detection with a great deal of accuracy instantly. There are a lot of ways to carry out boundary analysis, by viewing the post-match videos and audio to detect the player movement and performance of the players which involves a consistent time delay in calculating points. There are approaches where the detection of player's movement and patterns are noticed in the recorded video to create games in the play station or Xbox games. Virtual Gaming is being one of the emerging areas where lots of innovations and reality are brought in to the games such that it resembles the live game by inducing all the tricks followed by a natural player. In the existing approach live detection is not carried out, so the proposed approach will be an added advantage to the players globally to reduce the efforts by excluding the challenges made by the opponent players.

KEY WORDS: BOUNDARY LINE DETECTION, NOVEL APPROACH, VIRTUAL GAMING AND LIVE DETECTION.

INTRODUCTION

Sports are one of the energetic and dynamic events, though if we are watching the match either in live television broadcasting or in person during the match.

So any game will hike the heartbeat of fans irrespective of the watching medium. Tennis is being one of the nail-biting games that have billions of fans across the globe. There prevails extensive research work that is carried out in the motto of analyzing or criticizing the skill set, endurance and performance level of the players. One of the great advancements in this era is that video can be precisely recorded irrespective of weather conditions. This helps to mold the players by watching the recorded match videos and correcting them by avoiding such activities in the forthcoming matches. This also helps the physiotherapists or sports coach to correct the players'

movement during the match to avoid injuries. So this clear evidence states that recorded video is a great boon to any sportsmen. In this paper, a novel approach is proposed to detect the boundary line during the match instantly. The following general guidelines were carried out during the tennis match

1. The player must hit the ball only within the defined boundaries of the Tennis court to score points.
2. The player should not the touch or cross the net that divides the tennis court boundaries between two or more players.
3. The players should carry the ball using the Tennis Racquet.
4. The players should not hit the ball twice using their racquet.
5. The player has to wait till the ball is returned by the opponent player who is standing next to the net.
6. If the ball touches the player it leads to a penalty.
7. Ball on the line of the boundary line, the score is given in favor of the player.
8. When a player begins by serving using the Tennis Racquet, it must reach the opposite end player with one bounce.
9. Any form of verbal abuse or gesture will lead to a penalty.
10. The player should not leave the Tennis Racquet intentionally during the run of the game.

Figure 1: Boundary Line Measurement of Tennis Court
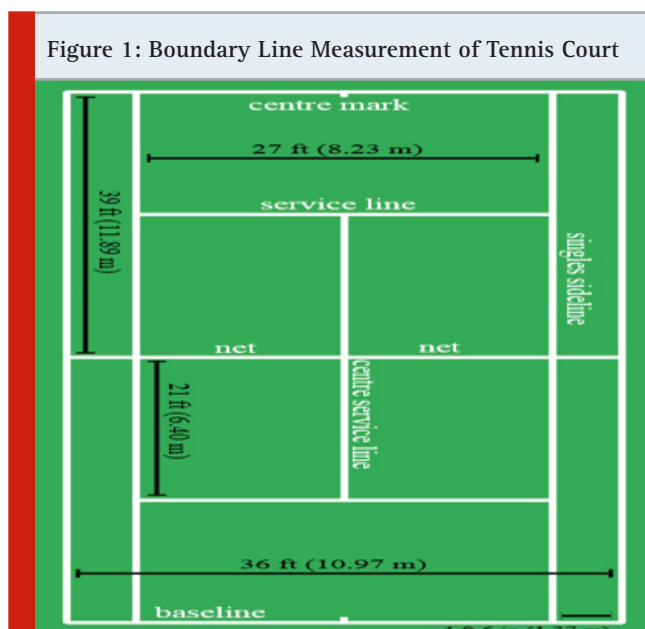
The events that will occur during the Tennis match are
• The players serve initially during the start of the match
• The player may serve during the first time or in the second time or if it is let the condition
• ACE being a legal serve which should not be touched by the opponent

• The player may serve an ACE which is difficult for the opponent player to return the ball
• There will be a rally if the player returns the ball until any one of the players fails to return the ball
• The player approaches the net to play smash during the run of the match

One of the researchers has proposed transaction pattern matching techniques to detect the particular frames or sequence of frames from the recorded video to monitor the rally shots played by the players; it also helps in replay sequence much (Kijak et al., 2006). (Kolonias et al,. 2004) and his team proposed a general architecture to illustrate the progression of Tennis match; however, the results are not fruitful in the existing methodology. There is an extensive research work carried out in (Rea et al,. 2005; Ekin et al,. 2003) to detect the player movement in geographical space, but it also went in the vein where it reflected only the image of the players that cannot be utilized completely to detect the event detection. The player movement and court complete view is detected using DCR (Ekin et al,. 2003) which is used to extract the shots played all over the court. In (Farin et al,. 2005) it uses a technique to detect the line detection and court position in video frames.

In this paper, we propose a technique to detect the boundary line during the match, in order to give an on-court decision by the referee, rather than going for a video referral. In the game of Tennis usually, when a shot is played then players challenge the referee if the ball is on the scoring line or not. A novel approach is proposed to detect the boundary line of the ball in order to reduce the physical strain of the player.

MATERIAL AND METHOD

Performance of Boundary line Detection: The player challenges the referee if there is a suspect in the mind of the player during the match, the challenge can be made by the player to ensure whether the ball touches the lines or not. If a challenge call is made by the player then it is reviewed by watching the video and the decision is given by the referee. If such challenging calls are made frequently then it tests the player's mental endurance, physical fitness and more importantly it also declines the morality. The Tennis serve and rally shots played by the player using the Tennis Racquet are of great speed which sometimes cannot be visualized by the naked eye especially in the case of boundary line detection. If the player misses the scene of watching the ball touching the boundary line and the same is missed by the referee then the score is given to the opponent player, unfortunately. At times these mistakes are being detected only after completion of the match.

The speed generated by the Tennis player using the Racquet depends mainly on the skillset and fitness of the player, some of the famous Tennis player named Gonzales, Soderling, Del Potro, Federer, Djokovic, Pete Sampras, Andy Murray generates lots of speed during the

match. The speed is enormous when the players serve at a speed of 130 mph to 140 mph, but if the player is very tall then the serve speed can hike up to 150 mph. The forehand shots range from 70 mph to 90 mph, forehand is much stronger than backhand and need to consider the backhand. The rally shots played by the players during the match will range from 65 mph to 80 mph, so when a player generates a large amount of speed during the match depends on players' endurance, skillset and adrenal pumping level during the match.

In this paper, we create a prototype to identify whether the ball is on the boundary line or not instantly, earlier there was an umpire appointed to watch and call whether the ball is on the boundary or not, but this created lots of disputes among the players as result this was retained back and Hawkeye technology was introduced. Hawkeye technology is an established and proven technology in the game of Cricket. In this game, the player can challenge for a Leg Before Wicket (LBW) if the umpire decision is not satisfactory. In the same way in the game of Tennis the player can challenge the ball has touched the boundary line or not, since the ball is traveling at high velocity, it remains tough for a referee to judge accurately.

RESULTS AND DISCUSSION

The real challenge is that the total number of times a Tennis player can suspect about boundary line during the match is limited. A player can challenge line umpire call as long as his/her challenge right. The player can challenge the boundary line only three times, if the call goes wrong and more importantly one additional challenge is given during the tie-breaker of the game. This process is carried out during the match set. The leftover calls are not carried forward to the next set. Consider a condition in which scores are tied at 6 each, in this scenario each player can challenge three boundary line calls. If the game continues and reaches 12 games then extra three boundary line call challenges are allowed at both the ends.

Figure 2: Block diagram of Boundary line detection
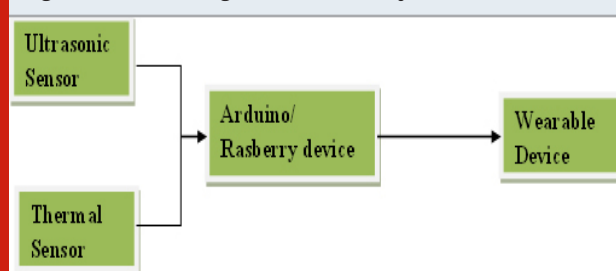
Suppose if the challenge is quite a number then the above process can drain the player's potential and also their physical strength during the match. Our novel approach is to detect the 67 mm diameter Tennis ball is on the boundary line or not. The ultrasonic sensor and thermal sensor are placed every two feet throughout the boundary line to detect whether the Tennis ball is

hitting the line or not. All the sensors are connected by the Internet of Things (IOT), either Arduino or Rasberry are used depending on the context. The data collected through the sensors are processed instantly and fed on to the wearable device, which will be used by the umpire. In addition, this can be provided to the players in the embedded wearable device. In detecting whether the ball is hitting the boundary line or not then the points can be given accordingly to the players. This allows the player to concentrate more on the game rather than concentrating on the boundary line, thereby increasing the concentration in the game resulting in tremendous efficiency.

Figure 3
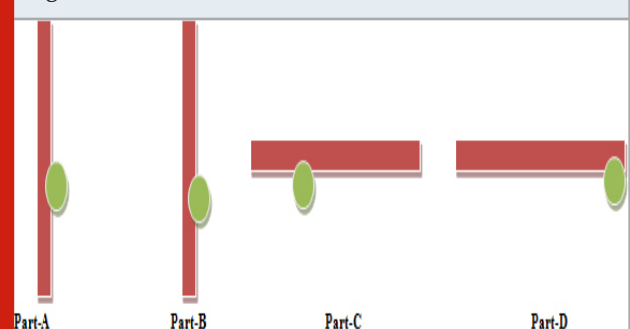
These are some of the common possibilities of the ball hitting the boundary line in the vertical line or horizontal line. It is very difficult if the player concentrates on the line rather than the match; if the sensors work properly then it is taken care by the devices more accurately to gain the points in order to win the match. The Tennis ball is captured using the ultrasonic sensor and for more exact results thermal sensors are used to detect the ball hitting the line and creating an impact sensor, this is captured using the thermal sensors. This reduces the delay during the call made by the player during the run of the match, if done then the challenge umpire review the call using the recorded audio to replay and produce exact results, this is carried out offline where it disturbs the match, ability and more over the flow of the player is greatly reduced. So taking all this in to consideration the decision is made instantly once the data from the device rings or alerts in the wearable sensor device.

CONCLUSION

Tennis is an interesting sport that is played in several hundred countries that involves precise steps in calculating the points. This proposed paper focuses on a novel approach to detect the ball hitting the boundary line without making a challenge call to the referee. There are approaches where audio and visual things are both embedded to obtain exact results, but these results are still offline and no on line results are still available. So our approach can be used extensively in trial and error basis on local matches to improve the results of the device before getting into the international stage. Our approach is carried out in a standard environment and will be extended in future under different weather conditions

such as hot summer, spring and even during wet times of the court because the Tennis game is not played during rain, so once the rain stops the court becomes wet so we have to check the durability and accuracy of the device for better exact results.

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Detection of Microaneurysms Using Automatic Mass Screening and Diagnosis Model

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ABSTRACT

Micro aneurysms(MAs) is one of the main symptom of Diabetic Retinopathy. Diabetic Retinopathy (DR) can be diagnosed by earlier detection of Micro aneurysms(MAs) so the blindness can be prevented. A powerful technique is proposed for micro aneurysms screening in retinal fundus images. In the earlier stage of proposed method, the features of the retinal images are extracted using edge detection. Later, the features based on vessels along with shape and intensities are also extracted. At last, the extracted features are collectively stored as the data for different candidates. The multi SVM classifier is trained by loading the data. The test image is fed into the multi SVM classifier which can able to classify the given test image among the two classes to which class does the test image belongs to. This method achieves accuracy and sensitivity of about 97% and 97.95% respectively.

KEY WORDS: DIABETIC RETINOPATHY(DR), RETINAL FUNDUS IMAGES, MICRO ANEURYSMS, EDGE DETECTION, MULTI SVM CLASSIFIER.

INTRODUCTION

Diabetic Retinopathy(DR) is the crucial disease caused among people with diabetics when the blood sugar level increases. It causes the leakage of blood and swelling of blood vessels which is known as microaneurysms(MAs). MAs appear as tiny, reddish isolated dots near tiny blood vessels in fundus images. Detection of Microaneurysms(MAs) is one of the important strategies for diagnosis of Diabetic Retinopathy(DR) and

prevent blindness in early stage which is cost-effective health care practice. Due to lack of ophthalmologists and enormous number of people with the eye problem, an automated diagnosis tool can improve the efficiency and reduce the cost in large-scale screening setting. Some methods are available in detection of Microaneurysms (MAs). Some methodologies for the detection of MAs have been proposed, most of which were performed in two stages.

- In the first stage, several candidates with similar characteristics to MAs are extracted.
- In the second stage, a set of features is obtained for each candidate and a classification technique is applied for the discrimination of MAs from non-MA candidates.

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In proposed method, a hybrid approach for the candidate extraction which is a combination of mathematical morphology techniques and a pixel classification method. The true MAs are then detected using a k-Nearest Neighbors (kNN) classifier and a set of shape and intensity features. For the extraction of initial candidates, a modified doublering filter in which the average pixel intensity value of the inner ring is compared with that of the outer ring, then the candidates are re-examined by removal of blood vessels. The candidates were classified using a three-layered feed-forward neural network.

The performance of the proposed method on the e-ophtha-MA datasets shows the effective results. Moreover, the evaluation results on five public datasets demonstrate that the proposed MAs detection method is insensitive to the characteristics of the imaging device, image resolution and image modality.

MATERIAL AND METHOD

Literature Survey: Microaneurysms Detection is one of the most important causes for blindness. Automated identification of Microaneurysms (MA) can be of immense help to the Ophthalmologists and the society. The existing approaches towards Microaneurysms (MA) diagnosis is concisely presented here. Generally, the process of Microaneurysms (MA) detection involves the extraction of optic disc and cup followed by elicitation of its properties such as ISNT ratio and cup to disc ratio to differentiate normal images from Microaneurysms (MA) affected images. Some of the approaches are briefed here. Microaneurysms (Acharya et al., 2011) is due to improvement of something in Intraocular Pressure, which is the fluid pressure inside the eye. It results in the larger size of cup disc. It affects the properties based on texture and intensities. They proposed new techniques to differentiate images as Microaneurysms (MA) or non-Microaneurysms (MA). In the first step the fundus images are preprocessed to remove noise. Then, the features based on High order spectral (HOS) and texture are extracted to identify Microaneurysms (MA). Many classifiers were used to classify the images as Microaneurysms or non-microaneurysms includes Naïve Bayes, Support vector machine (SVM), sequential minimal optimization (SMO) and Random Forest. By the usage of Random Forest classifier they obtained 91% accuracy.

In sparse dissimilarity-constrained coding (SDC) method (Cheng et al., 2015), they consider the results of the segmented optic discs with the known Cup Disc Ratio (CDR). These results were used later. Another new algorithm (Damon et al., 2012)which detects the optic cup that is based on the curves of the vessels. In the first step, they computed the wavelets of edges of green red channel and also the gradient of green channel. Then, the fused image is formed which is used for extracting features like standard deviation and mean. These extracted features were used to identify the vessels using several patches of interest. By localizing maximum curvature of the identified blood vessels, the vessel curve is detected. Using this algorithm 67 images were valuated. It also reduced 43.3% errors in detection of cup disc. Another framework (Geetha Ramani et al., 2014) based on image features to identify Microaneurysms (MA). The methodology included Conversion to various color spaces, statistical, channel extraction, histogram, GLCM based feature extraction and classification through Grafted C4.5 yielding an accuracy of 86.67% on HRF images with 3 fold cross validation. In diverse image processing techniques (Imran Qureshi 2016) as well as different computer based systems concerned mainly in the detection and diagnosis of Microaneurysms (MA) and to highlight the sternness of Microaneurysms (MA) across the globe.

To expresses small effort regarding detection of Microaneurysms (MA) disease. As per (Khalil et al.,2014), their techniques provide an analysis on various machine learning techniques review on machine learning techniques intensionly. From these techniques we were able to identify approximately 85% of microaneurysms cases. Another approach attempt to detect Microaneurysms (MA)through Cup to disc ratio,texture and intensity based features (Salem et al., 2017).The predictions from combination of texture and intensity features and cup to disc ratio are interrelated to classify the image as Microaneurysms (MA), suspect or non-Microaneurysms (n-MA). The act of the system reached a sensitivity and specificity of 90% and 87% respectively. A single matrix formed by computing GLCM (Simonthomas et al., 2014) for the four directions. From the composed single matrix Haralick texture features were calculated.

At last, the fundus images were classified using K nearest neighbor (KNN) classifier. An local dataset with 60 images were valuated and provides an accuracy of about 94%. One more approach (Vijapur et al., 2014) is through data driven workflow for detection of Microaneurysms (MA) through extraction of energy descriptors from exhaustive co-efficient images obtained through application of symlets, daubechies and bio-orthogonal wavelet filters and calculation of cup to disc ratio feature through optic disc attained through disc prediction and cup through watershed segmentation attaining a detection accurateness of 95% on images. In Adaptive Histogram equalization technique is used for preprocessing the image. Then Edge detection is used to extract the features and the SVM is trained by the data values obtained from the features extracted. SVM algorithm helps to classify the test image from the two separated classes.

A. Preprocessing: Preprocessing an image is used to reduce the noise, to reconstruct an image, to perform morphological operations and to convert the image to binary/grayscale so that operations can be easily implemented on the image. The preprocessed image is shown in Figure.1

B. Adaptive histogram equalization: Adaptive histogram equalization (AHE) is used to improve image contrast. AHE is totally varies from the general histogram equalization.

This method calculates each histograms corresponding to different region of the given image which helps in evaluating lightness values of the image. It provides the better contrast to the image and also enhance the edges of the different regions of the image. It improves the image by transforming each pixel with a transformation function derived from a neighborhood region. Pixels near the image boundary are treated specially, because their neighborhood would not lie completely within the image. It can be solved by extending the image by mirroring pixel lines and columns with respect to the image boundary. The figure 2 represents the image with adaptive histogram equalization.

Figure 1: Preprocessing
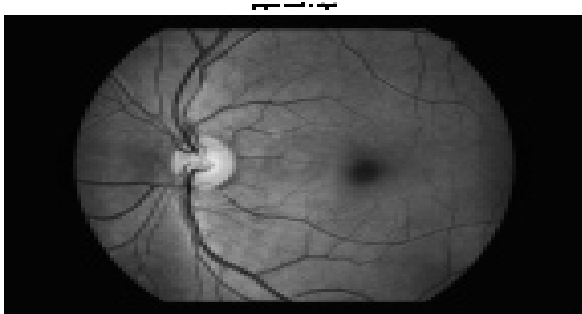
Figure 2: Adaptive Histogram Equalization image

C. Binarization: Image binarization is the process of taking a grayscale image and converting it to black and white, essentially reducing the information contained within the image from 256 shades of gray to 2:black and white, a binary image. This is sometimes known as image thresholding, although thresholding may produce image with more than 2 levels of gray .It is a form or segmentation to extract an object from an image.The process of binarization works by finding threshold value in the histogram- a value divides the histogram into two parts,each representing one of two objects either is a object or a background.It is called Global thresholding. The thresholding algorithm works by using informations in the form of statistical such as mean,median,entropy and in the form of shape characteristics of the histogram. The binary image is shown in Figure 3

D. Vessels Extraction: Retinal vessel analysis is a non invasive method to examine all the small arteries and veins which allows to draw conclusion about the morphology and the function of small vessels. Here the image is matched with retinal mask which is drived from Retina drive. The process is done by reconstructing an image using dilation and erosion.Then the accuracy and precision for the vessel extraction is calculated. Figure 4 shows the vessel extracted image.

Figure 3: Binary Image
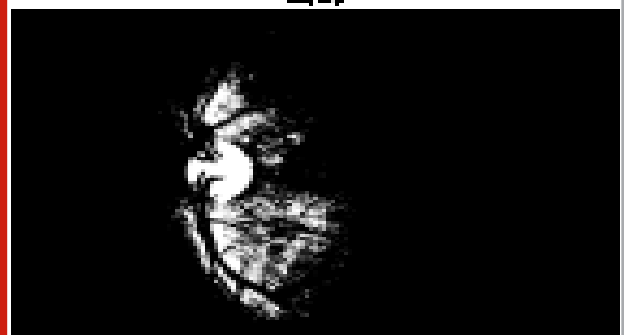
Figure 4: Vessel Extraction

E. Support Vector Machine algorithm: In machine learning, support-vector machines are supervised learning models with associated learning algorithms that analyze data used for classification and regression analysis. Given a set of training examples, each marked as belonging to one or the other of two categories, an SVM training algorithm builds a model that assigns new examples to one category or the other, making it a non- probabilistic binary linear classifier. An SVM model is a representation of the examples as points in space, mapped so that the examples of the separate categories are divided by a clear gap that is as wide as possible. New examples are then mapped into that same space and predicted to belong to a category based on the side of the gap on which they fall. In addition to performing linear classification, SVMs can efficiently perform a non-linear classification using what is called the kernel trick, implicitly mapping their inputs into high-dimensional feature spaces.

Figure 5: Block Diagram for the proposed Microaneurysms (MA) detection method

Figure. 8 indicates the image which is the output of the Histogram analysis ,which refers to a histogram of the pixel intensity values .It also shows the number of pixels in the given image.

Figure 6: Input Image

Figure 7: Preprocessed Image

When data are unlabeled, supervised learning is not possible, and an unsupervised learning approach is required, which attempts to find natural clustering of the data to groups, and then map new data to these formed groups. Classifying data is a common task in machine learning. Some of the given data points each belongs to one of two classes and the goal is to decide which class a new data point will be in. in support vector machine, a data point is viewed as p-dimensional vector and it can be separated using (p-1) dimensional hyperplane. This is called linear classifier .There are many hyperplanes that classify the data. One reasonable choice as the best hyperplane is the one that represents the largest separation or margin between two classes. It is known as maximum margin hyperplane. A good separation is achieved by the hyperplane that has the largest distance to the nearest training data of any class. Since in general the larger the margin distance the lower the generalization error of the classifier.

The above represented Figure.9 shows the binary image of the preprocessed image. This is the digital image that has only two possible values (Black-0 and White-1) for each pixel. From this an optimal threshold value is chosen for each image area.

RESULTS AND DISCUSSION

Validation and Experimental Results

A.Simulated Outputs: Figure.6 shows the Retinal input image for testing the features and detecting the presence of Micro Aneurysms in the given input image.

The below Figure.7 shows the preprocessed image of the given input image. This process improved data of the image that suppresses unwanted distortion and enhanced the features for further processing.

Figure 8: Histogram Analysed Image
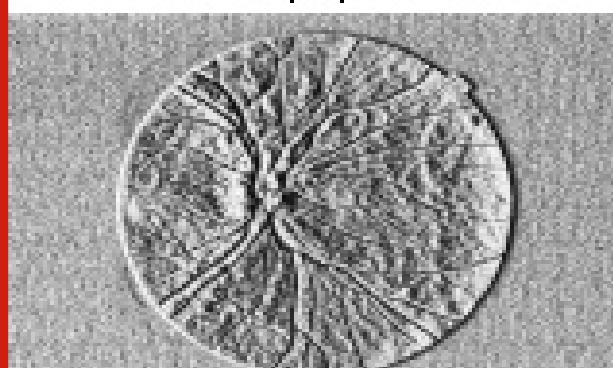
Figure 9: Binary Image
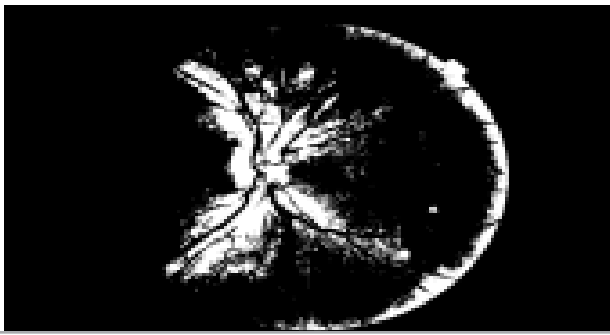
The SVM classifier that separates two classes (i.e.) affected region and normal region. The blue arrow represents the weight vector to determine the features of the trained data sets. The red middle line is the hyperplane separating the two classes. The hyperplane is choosen based on the maximum separating margin. The weight vectors can be modified by dragging or entering in the table for analyzing features of the test image with trained features. The compared values are calculated and displayed. The error rate determines the accuracy of the classifier. E-optha is a database of color fundus images designed for Diabetic Retinopathy (DR). It consists of two different types of files for exudates and microaneurysms. It is manually annotated database.

Table 1. Result Analysis

ALGORITHM	ACCURACY	SENSITIVITY	SPECIFICITY
SVM	97%	97.95%	96.07%
PRECEPTRON	96.2%	95%	95.13%

Database of images with micro aneurysms. It contains 148 images with micro aneurysms or small hemorrhage and 233 images with no lesion. Table.1 represents the analysis of the results. The accuracy, sensitivity and specificity are calculated for the 50 test using the following ,

Sensitivity = TP/ (TP+FN)
Specificity = TN/ (TN+FP)
Accuracy   = (TN+TP)/ (TN+TP+FN+FP)

CONCLUSION

Early detection and treatment of these diseases are crucial to avoid preventable vision loss. In the traditional way of diagnosis, the ophthalmologists will examine retinal images, look for possible anomalies and give the diagnostic results. The automatic processing and analysis of retinal images could save workloads and may give objective detection to the ophthalmologists. Feature extraction, which is the fundamental step in an automated analyzing system, is investigated in this paper. Efforts have been made to extract the normal and abnormal structures in retinal images automatically and robustly. Applying computer image processing techniques to the analysis of color retinal image was reported as SVM and MLP model. Developing automatic retinal image analyzing and diagnostic system has attracted the interests of many researchers since then. It may be differs easily mainly due to the noises, uneven illumination, and variation between individuals. Accuracy and Sensitivity achieved are 97 % and 97.95% respectively.

Future Enhancement: In this system, different techniques of MAs recognition are reviewed on the basis of feature extraction. For future enhancement, the grouping or clustering of the images can be performed based on affected and normal images. Segmentation can be performed and features can be extracted using canning edge detection. It provides easier and effective way to classify different features of the images.

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A Comprehensive Review on the Applications of Neutrosophic Sets and Logic

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ABSTRACT

Neutrosophic Set and Logic is a general framework for unification of many existing logics. In Neutrosophic Set, indeterminacy is quantified explicitly and truth-membership, indeterminacy-membership and falsity-membership are independent. The Neutrosophic Set is a powerful general formal framework that has been recently proposed. There exists a lot of applications in all fields such as in information technology , information system and decision support system for example, relational database systems, semantic web services, financial data set detection, new economy's growth, decline analysis and etc... These notion and application may help the researcher in making algorithm to solve problems. The goal of this article is to highlight some of the applications of Neutrosophic Sets and Logic.

INTRODUCTION

Solution of real world problems often rely on solutions of mathematical models of empirical phenomena. It is well known that the precision and exactness necessary during the construction and solution of such models are not always true in real situations. The major difficulty encountered by a model builder is to express imprecise notions in a seemingly precise form. Conventional mathematics is not equipped to handle vagueness. As researchers and mathematical model builders continue their efforts to construct intelligent systems they are coming to grip with the issue of uncertainty in human knowledge and reasoning.

In 1965, Zadeh introduced a modification of set theory known as fuzzy set theory to study notions with prescribed vagueness. As cited before, uncertainties are present in the process of modeling, as well as in the behaviour such as in viruses and populations in general. To deal with uncertainties the theory of Fuzzy Sets (FS) were introduced and it shows meaningful applications in many field of studies. In fuzzy set theory, the membership of an element to a fuzzy set is a single value between zero and one. However in reality, it may not always be true that the degree of non-membership of an element in a fuzzy set is equal to 1 minus the membership degree because there may be some hesitation degree. K. Atanassov in 1986, proposed the generalization of Fuzzy Sets , called Intuitionistic Fuzzy Sets (IFS). In IFS the degree of non-belongingness is not independent but it is dependent on the degree of belongingness.

FST can be considered as a special case of an IFS where the degree of non-belongingness of an element is exactly equal to 1 minus the degree of belongingness. IFS have the ability to handle imprecise data of both complete and incomplete in nature. In applications like expert systems,

belief systems and information fusion etc., where degree of non-belongingness is equally important as degree of belongingness, intuitionistic fuzzy sets are quite useful. Neutrosophic Set is a part of Neutrosophy that studies the origin, nature, and scope of neutralities, as well as their interactions with different ideational spectra. The Neutrosophic Set is a powerful general formal framework that has been recently proposed.

The generalization of Classical Set, Fuzzy Set and Intuitionistic Fuzzy Set were triggered by Smarandache(Smarandache.F 1998). A Neutrosophic set is a set where each element of the universe has a degree of truth, indeterminacy and falsity respectively and which lies between [0, 1]*, the non-standard unit interval. Unlike in Intuitionistic Fuzzy Sets, where the incorporated uncertainty is dependent of the degree of belongingness and degree of non-belongingness, here the uncertainty present, i.e. the indeterminacy factor, is independent of truth and falsity values. Neutrosophic Sets are indeed more general than IFS as there are no constraints between the degree of truth, degree of indeterminacy and degree of falsity.

All these degrees can individually vary within [0, 1]*. This indeterminacy imports more information than fuzzy and intuitionistic fuzzy logic. Hence the application of Neutrosophic Logic would lead to better performance than fuzzy logic. In modeling science and engineering problems there arise some parameters which is uncertain or imprecise. But Fuzzy and Intuitionistic Fuzzy Logic does not have the term indeterminacy. To handle such situation Neutrosophic Set were developed. Many researchers have applied the Neutrosophic Logic in various fields.

MATERIAL AND METHOD

Summary: Smarandache F (2002) has emphasized, a cloud as a Neutrosophic Set, because its borders are ambiguous, and each element (water drop) belongs with a Neutrosophic probability to the set (e.g. there are a kind of separated water drops, around a compact mass of water drops, that we don't know how to consider them: in or out of the cloud). Also, we are not sure where the cloud ends nor where it begins, neither if some elements are or are not in the set. That's why the percent of indeterminacy is required and the Neutrosophic probability (using subsets - not numbers-as components) should be used for better modeling: it is a more organic, smooth, and especially accurate estimation. Indeterminacy is the zone of ignorance of a proposition's value, between truth and falsehood. Smarandache F(2005) generalized the Intuitionistic Fuzzy Set (IFS), Paraconsistent Set, and Intuitionistic Set to the Neutrosophic Set (NS). Many examples are presented. Distinctions between NS and IFS were discussed.

Wang H et al.,(2010) have presented an instance of Neutrosophic Set called Single Valued Neutrosophic Set (SVNS). The single valued Neutrosophic set is a generalization of Classic Sset, Fuzzy Set, Interval Valued Fuzzy Set, Intuitionistic Fuzzy Set and Paraconsistent Set. The notion of inclusion, complement, union, intersection, have been defined on single valued Neutrosophic Sets. Various properties of set-theoretic operators have been provided. In the future, they will create the logic inference system based on single valued Neutrosophic Sets and apply the theory to solve practical applications in areas such as expert system, information fusion system, question-answering system, bioinformatics and medical informatics, etc.

Florentin Smarandache (2015) proposed, Neutrosophic Analysis is a generalization of Set Analysis, which in its turn is a generalization of Interval Analysis. Neutrosophic Precalculus is referred to indeterminate staticity, while Neutrosophic Calculus is the mathematics of indeterminate change. The Neutrosophic Precalculus and Neutrosophic Calculus can be developed in many ways, depending on the types of indeterminacy one has and on the methods used to deal with such indeterminacy. Here, the author presents a few examples of indeterminacies and several methods to deal with these specific indeterminacies, but many other indeterminacies there exist in our everyday life, and they have to be studied and resolved using similar of different methods.

Therefore, more research should be done in the field of Neutrosophics. The author introduces for the first time the notions of Neutrosophic mereo-limit, Neutrosophic mereo-continuity (in a different way from the classical semi-continuity), Neutrosophic mereo-derivative and Neutrosophic mereo-integral (both in different ways from the fractional calculus), besides the classical definitions of limit, continuity, derivative, and integral respectively. Future research may be done in the Neutrosophic fractional calculus.

Ye J (2015) interpreted the combination of trapezoidal fuzzy numbers and a single-valued Neutrosophic Set, this paper proposes a Trapezoidal Neutrosophic Set, some operational rules, score and accuracy functions for Trapezoidal Neutrosophic numbers. Then, a Trapezoidal Neutrosophic number weighted arithmetic averaging (TNNWAA) operator and a Trapezoidal Neutrosophic number weighted geometric averaging (TNNWGA) operator are proposed to aggregate the Trapezoidal Neutrosophic information, and their properties are investigated.

Furthermore, a multiple attribute decision-making method based on the TNNWAA and TNNWGA operators and the score and accuracy functions of a Trapezoidal Neutrosophic number is established to deal with the multiple attribute decision-making problems in which the evaluation values of alternatives on the attributes are represented by the form of Ttrapezoidal Neutrosophic numbers. Finally, an illustrative example about software selection is given to demonstrate the application and effectiveness of the developed method.

Biswas.P et al,. (2016) analyzed that a Single-valued Neutrosophic Set is a special case of Neutrosophic Set.

It has been described as a generalization of crisp sets, fuzzy sets, and intuitionistic fuzzy sets in order to deal with incomplete information. In this paper, a new approach for multi-attribute group decision-making problems is proposed by extending the technique for order preference by similarity to ideal solution to single-valued Neutrosophic environment. Ratings of alternative with respect to each attribute are considered as Single-valued Neutrosophic Set that reflect the decision makers' opinion based on the provided information.

Neutrosophic Set characterized by three independent degrees namely truth-membership degree (T), indeterminacy-membership degree (I), and falsity-membership degree (F) is more capable to catch up incomplete information. Single-valued Neutrosophic Set-based weighted averaging operator is used to aggregate all the individual decision maker's opinion into one common opinion for rating the importance of criteria and alternatives. Finally, an illustrative example is provided in order to demonstrate its applicability and effectiveness of the proposed approach.

Deli.I et al.,.(2017) discussed the concept of a single valued Neutrosophic number (SVN-number) is of importance for quantifying an ill-known quantity and the ranking of SVN-numbers is a very difficult problem in multi-attribute decision making problems. The aim of this paper is to present a methodology for solving multi-attribute decision making problems with SVN-numbers. Therefore, firstly the concepts of cut sets of SVN-numbers were defined and then applied to single valued Trapezoidal Neutrosophic numbers (SVTN-numbers) and Triangular Neutrosophic numbers (SVTrN-numbers). Then, they have proposed the values and ambiguities of the truth-membership function, indeterminacy-membership function and falsity-membership function for a SVN-numbers and studied some desired properties. Also, they have developed a ranking method by using the concept of values and ambiguities, and applied to multi-attribute decision making problems in which the ratings of alternatives on attributes are expressed with SVTN-numbers.

Abdel-Baset et al,. (2018) said that for any organization, the selection of suppliers is a very important step to increase productivity and profitability. Any organization or company seeks to use the best methodology and the appropriate technology to achieve its strategies and objectives. The present study employs the Neutrosophic Set for decision making and evaluation method (DEMATEL) to analyze and determine the factors influencing the selection of SCM suppliers. DEMATEL is considered a proactive approach to improve performance and achieve competitive advantages. This study applies the Neutrosophic Set Theory to adjust general judgment, using a new scale to present each value. A case study implementing the proposed methodology is presented (i.e. selecting the best supplier for a distribution company). This research was designed by Neutrosophic DEMATEL data collection survey of experts, interviewing professionals in management, procurement and production. The results analyzed in this research prove that quality is the most influential criterion in the selection of suppliers

Biswas.P et al,.(2018) has introduced Interval Trapezoidal Neutrosophic number and defined some arithmetic operations of the proposed interval Trapezoidal Neutrosophic numbers. Then they consider a multiple attribute decision making (MADM) problem with interval Trapezoidal Neutrosophic numbers. The weight information of each attribute in the multi attribute decision making problem is expressed in terms of interval Trapezoidal Neutrosophic numbers. To develop distance measure based MADM strategy with interval Trapezoidal Neutrosophic numbers, they define normalised Hamming distance measure of the proposed numbers and develop an algorithm to determine the weight of the attributes. Using these weights, they aggregate the distance measures of preference values of each alternative with respect to ideal alternative. Then determine the ranking order of all alternatives according to the aggregated weighted distance measures of all available alternatives. Finally, they provide an illustrative example to show the feasibility, applicability of the proposed MADM strategy with interval Trapezoidal Neutrosophic numbers.

Chakraborty.A et al,. (2018) have introduced the concept of Neutrosophic number from different viewpoints. They define different types of linear and non-linear generalized Triangular Neutrosophic numbers which are very important for uncertainty theory. They have also introduced the de-neutrosophication concept for Triangular Neutrosophic numbers. This concept helps to convert a Neutrosophic number into a crisp number. The concepts are followed by two application, namely in imprecise project evaluation review technique and route selection problem.

Faruk Karaasian (2018) described that the Fuzzy set and Intuitionistic Fuzzy Set are two useful mathematical tool for dealing with impression and uncertainty. However sometimes these theories may not suffice to model indeterminate and inconsistent information encountered in real world. To overcome this insufficiency, Neutrosophic set theory and Single-valued Neutrosophic Set (SVNS) theory which is useful in practical applications, were proposed. Many researchers have studied on Singlevalued Triangular Neutrosophic numbers and Single-valued Trapezoidal Neutrosophic numbers. In this paper, concepts of Gaussian single-valued Neutrosophic number (GSVNN), α-cut of a GSVNN and parametric form of a GSVNN are defined, and based on α-cuts of GSVNNs, arithmetic operations for GSVNNs are defined. Also, some results are obtained related to arithmetic operations of GSVNNs. Furthermore, a decision making algorithm is developed by using GSVNNs operations, and its application in medical diagnosis is given.

Abdel-Baset.M et al,. (2019) have proposed an advanced type of Neutrosophic technique, called type 2 Neutrosophic numbers, and defines some of its operational rules. The type 2 Neutrosophic number weighted averaging operator is determined in order to collective the type

2 Neutrosophic number set, inferring some properties of the suggested operator. The operator is employed in a MADM problem to collect the type 2 Neutrosophic numbers based classification values of each alternative over the features. The convergent classification values of every alternative are arranged with the assistance of score and accuracy values with the aim to detect the superior alternative. An illuminating example to confirm the suggested approach for multi attribute decision making issues, ordering the alternatives based on the accuracy function has been introduced. Finally, the authors provide a real case dealing with a decision making problem based on the proposed T2NN-TOPSIS methodology to prove the efficiency and the applicability of the type 2 Neutrosophic number.

Abdel-Baset.M et al,.(2019) proposed the stress is placed upon the choosing of sugar analyzing smart medical devices for diabetics' patients. The main objective is to present the complications of the problem, raising interest among specialists in the healthcare industry and assessing smart medical devices under different evaluation criteria. The problem is formulated as a multi criteria decision type with seven alternatives and seven criteria, and then edited as a multi criteria decision model with seven alternatives and seven criteria. The results of the Neutrosophics with TOPSIS model are analyzed, showing that the competence of the acquired results and the rankings are sufficiently stable. The results of the suggested method are also compared with the Neutrosophic extensions AHP and MOORA models in order to validate and prove the acquired results. In addition, SPSS program to check the stability of the variations in the rankings by the Spearman coefficient of correlation has been used. The selection methodology is applied on a numerical case, to prove the validity of the suggested approach.

CONCLUSION

Differential equations have a remarkable ability to predict the world around us. They are used in a wide variety of disciplines, from Biology, Economics, Physics, Chemistry and Engineering. They can describe exponential growth and decay, the population growth of species or the change in investment return over time .Differential equations are also used as aspect of algorithm on Machine Learning which includes computer vision, also involves solving for optimal certain conditions or iterating towards a solution with techniques like gradient descent or expectation maximization. In Mother Nature, Differential Equations are essential tool for describing the nature of the physical universe. In modeling problems, it has major applications in the field of science and engineering and the study of differential equation with uncertainty is one of emerging field of research.

Fuzzy differential equation (Bede.B et al,. 2005; Chalco-cano.Y et al,. 2008 ; Dubois.D et al,. 1978; Mondal.SP et al,. 2013) has been introduced to model this uncertainty. However, it considers only the membership value. Later, Intuitionistic Fuzzy Differential Equation (Kumar.M et al,. 2011; Shaw.AK et al,.2013; Wan.S 2013; Wang.J et al,.2013) was emerged with degree of membership and non-membership. However, these two logic does not have the term indeterminacy. Hence, Neutrosophic Differential Equation was developed to model the indeterminacy. Many methods for solving Fuzzy and Intuitionistic Fuzzy Differential Equations have been introduced by various researchers. Hence, various methods for solving Neutrosophic Differential Equation is an emerging field in this era. This paper will offer a useful resource ideas, techniques, methods and approaches for additional research on applications of Neutrosophic Sets and Logics.

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Radio Frequency Energy Harvesting for Wireless Devices

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ABSTRACT

Radio frequency (RF) sources of energy presently broadcasted from the base stations all around the urban and rural areas. The capability of harvesting RF strength from RF sources charges the minimum power gadgets and has result of benefits to reliability of the wireless devices. For large range operation, large antenna structure omni directional pattern is wished for realistic harvesting of RF strength from cell base stations and broadcast radio towers. RF strength are harvested from the unlicensed bands such as 2.45 GHz. RF to DC power conversion at extra distances from RF energy sources occurs while improving the RF sensitivity. The utility for wire unfastened charging by RF based totally wireless energy and energy harvesting continue. The challenge is to design rectangular patch antenna to reap RF energy from cell base station. The rectifier circuit may be designed to achieve a maximum performance for low input energy by using matching network and voltage multiplier. This circuit is successful for harvesting 2.45 GHz RF signal strength through antenna. It's far feasible to shape an entire rectenna device, and a go back loss of extra than -10dB.The values of output dc voltage and strength in step with the obtained RF power had been measured and the excellent cost of load resistance to harvest.

KEY WORDS: RADIO TRANSMITTERS, RF, DC, BASE STATION, CELLULAR PHONES, WIRELESS, ENERGY.

INTRODUCTION

Rf Energy Harvesting

Energy harvesters consume fuel from the surrounding resources and consequently are unfastened for the user. The different assets used for harvesting are Radio frequency, wind, vibration, solar, pushbuttons, thermo electric, acoustic etc. Till the output electricity produced by these techniques is low (i.e.) less than a few mW. It is able to power low strength consumption devices depending

on techniques. But it acts as a scope for future low electricity client electronics. The key factor for this type of generation are advancements in ultra low electricity or strength stingy electronic devices. Everything from our cellular telephones to our Wi-Fi access points to our microwave ovens creates measurable disturbances inside the electromagnetic fields that surround us.

Those disturbances create regions of area with potential energies that vary over time and/or distance. And anywhere a capacity difference exists, an enterprising engineer can continually find a manner to do some beneficial work. The energy harvesting can be made possible from the available electromagnetic waves. This may be finished with RF-to-DC converters harvesting power from radio waves already present inside the environment. Figure 1.1 illustrate that the radio wave

is omnipresent in form of alerts transmission from TV, Radio, wireless LAN, cell phone, etc.

Communication devices possess an omni-directional antenna that propagate RF energy in many directions, and maximizes connectivity with cell applications. The energy from the Wi-Fi resources is a deal higher, but handiest a small amount in real environment may be scavenged, relaxation is dissipated as warmth via different materials. Power harvesting technique has a major application on RFID tags and implantable electronics devices.


Figure 1: Available RF Sources
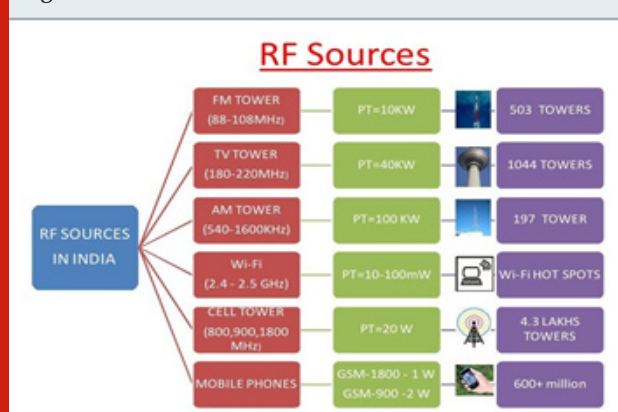
MATERIAL AND METHOD

Block Diagram: Radio frequency power harvesting is a power conversion approach employed for converting electricity from the electromagnetic area into the electrical domain i.e., into voltages and currents. Extracting strength from RF resources are challenging to the researchers since they discover themselves on as the midway between the electromagnetic fields and the electronic circuitry. The basic circuit diagram for energy harvesting is given in Fig 2.

Figure 2: Schematic diagram of RF energy harvesting
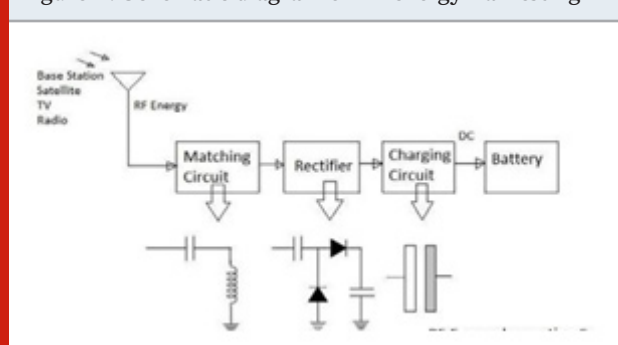
It consists of following modules. It converts energy from RF to DC. Components utilized in those modules.
- Antenna
- Matching Network
- Voltage multiple one or more (i.e. rectifier circuit)
- Energy storage circuits

Antenna Fundamentals: Antenna is an electrical device which transforms electricity to electromagnetic propagation and vice versa. It can either act as a transmitting or receiving antenna. The purpose of a transmitting antenna is to radiate the transformed waves to the receiver. The receiving antenna converts the received waves into electrical signal. The identical antennas are used for both transmission and reception. Now-a-days, antennas have passed through many changes, according with their length and shape. There are different types of antennas based upon their wide kind of applications.

Need of Antenna: In the world of communication systems, it is incapable without an antenna whenever there is a need for wireless communication. For the sake of communication antenna has the functionality of sending or receiving the electromagnetic waves, wherein you can't count on to lay down a wiring system.

Impedance Matching: The impedance value of the transmitter should be the same as that of the impedance value of the receiver, it is termed as Impedance matching. It is vital between the circuit and antenna. The maximum strength transfer between sender and receiver depends on the health of the antenna input impedance, the circuit and transmission line.

Necessity of Matching: The better output at certain frequencies can be obtained using a resonant tool. Antennas are such type of resonant device which gives higher output when impedance matching occurs,

- The effective radiation of antenna will happen if the antenna impedance fits the free space impedance
- For a receiver antenna, output electrical resistance needs to work with input electrical resistance of the receiver electronic equipment circuit.
- For a transmitter antenna, antennas enter resistivity should suit with transmitter amplifiers output resistivity, at the side of the cable resistivity.

Rectifier: The impedance matching is meant to suit the load impedance to the impedance of the each block. Matching is used to couple most RF source into the circuit. The circuit is made from capacitor and inductor. Voltage multiplier or rectifier product of diodes and capacitors. Higher are those stages better is the voltage on the load and lesser is the current. But higher wide variety of stages result into boom in charging delay before it is going for strength storage. The DC electricity received from the voltage doubler is saved either inside the capacitor or passed to the battery with a purpose to conserve for later use. Some of the advantages of RF power harvesting are Works in dark locations also, affords power on demand and even in mobility conditions, provides tracking capabilities, can advantages in electric tariffs, also can be work as secondary battery while on travel.

Recently, RF power harvesting has gained a variety of interest due to the fact RF strength is extensively broadcast from numerous reliable electromagnetic

resources. Therefore, its miles meaningful to accumulate and put it to use because the supply electricity for plenty electrical devices like headsets, wearable clinical sensors, for commercial purpose, and so on. In the RF strength harvesting process a rectifying antenna (rectenna), which will receive and converts the microwave energy to dc electricity, has a major role. Several researches has undergone on rectenna using varieties of resonant devices, for instance, on all wire antenna and patch antenna.

Literature Review: (R.A. Rahim et al,. 2013), developed patch antenna with circular polarization for harmonic suppression in an ambient RF energy harvesting. This provided a new layout for microstrip patch antenna with harmonic suppression frequency on 900MHz. The dimension of patch is minimized by applying in part ground aircraft. The implementation of the defected ground slot, undesirable radiations at harmonic frequencies are efficiently suppressed. The patch antenna is developed on an FR4 substrate with dielectric constant of 4.7 and height of 1.6 mm. This results in -20dB return loss at 900 MHz and suppress the second one and third harmonic up to -2dB. A rectangular microstrip patch antenna with a few modifications to the floor aircraft, shorting the opposite side and implementing slots on the patch resulst in compact and low profile circularly polarized microstrip patch antenna. This results in a capability to minimize the maximum value of the harmonics.

(Kush Agarwal1 et al,. 2013), designed meta material based compact antenna for an efficient wireless energy harvesting system. This paper affords an enormously efficient 2.4GHz Wi-Fi power harvesting gadget formed with a meta material primarily based circularly polarized (CP) antenna. For antenna miniaturization, impedance matching and improvement of front to back ratio of the antenna is obtained from the slotted truncated corner positioned on Reactive Impedance Surface (RIS). For the wireless strength harvesting gadget the receiving antenna is designed with a meta material primarily a compact antenna with CP bandwidth and stepped forward gain. The antenna is a radiator printed on the pinnacle of dual-layer FR4 substrate $\varepsilon r = 4.2$ and with dimension of 0.5mm and 3.2mm. RIS is printed on the interface between the 2 dielectric layers. The feeding is done using a coaxial probe at location of x = -4.75 and y = 0 recognize to patch center. For the ISM band of 2.40 GHz to2.48 GHz the measured axial ratio lies below 3 dB absolutely in the 10 dB over bandwidth of 2.35 GHz to 2.49 GHz. A most measured right exceeded circularly polarized gain of 4.6 dB accomplish at 2.44 GHz inside the boresight direction.

(Hucheng Sun and Yong-Xin Guo et al,. 2013), design a rectanna for 2.45 GHz with minimum input energy harvesting. For low input power rectenna with high efficiency are preferred because of the low electricity level of the available RF strength resources, so the rectennas require a relatively excessive enter power or else it exhibits unsatisfying efficiency for the low power

inputs. The rectifier section includes a resistive load, a schottky diode, and a dc pass filter out. As the schottky diode has rapid switching reaction, excess cut off frequency along with low built in voltage it is changed to chosen. It is made parallel throughout the CPS. To behave as dc pass filter and to reduce the size of rectifier a capacitor is truly connected to the CPS .The proposed rectenna has an efficiency of 80.3% and 50% with power density of 1.95 and 0.22 µWcm, respectively.

(Lei Bain et al,. 2014) proposed a circularly polarized Antenna for wideband. In order to achieve a bandwidth of 75% for the 10-dB go back loss a new hybrid feed network is designed with 90° phase difference between two output ports. The two output ports have proper amplitude stability. To have a segment of 0°, 90°, 180°, 270° a round patch antenna with four sequential rotation feed with proximity coupled L probes orientation is designed. The simulation results implies that from 0.9 to 2.5 GHz for SWR<2 the impedance bandwidth of 94%. Frequency band of 1.25 GHz to 2.42 GHz accomplish a 63.8% of axial ratio.

(Bruno R. Francisco et al,. 2014), developed an efficient 2.45 GHz rectifier circuit for low input power RF energy. This paper makes a specialist of a brand-new detailed method for the layout of a high-performance rectifier circuit. As the diode isn't a linear device and might produce harmonic signals. A rectifier circuit RF-DC may be carried out with one or extra Schottky diodes, a low-skip clear out on the center of the circuit, a DC load i.e., RF-block capacitor + resistor and a matching community. Hence, the conversion performance measured was of 70.4% for 0 dBm enter RF electricity.

(Cyril LaHue and Fabrice Seguin et al,. 2015), proposed a multiband RF energy harvesting in stacked configuration. While the amount of RF harvesting extended, stepped forward the impedance matching circuit because of difficulties to match the impedance for large bandwidth. The clear out capability is to healthy the antenna impedance and the rectifier conjugate impedanc. The rectifier impedance changes as a function of frequency and the incident wave. The RF band bypass filter out turned into designed to select a specific operating frequency and the dc outputs voltages in rectenna are measured at the load. On the adaptation of a multiband consists of kind of losses: the only is because of impedance mismatch and other is due to the filter out complexity. The RF to DC conversion efficiency as 62% for cumulative enter energy of -10dB for multiple RF band have been completed. But, for some null incident energy, impedance version and RF to DC conversion efficiency aren't optimum for multiband RF sources.

(XiulongBao et al,. 2016), develops a patch antenna with a differentially feeding technique. A circularly polarized differentially-fed antenna with omnidirectional pattern is investigated for application in RF power harvesting. The antenna is consists of a two substrate layers and back to back printed rectangular patches which have diagonal stubs and single truncation. The patch consists

of a common ground. Both patches generate circular polarization (CP) and omnidirectional CP is provided. The antenna results an axial ratio less than 3dB over the bandwidth of 20 MHz.

(Ang Ming Jie1 et al,. 2016), proposed circular patch antenna with slots for circular polarization. It results in a better axial ratio for all three resonant over the bandwidth 2.36 GHz to 2.40 GHz. The antenna dimension is 60× 60× 3.2 mm3. (MahimaArrawatia et al,. 2016) finished a have a look at on Broadband bent triangular omnidirectional antenna for RF electricity harvesting. In power harvesting software all the power acquired by the antenna should be brought the rectifier. Hence the unmarried feed omnidirectional antenna, which can get hold of both vertical and horizontal polarization is used. The rectifier input impedance is adjustments with frequency, enter energy and load. A Schottky barrier diode based voltage doubler is used for rectification. As the frequency increases the performance of the rectifier circuit decreases due to the extended parasitic losses within the diode. When the distance of transmitter increases the efficiency is decreased.

(Yen Sheng Chen and Cheng Wei Chiu et al,. 2017), develops a circuit for maximum power conversion efficiency. From the previous research they discovered that the conceptual limits of power conversion performance not yet been characterized, and the foremost rectenna shape is also not investigated properly. In order to gain the most PCE, their inspection shows that the rectenna shape was not simplest optimize the layout factors however additionally eliminate the impedance matching around the antenna and rectifier for ultra low strength scenarios. They have eliminated the matching circuit and reduces the wide variety of diodes and filtering capacitor. They discovered that it leads to better energy conversion performance and also minimization of issue loss. While the frequency has been maintained on increasing, the layout was no longer efficient to reap a most strength conversion performance.

(Hemant, Kumar et al,. 2019), accomplished simple wideband energy harvesting with a log-periodic dipole array antenna. In this, a cost effective log periodic dipole array antenna has been implemented. RF energy to DC voltage is accomplished by voltage doubler rectifier circuit using Schottky diode. A broadband exponentially tapered microstrip line is used among log periodic antenna and rectifier for matching the antenna impedance to the Schottky diode-based totally rectifier, is developed. At 25 m distance from the mobile tower, the broadband RF power harvesting device offers an output voltage of 1.7V across the load of 4.7kΩ. Vijayalakshmi J and Murugesan G., (2019) have developed a miniaturized high gain Ultra Wide Band applications (UWB) for wireless applications. The compact monopole antenna is best suitable for the short range communications.

(Arun Kumar M et al,. 2020) have proposed a Unmanned Aerial Vehicle (UAV) for sowing seed balls which might reduce the labor issues at future generations.

The battery life time is the major requirement in this UAV since it operates in wireless mode. The RF energy harvesting implementation in the UAV system creates a good revolution of the agriculture filed. Dinesh, V and Murugesan, G., (2019) proposed a compact UWB planar antenna for UWB. Compact UWB devices required such an RF harvesting for indoor wireless applications.

RESULTS AND DISCUSSION

System Analysis
Current System: Circularly polarized (CP) antenna with L-Probe and aperture coupling feed for wide-band operation is proposed by (Lau, K. L., and K. M. Luke et al,. 2005). The antenna layout and scattering measurements of a wideband patch antenna is obtained. Figure 3 indicates the geometry of the rectangular patch antenna model. Orthogonal polarization is obtained by configuring one input port fed with aperture fed and other input port with L probe feed. A Wilkinson energy combiner mounted under the floor aircraft became used to connect the two excitation ports to obtain circular polarization. A patch antenna that can offer dual polarization must be created for a twin fed type CP patch antenna. The dimensions for such type of antennas should be made closer for the end design of the circularly polarized antenna. The two input ports with phase quadrature and equal amplitude a feeding network is designed for choosing dual polarization antenna. The twin polarized antenna should satisfy the following criteria in order to create a CP patch antenna with wide impedance and 3-dB axial ratio bandwidth. The bandwidth of each input port of the twin antenna must be huge in order to achieve wide impedance bandwidth for the CP antenna.

The above said techniques were implemented. Rather than the impedance matching wide impedance bandwidth, of the enter ports must cowl comparable range of frequency. In general, verification must be done for, the required bodily length of a patch perhaps extraordinary for extraordinary feeding techniques, for the equal resonant frequency. With lower coupling between the 2 input ports, better axial ratio bandwidth may be received, for dual- fed kind CP antenna. Since extraordinary feeding strategies are employed for the 2 polarizations, the gain of every port won't be the identical with the running range of frequencies. In order to accumulate proper axial ratio bandwidth, the benefits for both ports have to be close throughout the frequency range. The antenna possessed a 14-dB go back loss bandwidth of 35% (from 1.49 to 2.12 GHz), and has a 3-dB axial ratio bandwidth of 20.4% (from 1.67 to 2.05 GHz).

Proposed Rectangular Patch Rectenna: A rectangular patch antenna designed, fabricated and for 2.45 GHz frequency of resonance. Considerable importance is located on realistic design methods which include selection of substrate and feeding. Design layout of patch radiator is given for the microstrip antenna, a single element probe-fed rectangular patch and an electromagnetically-coupled square patch, both operating at a frequency of 2.45 GHz. Measurements of input impedance, return-

loss, impedance bandwidth and benefit are presented. A microstrip antenna is a tiny metallic element of the small fraction of wavelength above a conducting ground plane. The patch and bottom ground are separated through a dielectric. The patch conductor is made up of copper and may count on any shape, however easy geometries usually are used, and clarify the evaluation and overall performance projection. The patch antenna is normally photo-etched at the suitable dielectric substrate. Usually the substrate will be the non-magnetic material. The relative permittivity εr of the substrate is generally in the area among 1 and 4 which optmizes the fringing fields that account for radiation. Higher the value of εr results in a better radiation performance.

On behalf of its simple geometry, the half wave square patch is generally used as microstrip antenna. It is designed with the aid of its width W, length L and thickness h, as shown in Figure 3. The suitable method of feeding the patch is the coplanar microstrip line, also photoetched at the substrate. The Coaxial feeds are also the method extensively used. The inner conductor of the coaxial fed is connected to the radiating patch where the outer conductor is hooked up to the ground. The aperture coupling is the technique where the substrate is placed between the patch and the feedline. The coupling among the two is provided by means of an aperture or slot in the ground plane. A microstrip patch can be electromagnetically-coupled the use of a coplanar feedline or a buried feedline. The coplanar feedline has a tendency to radiate greater than the buried feed line, since it was printed on the same substrate, hence it has high radiation efficiency.

Figure 3: Rectangular patch antenna model
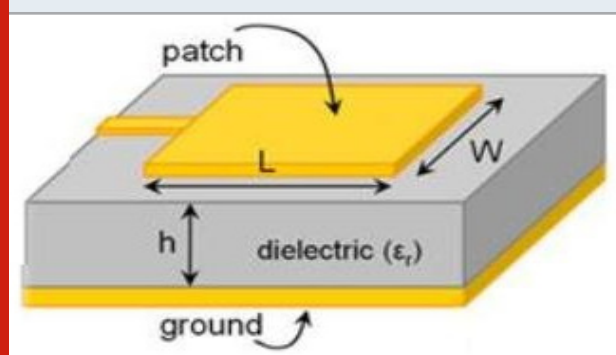
The buried feedline technique employs a double layer substrate as one for the radiator and other for the feed line. The substrate parameters may be chosen separately. The upper substrate on which the antenna is outlined calls for especially thick substrate with a low relative dielectric regular to decorate radiation and boom bandwidth, while the decrease feedline substrate require a slim substrate with a higher relative dielectric steady to save you radiation. The first antenna described here's a probe- fed rectangular patch designed to function at a frequency of 2.45 GHz, and in the end an electromagnetically-coupled (EMC) patch is developed. Different variables of antenna like VSWR, go back loss and radiation pattern

are calculated using MATLAB coding and for this reason their graphs are plotted in accordance with the simulated results using HFSS software. A Rectangular microstrip patch includes a radiating patch on one side of a substrate and patch on the other side as proven in Figure 4.

The patch is usually made from conducting material such as copper or gold and may take any viable shape. The radiating patch and the feed traces are usually photoetched at the dielectric substrate. Arrays of antennas can be photograph etched at the substrate, at the side of their feeding networks. Feed line such as co-axial fed probe is used for design purpose since it provides better matching, narrow bandwidth and occasional feed radiations. Phased array antenna is a multiple-antenna system. Higher directivity and gain improvement in antenna elements are obtained by linear or planar arrays. Consist of more than one antenna elements by 'collaborating' to synthesize radiation traits not available with an unmarried antenna. They are in a position to fit the radiation pattern to the desired insurance are and to exchange the radiation pattern electronically thru the manager of the section and amplitude. In addition, they're used to scan the beam of an antenna system, boom the directivity, and perform various other features which might be hard with any one unmarried element. The elements can be fed through a single line or by multiple lines in a feed community arrangement.


Figure 4: Circuit diagram of rectifier
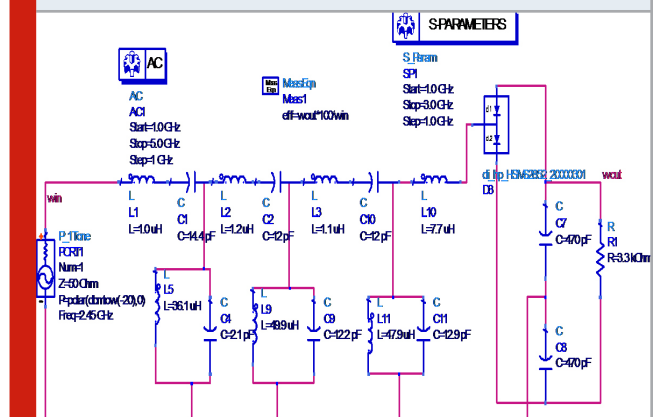
In general, two modules are there for a RF to direct current (DC) conversion machine, they are voltage multiplier circuit and the impedance matching network. Because of the simplicity of analysis in this work, voltage doubler topology turned into used the RF to DC converter. For the short changing at the high frequency the HSMS-2852 Schottky diode became decided on to assist. In order to attain most efficiency from the device, an impedance matching circuit changed into joined to the system. By using Agilent Advanced Design System (ADS) the simulations were performed. Figure 4 shows the proposed RF energy harvester. In order to get a smoother DC voltage during the conversion an additional clear out is added to the voltage multiplier's output. Anyhow, if this filter out it will boom both the scale and the price of the circuit.

The Voltage Multiplier and RF Schottky Diode Modeling: The RF alerts have a drawback of alternating signal and low amplitude. In order to increase the voltage and to rectify the alternating voltage to direct voltage the voltage multiplier circuits are used. There are different kinds of voltage multiplier which include Villard, Dickson and Grenache. The Dickson voltage multiplier consists of capacitor and two diodes are used to recognize the conversion from RF to DC. In order to operate at the low input strength levels the diode implementation is very important. The diodes must have low voltage drop, quick switching speed to operate efficiently. Since HSMS-2852 schottky diodes has a capacitance of 0.3 pF and 0.5V of voltage drop they are used. The diode is very efficient especially at low input levels along with -20 dBm. The resistive and capacitive impedance furnished by using the connected load and the junction of the diode determines its impedance. The packages of HSMS-2852 also consists of collection diodes. The vital parameters to find the diode impedance are the saturation and temperature current and they display a variety of features. It results in a non-linear diode impedance. The temperature of diode is directly proportional to the input energy and efficiency decreases if there is a variation in the impedance.

Matching Network: The transfer of maximum energy is obtained by matching the impedance between the source and load at each blocks. Imaginary and real parts must be identical with every different load and source inside the structures which includes reactive and resistive impedances. RF energy harvester should possess is the maximum energy shifting. Since the diodes are nonlinear it depends upon on the radiation and saturation resistance, the amount of impedance varies with the input energy level and resonant frequency. By calculating the rough running frequency and input power levels the exact impedance matching circuit may be used. Even a touch change within the impedance matching parameters can substantially have an effect on the frequency at which the gadget performance is maximized. Here the L-type impedance matching circuit made of an inductor followed by a shunt capacitor. The impedance matching circuit provides a maximum signal strength switch, at low energy level. Generally the RF to DC conversion circuits are capable to work only at low RF input power levels. Since the received RF signal strength is very low at the reception. Therefore, the impedance matching circuit is the vital block to convert the very low input current into usable DC voltage. The L-type impedance matching circuit is used in this energy harvesting which results in better matching to the antenna.

Figure 5: Equivalent model of the Schottky diode
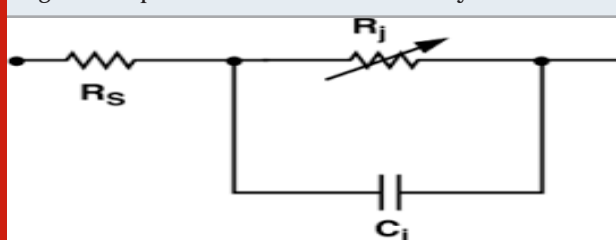
Rectangular Patch Antenna Result: Figure 6 shows the value of return loss is -33.52 dB for the proposed antenna at resonant frequency. The value of return loss shows that the frequency point resonance is below -10 dB shows better matching. The value of voltage standing wave ratio (VSWR) describes the power reflected from the antenna. It should be in the range between 1 and 2. The acceptable VSWR is 1.5. Figure 7 shows that the value of VSWR is close to the ideal value of 1. Smaller VSWR is better in order to deliver more power to the antenna.
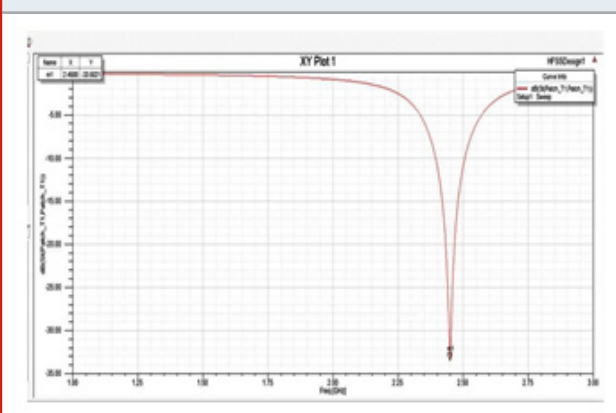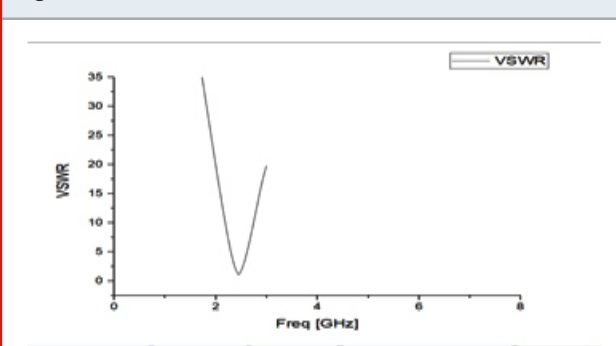
Figure 6: Frequency vs Return loss

Figure 7: Measurement of VSWR

Radiation pattern is a graphical description of the relative field strength transmitted or received by the antenna. Microstrip antennas can provide gain in the range of 4-7dBi. It shows the simulated radiation pattern with gain of 4.7587 dB. Figure 8 shows the radiation pattern at 0° and 90° degree. Figure 9 shows the 3D radiation pattern.
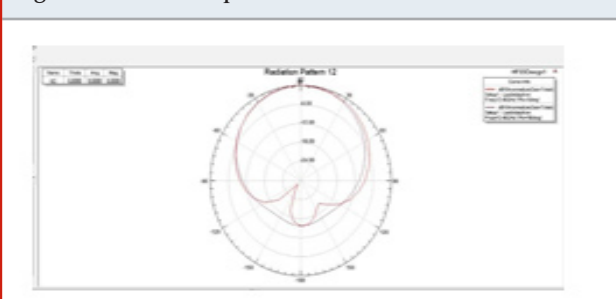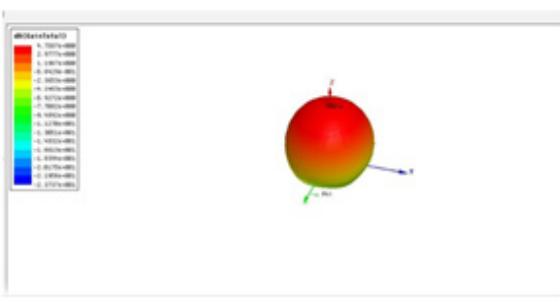
Figure 8: Radiation pattern at 0° and 90°

Figure 9: 3D Radiation pattern

Rectifier Design AT 2.45GHz: A zero-bias Schottky diode (HSMS2852) is chosen due to its ultra-low threshold voltage (150mV). It depicts the simulated RF-DC conversion efficiencies and frequency when the RF power is simultaneously input into the rectifier. The measured efficiencies agree with the simulated ones well. Measured efficiency of more than 60% have been gained for 2.45GHz operating frequency. Table1 describes the efficiency for different frequency level. From this, we can decide that the efficiency is keep on changing for different frequencies.

Table 1. Simulated frequency vs conversion efficiency

FREQUENCY (GHz)	EFFICIENCY %
1.45	65.241
2.45	65.273
3.45	65.255
4.45	65.268

CONCLUSION

This proposed antenna version is price effective, excessive efficiency and effect layout for the packages in 2.45GHz frequency range. The optimum layout parameters height of the substrate=1.5 mm, working frequency=2.45GHz had been used to obtain the compact dimensions and high radiation performance. It presents a benefit of 4.751 dB and VSWR < 2 is achieved over the whole frequency. HFSS antenna simulator software changed into used to implement the performance of the patch. In preference to chemical batteries RF strength harvester circuits have the ability to energize low-electricity electronic devices. In comparison of other harvesting systems with RF energy harvesters the RF harvesters suffers very much lesser in the weather conditions.

Since RF signals are weak inside the environment the voltage multiplier circuit and impedance matching have to be used in RF harvester system. Simulation is done. Voltage multiplication process, impedance matching, input frequency, component choosing are the different parameters that affect the performance of the device. The setup is helpful in extending the battery of a tool. For received RF strength varying from -8.3436 dB to -8.3416 dB, the output dc power varies from -12.05 dB to -12.04 dB respectively.

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Design and Implementation of Adaptive Filter Using Kogge Stone Adder

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ABSTRACT

Adaptive filters find their applications in noise cancellation, signal prediction, adaptive feedback cancellation and echo cancellation. In real time application the statistics of the incoming information is not available at that junction. Adaptive filters are a self-regulating system that uses the recursive algorithm for processing. This paper addresses the implementation of high speed parallel prefix adder,the Kogge Stone Adder in the adaptive filter design for noise cancellation. This is to improve the speed of computation. The RLS adaptive filter used for noise cancellation in ECG signal is experimented with traditional adder and the Kogge Stone Adder. The Performance of the filter is analysed in terms of Signal to Noise Ratio and is compared for 4,8,16,32 tap filters and the proposed adder implementation improves the performance of the filter.The designed structures are implemented in Virtex 5 FPGA and implemented results show that delay is reduced by 12.84% in Kogge Stone Adder than the traditional adder.

KEY WORDS: ADAPTIVE FILTER, ECG SIGNAL, FPGA IMPLEMENTATION, KOGGE STONE ADDER,SIGNAL TO NOISE RATIO.

INTRODUCTION

An adaptive filter plays a vital role in statistical signal processing. In practical situations, the system is operating in an uncertain environment where the input condition is not clear and the unexpected noise exists. Under such circumstances, system should have the flexibility to modify the system parameters and make adjustments based on the input signal and other relevant signal to obtain optimal performance. The main characteristics of the adaptive filter is the adjustment of filter coefficient with respect to the input signal. An adaptive filter is a self-modifying digital filter that adjusts its coefficients in order to minimize an error function[5]. This error function, also referred to as the cost function, is a distance measurement between the reference or desired signal and the output of the adaptive filter. In Figure. 1, x(n) denotes the input signal. The vector representation of x(n) is given in equation 1. This input signal is corrupted with noises. In other words, it is the combination of desired signal d(n) and noise q(n), as mentioned in equation 2.The input signal vector is x(n) which is given in equation 1,

$$x(n) = [\, x(n), x(n-1), x(n-2),......x(n-N-1)]T \quad (1)$$

Here, x (n) = Desired Signal + Noise Signal
Then, x (n) = d (n) +q(n)   (2)

Figure 1 Block Diagram of Adaptive Filter
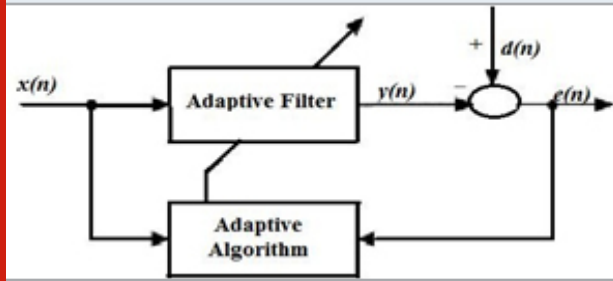
Adaptive Filter consists of finite impulse response (FIR) structure and adaptive algorithm part. For such FIR structure the impulse response is equal to the filter coefficients. The coefficients for a filter of order N are defined by equation 3,

$$w(n) = [wn(0), wn(1)......wn(N-1)]T \quad (3)$$

where, w (n) is tap weight vector.
The output of the adaptive filter is Y(n) which is given by equation 4,

$$Y(n)=w(n)Tx(n) \quad (4)$$

The error signal or cost function is calculated by subtracting the desired signal and estimated signal which is given in equation 5

$$e (n) = d (n) – y(n) \quad (5)$$

The error calculated in equation 5 is used to update the weight coefficients which is used as the correction factor shown in equation.6,

$$w (n+1) = w (n) +\Delta w(n) \quad (6)$$

where $\Delta w(n)$ is the correction factor for filter coefficients .The correction factor includes the error signal and the correction factor differs for various adaptive algorithm.

A Variety of Research models are available for the adaptive filter design in literature. Architecture for Low area and low power is achieved by using vedic multiplier and carry look ahead adder and used for ECG noise cancellation(Sumalatha et al. 2019). Sreenivaas Muthyala Sudhakar et.al.,(2012) implemented a high speed adder namely Hybrid HanCarslon adder for reduction in area and power. Several Robust adaptive algorithms and its VLSI architectures were derived and performance metrics were analaysed (Subrahmanyam Mula et al. 2019). Modified XOR gate structure was introduced in carry select adder to anlayse the performance in terms of area,power and delay (A.N.M.Hossain et al. 2019). A common su expression elimination method to provide low area was adopted.(Shaila Khan et al. 2016).Proportionate LMS and NLMS was implemented for Sparse System Identification(Subrahmanyam Mula et al. 2018). LMS and its Variant algorithms were studied for its behaviour under nonlinearities and its

suitability in VLSI(Subrahmanyam Mula et al. 2017) Reconfigurable FIR Filter was designed to achieve low power and analysis(Seok-jae lee et al 2011) Syed et al. 2009: Gomathi et al. 2020). The rest of paper is as follows: The detailed description of methods are described in section II. Results of 4 ,8 ,16 and 32 tap RLS adaptive filter with Kogge stone adder using Xilinx ISE FPGA design suite are illustrated in section III followed by conclusion in section IV.

MATERIAL AND METHOD

I.RLS Algorithm: Recursive Least Square (RLS) algorithm is a widely used adaptive technique due to its fast convergence rate than other algorithms like LMS[6], NLMS. New samples of the incoming signals are received at every iteration and the solution is computed in recursive form .RLS filter outperforms LMS filter by the factors such as fast convergence , utility of past available information in computation and no approximations in the derivation of its algorithm given below,
Step 1:Weight Initialization

$$w(0) = 0 (7)$$
Step2:Inverse CorrelationMatrix Initialization P(0)=δ-

$$1IM \quad (8)$$

Step 3:Compute Gain Vector

$$\pi(t+1) = P(t)u(t+1) \quad (9)$$

$$k(t+1) = \pi(t+1)/\lambda+ut(t+1)\pi(t+1) \quad (10)$$

Step 4:Compute Error Estimate

$$e(t+1) = d(t+1)-wt(t)u(t+1) \quad (11)$$

Step 5:Compute Inverse Correlation Matrix

$$P(t+1)=\lambda-1p(t)-\lambda-1k(t+1)ut(t+1)P(t) \quad (12)$$

Step 6:Coefficients Updation

$$w(t+1)=w(t)+k(t+1)e(t+1) \quad (13)$$

where λ is forgetting factor in the range [0,1]

Kogge Stone Adder: Kogge stone adder, it can be also called as the parallel prefix adder form of carry look ahead adder and it is one of the quickest and fastest adder among all the adders and generates a carry in 0 time and it can be used in the firms for the good and maximum performance of the arithmetic circuits[8]. In this kogge stone adder carry can be computed and generated fastly by computing in the parallel at cost of increased area. Kogge stone consists of Three stages of working:

1.   Pre processing
2.   Carry look ahead network
3.   Post processing

Pre Processing: Preprocessing stage takes each pair of bits in A and B and computes generate and Propagate signal as given in equation 14 and 15.

Carry Propagate: (Pi)Pi= Ai xor Bi   (14)

Carry Generate: (Gi) Gi= Ai and Bi (15)

Carry Look Ahead Network: This block provides a difference in KSA from other adders and is the major force that contributes to its high degree of performance. In this stage the carries are computed for each bit by using group propagate and generate signals.

Pc= Pi and Piprev (16)

Gc=Gi or (Pi and Giprev) (17)

Post Processing: The final stage of Kogge Stone Adder is the Post Processing Stage and computation of Sum bits is carrued out in this stage using the equation 18.,

Si= Pi xor Ci-1 (18)

Structure of Kogge Stone Adder (KSA): The Structure of KSA can be understood by the following Figure 2 which corresponds to 4-bit KSA.

An example of four bit Kogge Stone adder for addition of two numbers A=1011 and B=1100 with the initial carry Cin=0.The addition of these numbers followin the three stages and the result obtained is same as that calculated in normal operation.

Figure 2: Working of Four Bit Kogge Stone Adder
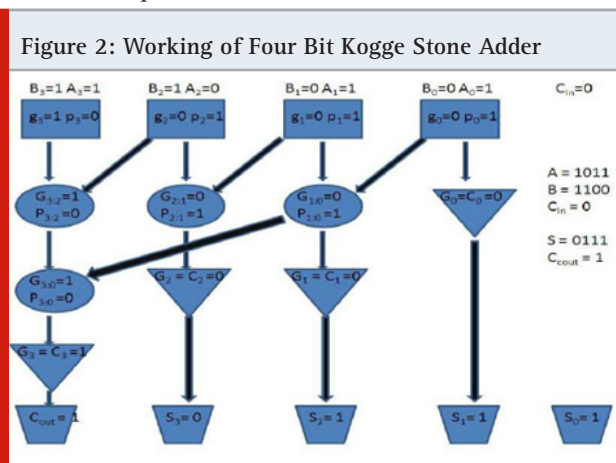
Filter Design: The Kogge Stone Adder (KSA) is incorporated in RLS adaptive algorithm both in FIR and Weight Update Part.

Figure 3 shows that four tap Conventional Adaptive filter structure is designed and simulated in Simulink and Xilinx FPGA . The blocks used in this structure are adder, multiplier, unit delay, divider, math function, constant, signal from workspace and scope.

Figure 4 shows that four tap RLS Adaptive filter structure using Kogge Stone Adder in FIR part is designed and

simulated in Simulink and Xilinx FPGA Kogge Stone Adder is incorporated in FIR part.

Figure 5 shows that four tap RLS Adaptive filter structure using Kogge Stone Adder in FIR part is designed and simulated in Simulink and Xilinx FPGA .

Figure 3: Structure of Four Tap Conventional RLS Adaptive Filter
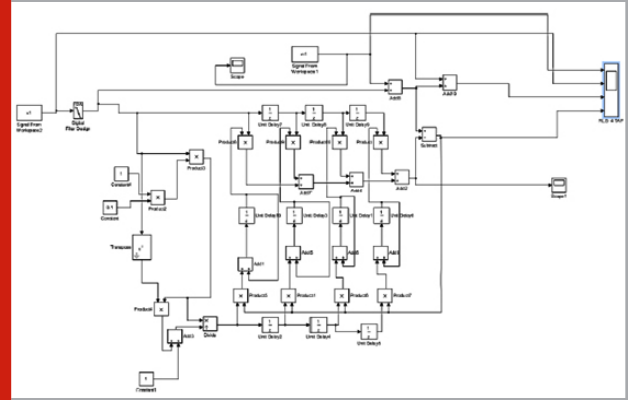
Figure 4: Structure of Four Tap RLS Adaptive Filter using Kogge Stone Adder in FIR Part
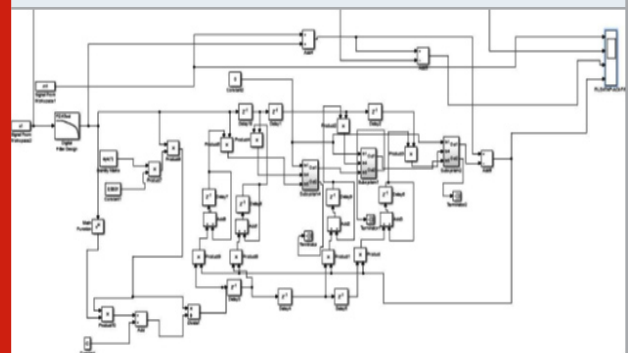
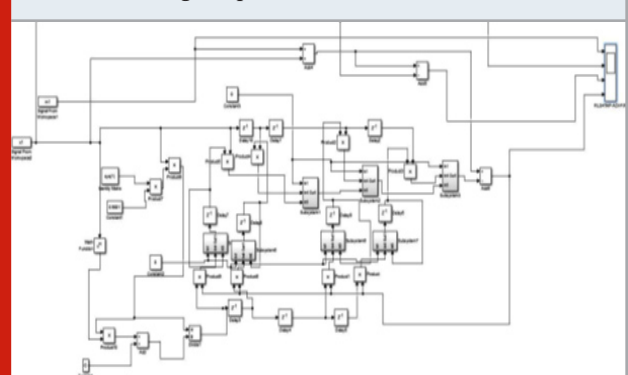Figure 5: RLS Adaptive Filter using Kogge Stone Adder in FIR and Weight Update Part

Figure 6: Output of Four Tap Conventional RLS Adaptive Filter Structure	Figure 7: Output of 4 Tap RLS Adaptive Filter Structure with Kogge Stone Adder in FIR and Weight Update Part

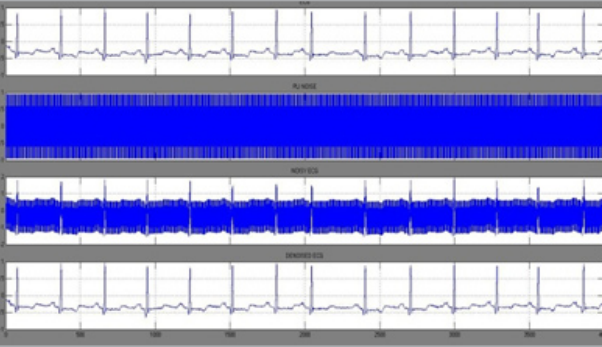Figure 6: Output of Four Tap Conventional RLS Adaptive Filter Structure

Figure 7: Output of 4 Tap RLS Adaptive Filter Structure with Kogge Stone Adder in FIR and Weight Update Part
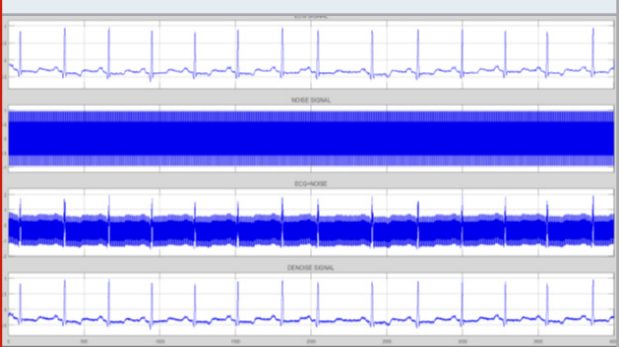
Table 1. Device Utilisation and Timing Summary for the Conventional RLS and Proposed RLS Structures

Filters/ Parameters	Filter Length-4			Filter Length-8			Filter Length-16			Filter Length-32		
	Normal	KSA Adder in FIR part	KSA Adder in FIR & WU part	Normal	KSA Adder in FIR part	KSA Adder in FIR & WU part	Normal	KSA Adder in FIR part	KSA Adder in FIR & WU part	Normal	KSA Adder in FIR part	KSA Adder in FIR & WU part
Number of Slice Registers	101	92	80	189	184	144	365	352	272	717	672	544
Number of Slice LUTs	642	592	485	1085	955	811	1945	1746	1379	4054	4006	3339
Number of LUT Flip Flop pairs used	679	620	501	1146	995	827	2054	1810	1395	4259	4128	3365
Number of fully used LUT-FF pairs	64	64	64	128	144	128	256	288	256	512	550	518
Minimum period(ns)	26.15	21.73	20.07	33.96	33.35	20.10	48.73	21.97	20.58	79.75	24.18	22.70
Minimum input arrival time before clock(ns)	27.01	22.28	20.94	34.83	22.41	20.75	49.60	22.10	20.88	80.62	24.30	22.77
Maximum output required time after clock(ns)	20.90	16.48	16.62	28.71	16.64	16.64	43.48	16.73	17.12	73.00	17.42	17.74
Maximum combinational path delay(ns)	33.35	33.35	32.49	33.35	33.35	33.21	44.35	33.21	32.46	73.87	33.35	32.46

Figure 8: Comparison of SNR Values
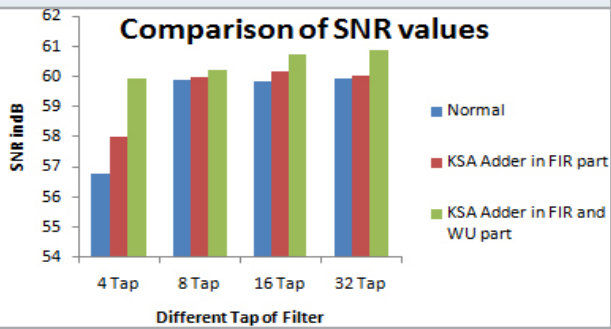
RESULTS AND DISCUSSION

In this section, the performance of RLS adaptive filters with and without Kogge Stone adder for noise cancellation application is evaluated. The ECG signal is taken as the input for the performance evaluation of RLS filter. RLS filters of the order 4,8,16,32 are designed and simulated. The ECG signal used for the analysis is obtained from MIT-BIH arrhythmia database ECG signals are affected by many noises like Power Line Interference (PLI) noise, Electromotive noise etc. The PLI noise has high percentage of occurrence in signal compared to other noises. ECG Signal contaminated with PLI noise of 50-60 Hz is applied as input signal to the designed filters.

In Figure 6, the first subplot shows the input ECG signal (Rec.No.105), the second subplot shows the PLI noise, the third subplot shows the contaminated ECG, the fourth subplot shows the denoised ECG signal obtained using 4-tap RLS filter.

In Figure 7, the first subplot shows the input ECG signal (Rec.No.105), the second subplot shows the PLI noise, the third subplot shows the contaminated ECG, the fourth subplot shows the denoised ECG signal obtained using 4-tap RLS filter with KSA in FIR and Weight Update Part.

Signal to Noise Ratio Calculation: Signal to Noise Ratio is compared and tabulated between conventional and modified RLS Adaptive Filter Structure.

Figure 8 represents the comparison of SNR values compared for different order of filter. The results obtained reveals that proposed RLS Adaptive filter structure with adder replacement in both FIR part and Weight Updation (WU) part shows an average of 4.8% SNR improvement.

Implementation Results: The designed filter structures are implemented in Xilinx Virtex FPGA and analysed for the parameters of area and delay.The results are tabulated in Table I.

Table 1 represents the resource utilization, combinational delay and various other characteristics for RLS algorithm. Different Tap Lengths are used for the design and the

performance is observed. Area reduction of 20.0%, 23.8%, 25.4% and 24.7% for 4 tap,8 tap, 16 tap and 32 tap RLS Adaptive filter structure and Combinational path delay reduction of 2.5%, 0.4%, 26.8%, 56.0% for 4-tap, 8-tap, 16-tap and 16 tap RLS adaptive filter structure respectively is obtained when Kogge Stone adder is incorporated in the FIR and WU part of the architecture.

CONCLUSION

Two forms like Conventional RLS Adaptive filter and RLS Adaptive filter using kogge stone adder in FIR part and Weight update part were designed and implemented in Simulink. Both the architecture were realized in a digital environment using Xilinx ISE tool. Simulation is performed with various ECG signals obtained from MIT BIH database as input to the designed filters and its SNR is obtained. From the analysis, it is observed that the number of slice registers and combinational path delay are reduced in RLS Adaptive filter using kogge stone adder compared to Conventional RLS Adaptive filter for ECG signal denoising. Area reduction of 20.0%, 23.8%, 25.4% and 24.7% for 4-tap, 8-tap, 16-tap and 32-tap RLS Adaptive filter structure and Combinational path delay reduction of 2.5%, 0.4%, 26.8%, 56.0% for 4-tap, 8-tap, 16-tap and 16-tap RLS adaptive filter structure respectively is obtained when Kogge Stone adder is incorporated in the FIR and WU part of the architecture.

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Design of Power Demand Controller for Domestic Loads

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ABSTRACT

Among every one of the sources, energy is one of the significant and necessary sources for any country. Almost all the plants which are used for generating power have been installed. Despite the fact that the plants are producing more power, the electrical demand is expanding day by day. To bridge the gap between supply and demand the power utilization should be optimized. A way to defeat this issue in the present situation is to use the current sources as ideally as could be expected under the circumstances, constraining the wastage in the use of electric strength. In 2012 there was a severe power cut problem in Tamil Nadu. There was a power cut of two, three hours interval and a maximum of four hours. Also, the power was on and off between one-hour interval. So, people were under high pressure because of the power cut during those days. In this paper we implemented a new technique which encourages the customer to use less power during power cut time. We designed a system which passes the signals to the consumer through RF transceiver about the time of power cut.LCD display is attached with it to show the time and buzzer provides the warning sound. There will be two modes of operation, one is Normal mode and another one is demand mode. In normal mode the power from the energy meter is given directly to the load. In demand mode the power from the energy meter is given to the domestic loads through power demand controller (PDC). Certain amount of limited power can be allocated to each and every home. When the system is in demand mode, if people use more than the allocated power, power cut will be done particularly for that home. The normal mode will be enabled after the set time period. A Relay is also attached with it, to switch over the operation from one mode to another.

KEY WORDS: POWER DEMAND CONTROLLER (PDC), DEMAND MODE, LCD DISPLAY, BUZZER.

INTRODUCTION

Power shifts on hourly premise and consistent power cut is going on since numerous years all over India. Individuals are under high strain in view of consistent power cut. In the year of 2012, individuals are confronting extreme power deficiencies, with blackouts enduring

8-10 hours and in rural regions, power cuts can go as long as 14 hours every day. Due to this, people cannot able to complete their work in proper scheduling time. In our proposed system the function of electric loads is controlled by PDC.

The purpose of PDC in our invention is to utilize the power below the predetermined demand during power cut times. This technique is not only used for controlling single load but also engaged in controlling the electrical loads on some priority basis(Clark W.Gellings, 1981)(K.Gatsis et al,. 2013). Initially the total available power can be divided and it is equally shared with all customers. According to their needs they can utilize the home loads. If they use

more than the limited power, power shut down will be done for that home alone.

In this technique we used RF transceiver for sending and receiving the signals, which is implemented in Electricity board and each and every house. At the time of power shut down the transmitter send the signal to end users via transmitting antenna. Once the signal received in the receiver the system will enter into demand mode.(Clark W.Gellings, 1981)(Reynolds M.Belgado et al,. 1985)

MATERIAL AND METHOD

Proposed System: Power demand controller is a device which is used to control the supply of energy to home loads. This device should be connected to energy meter of each and every home. Through the PDC device the power from energy meter is given to loads(Zahir -J. Paracha, 1996).For example if we take a day, people can utilize the maximum amount power which can be allocated by EB office. But during power shut down the supply of current is controlled by PDC. So,Instead of power shut down minimum power can be provided by EB to every end users. so people cannot able to use more power than the allocated.

Figure 1: Normal mode
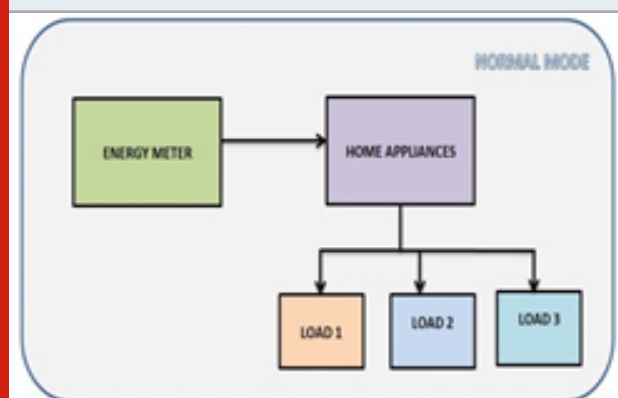
During normal mode the power from the energy meter is directly given to home loads which are shown in fig 1, but in demand mode the path of current supply can be changed by relay.We are having two sections, one is transmitter section and another one is receiver section. Here RF Transceiver is used in both the sections for sending and receiving the signal. As name suggests it operates at radio frequency range(O. C. Imer et al,. 2006). In our system both the Transceiver operates at the same frequency as 434 MHz with bit rate of 1Kbps-10Kbps (S Umesh et al,. 2007).

Block diagram of Transmitter section

The block diagram of transmitter section is shown in fig 3.It comprises of PIC microcontroller, MAX 232 and RF Transceiver.PIC stands for Peripheral Interface Controller. Because of RISC architecture it operates very fast.Also it is very easy to execute a program using PIC. The time when the power shut down is going to happen is

already fixed and it is programmed. During that time the controller sends the signal through the RF Transceiver.
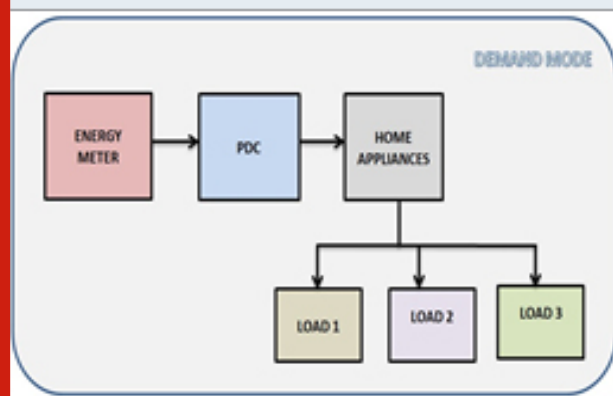

Figure 2: Demand mode
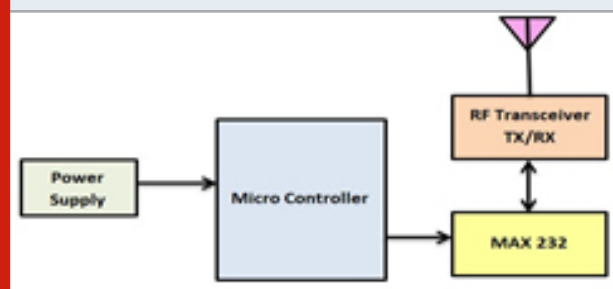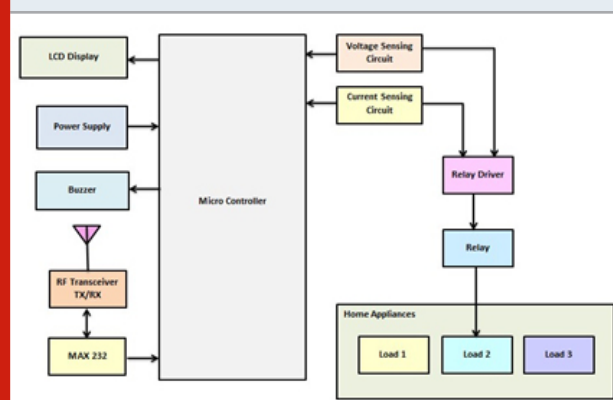

Figure 3: Transmitter section

Figure 4: Receiver section

Block diagram of Receiver section

Once the signal received by receiver section then the system will enter into demand mode.In this mode customer can utilize the home appliances according their needs. For Example in the summer season fan is need for every home.so they can utilize it. In night time instead of fan they can use lamps. Likewise according to the people need they can utilize the home appliances with in the certain limit (S. Tatikonda et al,. 2004).

The PDC receiver section is shown in fig 4.It consists of voltage and current sensing circuit, MAX 232, LCD display and Buzzer. Initially the AC supply is given to the PDC circuit.This AC power can be converted to DC by power supply unit and that can be provided to all other components. Current transformer is mainly used for monitoring the circuit operation and measuring the current consumed by the loads (P. Tabuada, 2007). And also it is used for high voltage protection.PIC microcontroller is a main part of this device. The limited amount of power is already programmed with in it. It compares the amount of power consumed by the load with the threshold power. If it exceeds then through RF transceiver sends the signal to EB to cut the power to that particular home alone(S. Tatikonda et al,. 2004). The LCD display and Buzzer is attached with receiver side. It gives information about timing and warning signal about the time of power cut (K.Gatsis et al,. 2013).

Advantages of proposed system
• Scheduling of power is achieved.
• It needs less maintenance.
• It does not require costly equipment.
• We can avoid total power shutdown.

RESULTS AND DISCUSSION
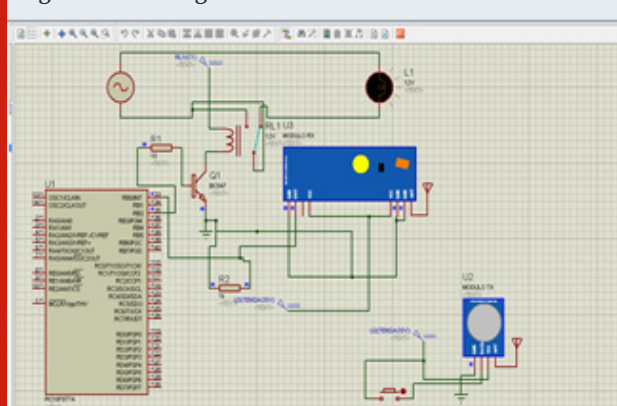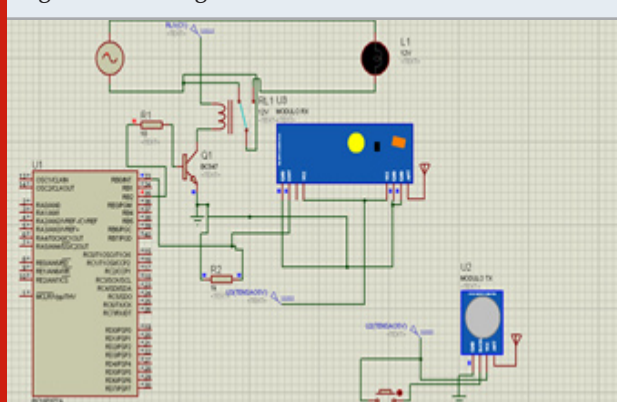
Figure 5: working of PDC when load is connected


Figure 6: working of PDC when load is disconnected

Simulation Results

The simulation model of PDC is shown in fig 5.Both

the RF transmitter and Receiver has been designed. The output of the receiver is connected to load through PIC microcontroller(PIC16F877A).The Transistor BC547 is a current controlling device, which is acting as a switch connected between the port b of controller and the home loads (S Umesh et al, 2007).The controller compares the current usage of power with the threshold power. If it exceeds the position of the switch is changed by transistor and it will disconnect the supply to loads.It is shown in figure 6. LCD display is also connected in the receiver side. It is shown in fig 7.It displays the time of power cut and also the amount of power consumed by the load. Here the load is disconnected because of the excess usage.so it displays that voltage is zero. Buzzer is also connected with it to give the warning sound before the power cut is going to happen.

Figure 7: PDC with LCD display
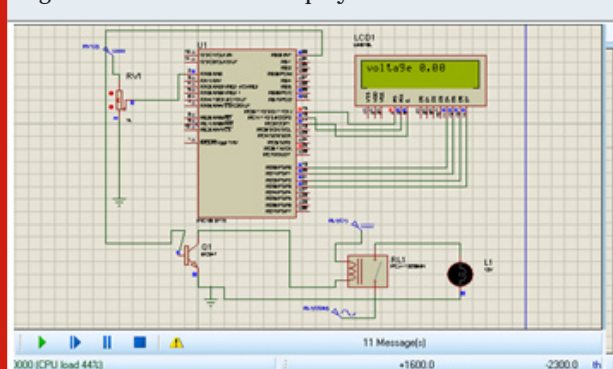
Hardware Output: Figure 8 shows the transmitter section which is going to be placed in EB station. This transmitter unit is used for controlling the power distributed to the home which is connected via the relative receiver unit.

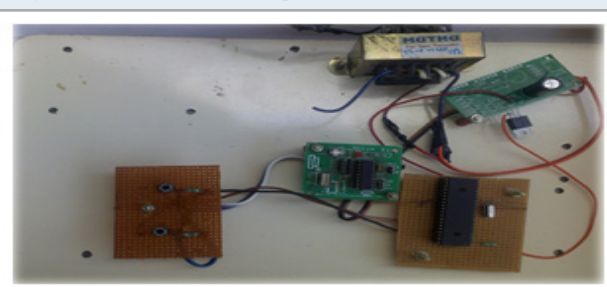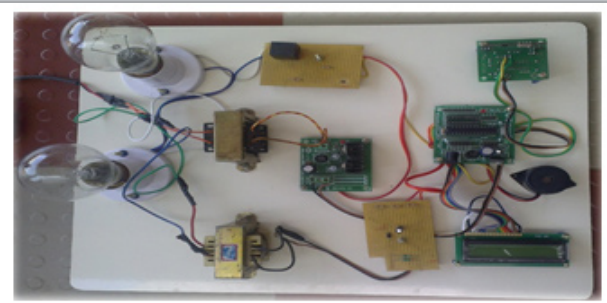Figure 8: Hardware description of Transmitter section

Figure 9: Hardware description of Receiver section

The Receiver unit is installed in the home and it is working based on the signal transmitted from Transmitter unit which is already placed in EB distribution station. Figure 9 shows the receiving unit setup in which the power control board (PCB) is connected.

CONCLUSION

We designed a Power demand Controller system with RF Transceiver. The PIC microcontroller controls the power shut down and the power scheduling is achieved by our proposed system. Programmed power distribution can be carried out in EB station and a predetermined fixed quantity of power can be distributed to each and every home. People will be aware of power shut down if they use more than the allotted power.so they can utilize optimum power during power cut. In future this system will be attached with renewable energy source like solar power system. If power cut will happen due to extra usage of load,they can use this solar energy for functioning of their home appliances.

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Concurrent Speed Control of DC Machine with Armature and Field Mechanism using MATLAB

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ABSTRACT

In this modern era, we need to focus on the speed control of motor in order to utilize these machines to achieve steady state stability in industries for the purpose of running lower and higher loads. Generally, there are two methods that are available to control the speed is armature voltage control and flux control method. In this paper we control the speed by simultaneous changing of field and armature resistance value in the ratio of 1: K.such that we can able to match the load requirements. We simulate the results in MATLAB that can be used as pedagogy for the innovations in teaching professions.

KEY WORDS: SPEED CONTROL, STEADY STATE STABILITY, MATLAB.

INTRODUCTION

In modern days who has to work with machines, he wants to run that machine as per the load. To run the machine as per the load given to it, speed control must be done. If the load given to the machine is low then the speed of the machine should be high, hence the load decides the speed of the machine. DC machine consist of two windings they are armature and field windings. In all DC machines current is passed to the armature winding through carbon brushes. They are called as commutators. These commutators are connected to the armature winding. When the supply is given one part of the armature windings get energized and acts as the poles. Now they are influenced by the stator poles and due to the action of attraction and repulsion and based on the position rotor the machine starts rotating. The main benefit of the DC machine is speed control.The speed of the DC machine directly proportional to the armature voltage and inversely proportional to the flux produced.

MATERIAL AND METHOD

Speed control of DC shunt motor is possible by varying the parameters used in it. Based on those parameters used externally we can able to control the speed of the motor

$$N \alpha E b /\phi \quad Eb= V- IaRa$$

From the above expression we can clearly understand that speed is directly proportional to the back emf and inversely proportional to the ϕ Based on this concept by varying the flux is known as field control (flux control) and by varying the armature voltage is known as Armature control.

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A. Armature Control: Right now armature control the rheostat is legitimately associated with the armature windings, by shifting the opposition esteem the speed can be controlled. Since speed is legitimately corresponding to the armature voltage. The circuit diagram is given in Figure 1.

$$N \alpha \ 1/Va$$

Figure 1: Armature Control
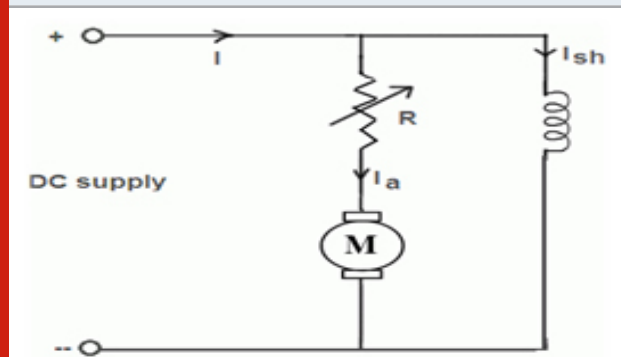
We use this technique in order to run the motor at below rated speed, but these results in power loss in rheostat. This method is neither economical nor efficient.

B. Field Control: In this method of Field control the rheostat is connected to field windings and that is parralel to armature winding. By varing the resistance value the speed can be controlled.

Figure 2: Field Control
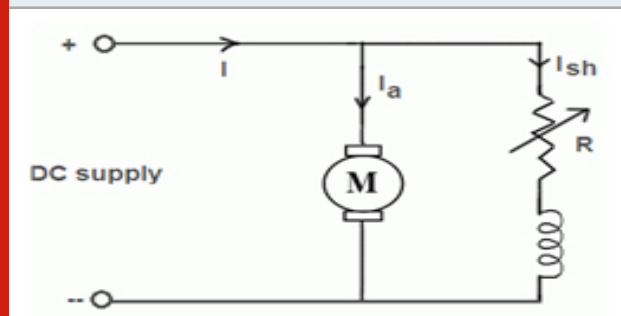
We use this technique in order to run the motor above the rated speed. It is a most commercial method and there is a speed limit for increasing the speed to maximum value. Thus, the rated speed ratio is 1:6 (maximum speed: minimum speed)

RESULTS AND DISCUSSION

Apart from controlling speed of the motor seperately in two various methods we can able to control the speed of the motor simultaneously using both armature and field control techniques. We use MATLAB Simulink for this technique.

A. Concurrent Techniques: For performing this technique

in MATLAB Simulink DC machine of 5HP,240V,1750 RPM having a field voltage of 300V and a step signal input on torque. This setup consists of both armature and field control in a single circuit. The circuit diagram is given on the Figure 3. In this concept first we fix the rated speed of the machine by varying the armature and field rheostat simultaneously at the ratio of 1:K. After it is fixed to the actual machine rated speed it is varied for above and below rated speed by adjusting both the rheostat simultaneously at 1:K ratio. When the resistance value decreases then it tends to increase in speed of machine, This action is known as above rated speed control and represented in the Figure 4. When the resistance value is increased then it tends to decrease in speed of Machine, This action is known as below rated speed control and represented in the Figure 5.

Figure 3: Controlling the speed using both Armature and Field control simultaneously
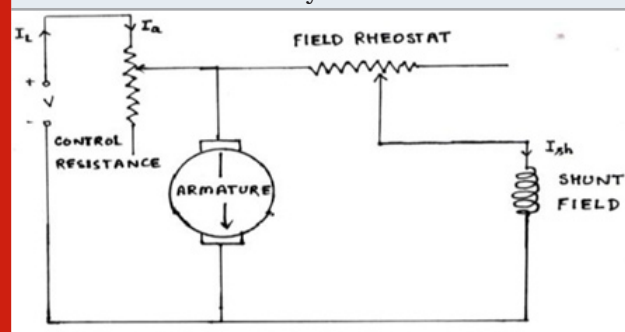

Figure 4: MATLAB Simulink design for controlling at above the rated speed
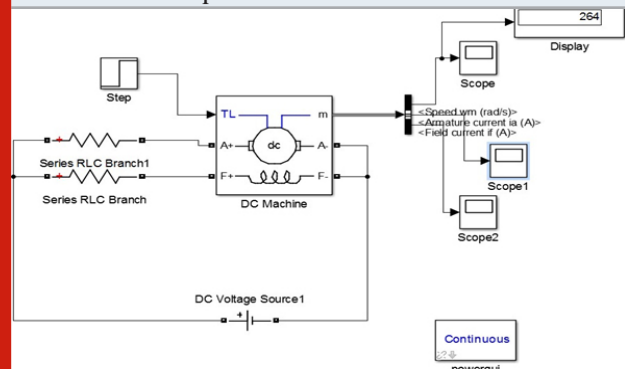

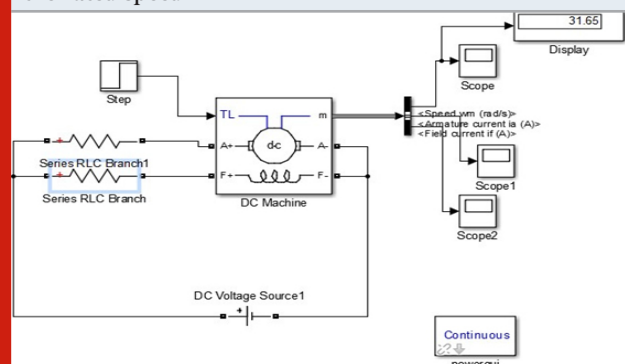Figure 5: MATLAB Simulink design for controlling below the rated speed
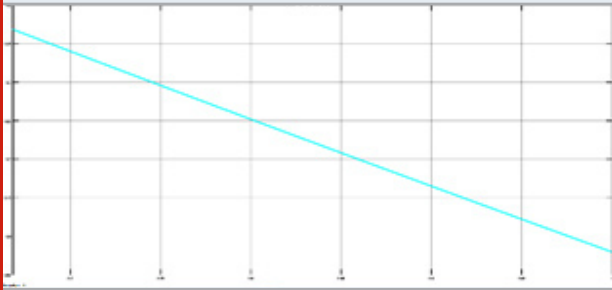
Figure 6: Speed Vs Time during below rated speed

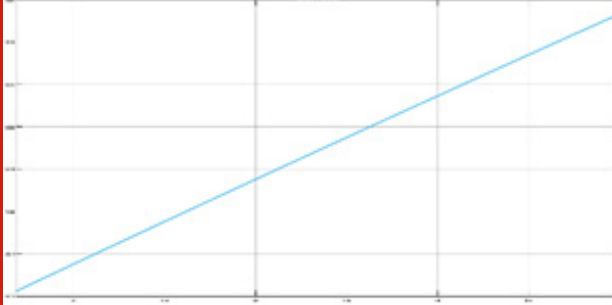Figure 7: Armature current Vs Time during below rated speed

Figure 8: speed vs time during above rated speed
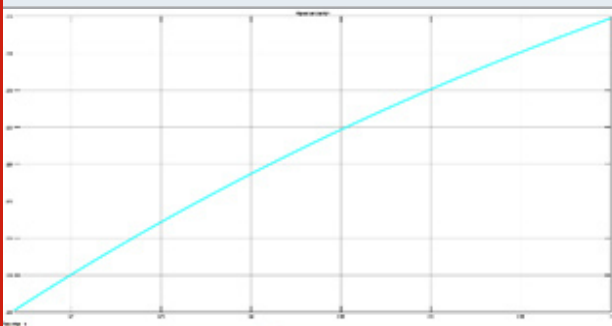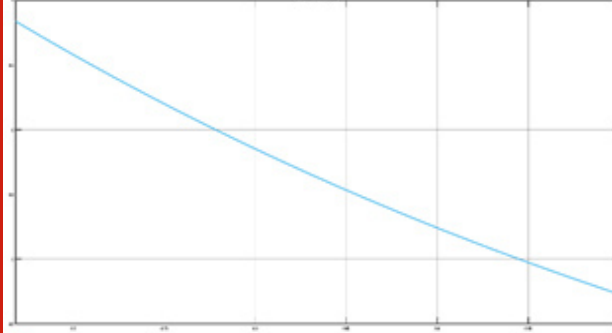

Figure 9: Armature current Vs Time during above rated speed

CONCLUSION

While we use both armature and field control technique in this circuit, there is a possibility of making both above rated and below rated speed control methods. After a

particular value of resistance, the machine gets stopped. For this operation we are considering a 5HP DC machine of 240V of input supply and 300V for field the rated speed for this machine is 1750 RPM. We had given a same supply for both armature and field windings, the operation of machine continues from the resistivity value of0 – 300Ω on the field side and on the armature side 0- 100Ω.By varying the resistance at the ratio of 1: K. From this experiment the motor starts at high speed which is greater than the actual speed as soon as the value of resistance is added at the ratio of 1: K, then the speed of the machine starts increasing with increase in armature current. If we constantly increase the armature and field resistance value simultaneously in the ratio of 1: K. Here we come to know that the speed of the DC machine decreases and remains running at low speed. This was graphically shown at Figure 6 and Figure 7. If we decrease the value of armature and field resistance value simultaneously in the ratio of 1:K. That leads to increase in speed of the DC machine. This was graphically represented in Figure 8 and Figure 9.

The characteristic curves are given in Figure 7 explains that when the value of resistance is added is decreased the speed of the motor is increased. Thus DC machine speed control has been varied above and below rated speed when we move the armature and field rheostat by simultaneous action. Thus, we can able to control the speed of the DC machine for low loads and to perform the various operations in an effective and economical manner.

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Interleaved Boost Converter Based Photovoltaic Array System Employing Fuzzy Based MPPT for the Rapid Change of Solar Irradiance

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ABSTRACT

The Photovoltaic System should operate at its maximum power point, in order to get more energy efficiency. Maximum power varies with solar irradiation and temperature. In this paper, Interleaved Boost Converter (IBC) is used, which comprises of two boost converters operating 180^0 out of phase. The current is divided into two paths in the interleaved boost topology; thereby the conduction losses can be minimized, which makes the efficiency of the proposed interleaved boost converter better than the conventional single phase converters. This topology reduces input current ripple, output voltage ripple and size of the components. Fuzzy logic controller (FLC) based MPPT algorithm is utilized. The values for this controller are acquired from another MPPT algorithm called Perturb and Observe (P&O) technique. Fuzzy logic is used to obtain the MPP operating point faster and have more stable PV output power. The complexity of search algorithm is reduced by fuzzy logic. The Fuzzy Controller tracks the MPP accurately. Hence the FLC is preferred. This paper delineates the performance of the proposed converter with results obtained

KEY WORDS: INTERLEAVED BOOST CONVERTER, MAXIMUM POWER POINT TRACKING (MPPT), FUZZY LOGIC CONTROLLER (FLC), PHOTOVOLTAIC SYSTEM, SOLAR ARRAY.

INTRODUCTION

Renewable energy source plays an important role in the generation of electric power. There are different sources of renewable energy such as wind energy, solar energy, bio mass, geothermal etc., Solar energy is a good choice of generating electricity that causes less pollution and do not threaten the environment. The solar energy is directly converted into the electric energy by the Photovoltaic (PV) module. PV system is used to determine an optimal operating point of the PV array in which the maximum power can be drawn for the given load application. There is only single maximum power point under certain temperature and light intensity in a normal cell. And hence, MPPT of the PV cell is significant as far as the system efficiency is concerned.

Instead of mechanically changing the position of the solar panels, MPPT works electronically to keep the output at the maximum power. Many MPPT methods are proposed by the researchers (Salas et al., 2006; Mei Shan Ngan etal 2011). All the algorithms show a high accuracy in finding

MPPT but the Fuzzy Logic based algorithm presents the advantage of being the fastest to track the maximum power point because of its improved efficiency and works with imprecise inputs without any accurate mathematical model and also handle non-linearity.

Depending upon the surrounding conditions such as temperature and irradiation, the output power of the solar cell can easily be changed and hence its efficiency is low. Thus for the transmission of the power from PV array to the load, high efficiency is needed for the power conditioning systems (PCS). Generally a single stage PV PCS is composed of two conversion stages namely dc/dc conversion stage and dc/ac conversion stage. The dc/dc converter performs the maximum power point tracking and the simplest dc/dc converter topology that can be used for this purpose is the boost converter. However, conventional photovoltaic panels produce low voltage levels. To solve this disadvantage, interleaved boost converter is used because of its reduced ripple currents in both the input and output circuits and hence there is a decrease in the boost inductor magnetic volume. (Seyezhai., 2011; Harine et al. 2011) Higher efficiency is realized by splitting the output current into two paths, and thus reducing I^2R losses and inductor AC losses. Thus interleaved boost converter is used for high power applications to eliminate reverse-recovery. The soft switching technique is used to reduce the switching loss and the switching stress by reducing the switching frequency and by using this technique, the size of the magnetic components gets reduced and the power density is increased (Doo-Yong Jung, et al., 2011).

MATERIAL AND METHOD

A. Solar panel: Solar panel (PV panel) is a packaged, connected assembly of solar cells called PV cells. A PV array consists of several photovoltaic cells in series and parallel connections. Series connections are responsible for increasing the voltage of the module whereas the parallel connection is responsible for increasing the current in the array (Dorin et al., 2010).

Figure 1: Equivalent Circuit of the PV Cell
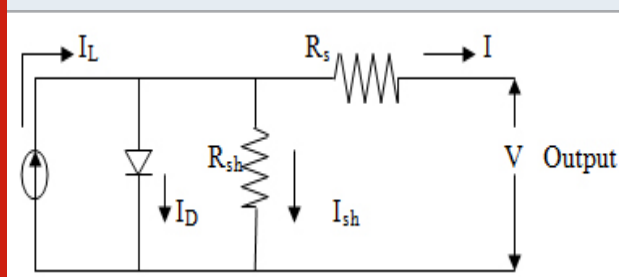
The equation (1) depicts the I-V characteristics of the solar PV cell. By means of this equation, the uncomplicated equivalent circuit is revealed in figure 1.

$$I = I_{PH} - I_D - I_{SH} \qquad (1)$$

where I is the Cell current (Amperes), PH is the Photo current (Amperes): D is the Diode current (Amperes), SH is the Shunt current (Amperes). The I-V characteristics of a typical solar cell are as shown in the figure 2

Figure 2: I-V characteristics curves of a solar panel
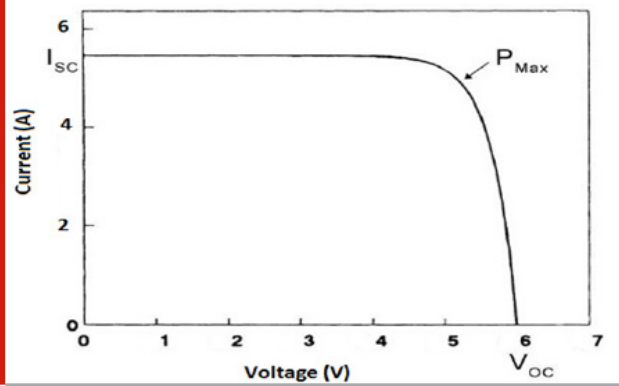
When the voltage and the current characteristics are multiplied, the P-V characteristics is obtained as shown in Figure 3

Figure 3: P-V characteristics curve of Solar Panel
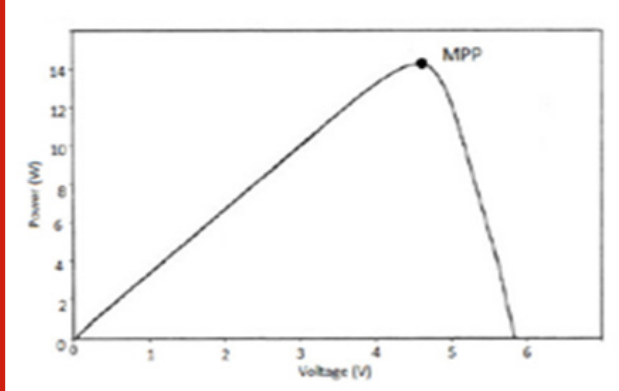
The entire system has been modelled on MATLAB/Simulink. The Simulink model of the Solar PV panel (Masked) is shown in figure 4 and figure 5 represent the model of solar panel (Unmasked). The inputs used to model the solar PV panel are temperature, solar irradiation, number of solar cells in series and number of rows of solar cells in parallel.

Figure 4: Modelled Solar PV panel
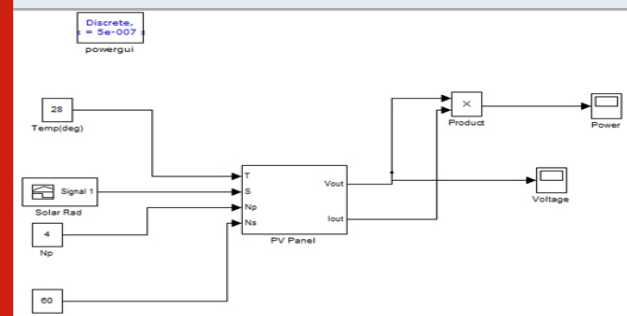
Figure 5: Modelled solar PV panel (Unmasked)

The simulation is carried out for cell temperature of 28° C, 60 solar cells in series and 4 rows of solar cells in parallel. The irradiation is shown in figure 6. It varies from 60 Watt per sq. cm. to 85 Watt per sq. cm, which is close to the day values of solar radiation received on the earth's surface. The simulation runs for a total of 0.14 seconds, with the irradiation taking up a new value every 0.04 seconds and staying constant for the consequent 0.04 seconds. The voltage obtained is 20.6V and the current is 13.6A for the irradiation signal of 85 Watts per sq.cm.

Figure 6: Output Voltage of PV panel

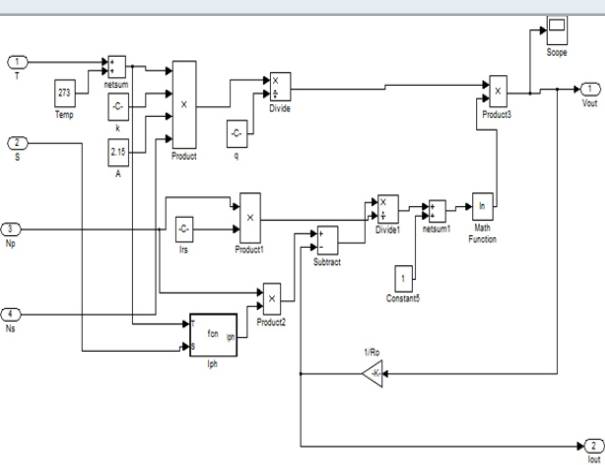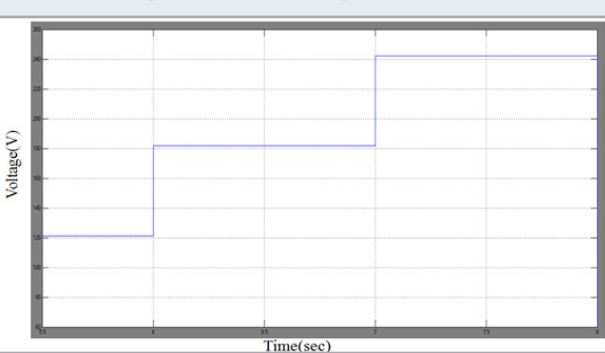

Figure 7: Output Power of PV panel
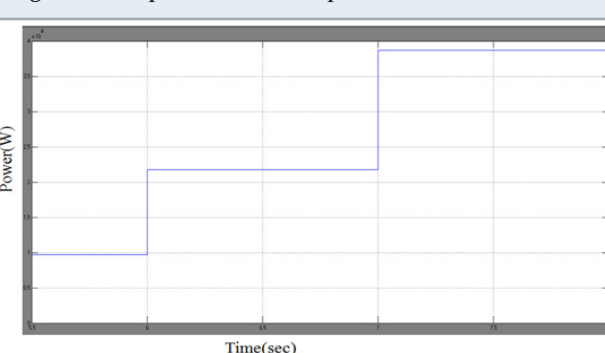
From the figure7, the power obtained was around 280Watts for a solar irradiation value of 85 Watts per sq.cm. From the simulation results, we conclude that for

the insolation level at 85W/cm², the PV array delivers the maximum power 280W. Similarly for the insolation levels 70W/cm² and 60W/cm², it delivers the maximum power 190W and 140W at the load values respectively. For all the three condition we assume that the temperature is at 28°C.

B. MPPT Algorithm

Figure 8: P&O Algorithm
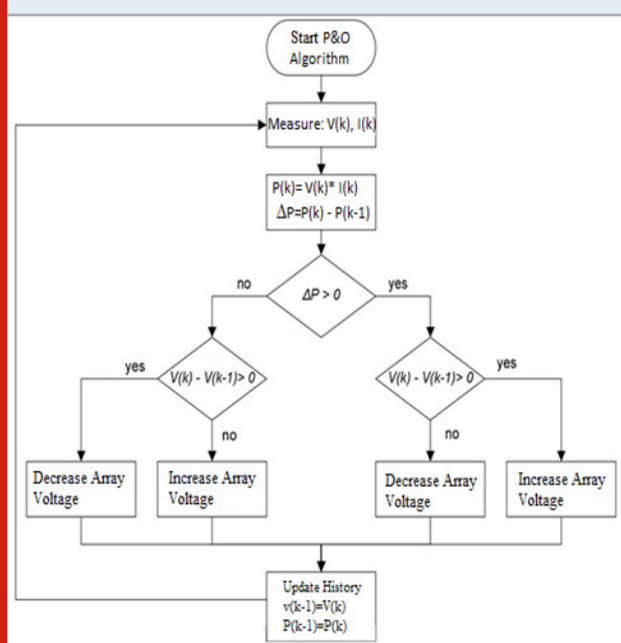
Numerous techniques have been proposed so far to realize MPP. These MPPT methods vary in complexity, sensors required, convergence speed, cost, range of effectiveness, implementation hardware, popularity, and in other respects. Among them constant voltage method, the Perturb-and Observe (P&O) method, the incremental conductance method etc., are most common. The P&O algorithm is mostly used, due to its ease of implementation The FLC based on linguistic fuzzy rules has more flexibility and intelligence than conventional P&O controller. (Aït Cheikh et al., 2007; Chekireda et al., 2011; Asiful Islam et al., 2007). Three main modules in the FLC are: 1.Fuzzification 2.Fuzzy rule base and inference and 3.Defuzzification

Figure 9: Fuzzy Logic Control
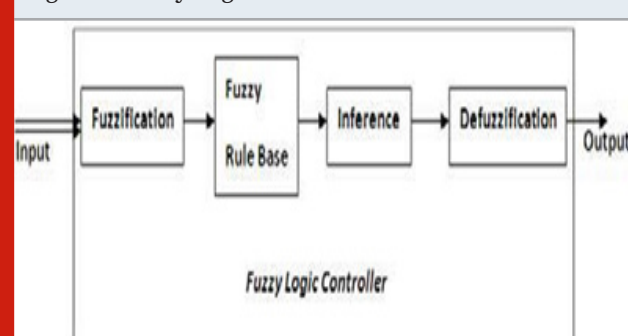
Figure 10: FLC Flow Chart
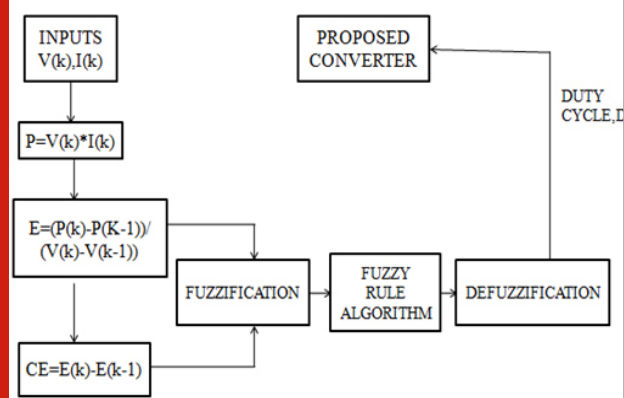
Initially, the error (E) and the change of error (CE) are fed into the fuzzifier. By the preferred membership functions, the input crisp values can be fuzzified to a set of fuzzy values (Chin et al., 2011; Saban Ozdemir et al., 2017). For fuzzy inference, a fuzzy rule base is built with some linguistic fuzzy rules. Based on the designed fuzzy rule base, the fuzzy inference engine derives a set of fuzzy results with selecting minimum and maximum. Finally, the defuzzifier combines and transforms the fuzzy results to a crisp output value.

C. Interleaved Boost Converter: The interleaved boost converter consists of two single-phase boost converters connected in parallel. The two PWM signal difference is 180^0 when each switch is controlled with the interleaving method. The input current is the sum of the two inductor currents, IL1 and IL2. Because the inductor's ripple currents are out of phase, they cancel each other out and reduce the input-ripple current that the boost inductors cause.

Figure 11: Interleaved Boost Converter
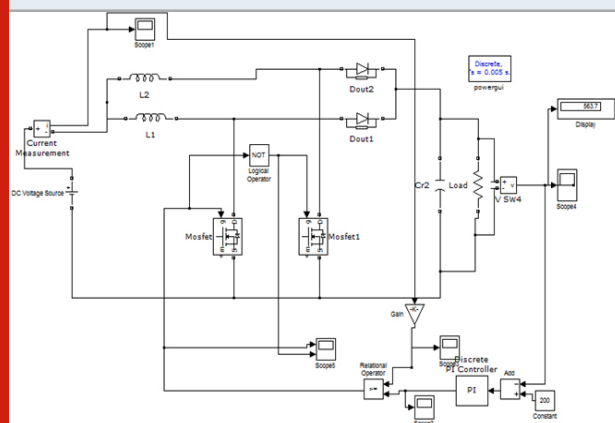
IBC is usually employed in high input-current and high input-to-output voltage conversion applications. Interleaving is employed to reduce the input current ripple, and therefore to minimize the size of the input filter that would be relatively large if a single boost converter was used.

Figure 12: Switching Pulses
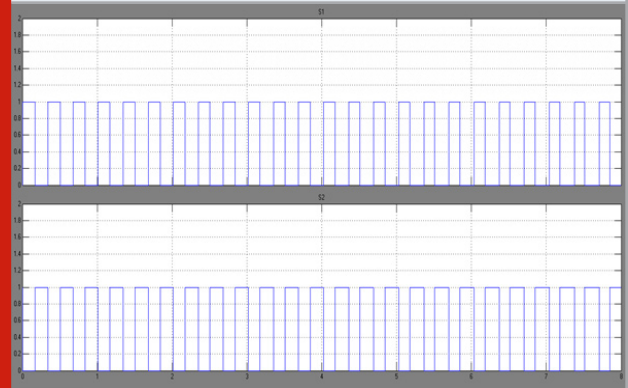
Interleaving adds additional benefits such as reduced ripples in both input and output circuits. Higher efficiency is realized by splitting the output current into 'n' paths, substantially reducing I²R losses and inductor losses.

Figure 13: Input Waveform
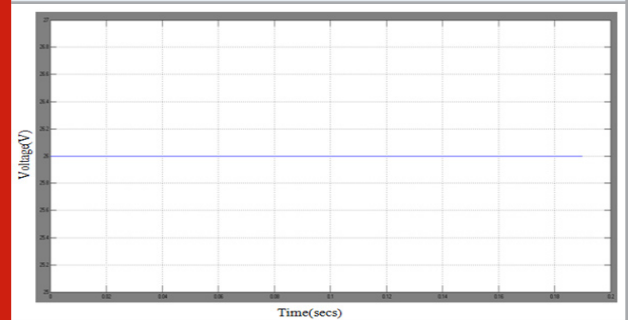
Figure 14: Output Waveform
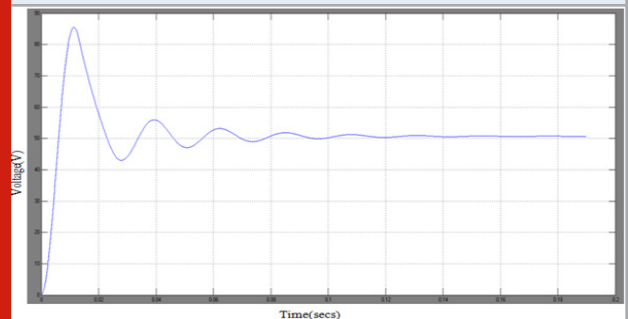
The input is given as 26V. By using the interleaved boost converter, the output voltage gets increased and becomes constant at 50V.The inductor current is between 8.5A and 7.5A. The average is equal to 8A with a ripple of 7.70% which is slightly less than the calculated ripple equal to 10%. The input current ripple is about 0.08%. Figure 14 shows the output voltage waveform for IBC which is settled at 50V.

RESULTS AND DISCUSSION

Proposed Model: Interleaved Boost Converter finds applications in various real life scenarios like Automobile

Engines, solar water pumping etc. The simulation has been done for a resistive load of 300ohm. In the IBC circuit, the inductor has been chosen to be 0.763 mH and the capacitance is taken to be 0.611 µF for a ripple free current. Figure 15 shows the simulink block of Interleaved Boost Converter using P&O Algorithm. The Output Voltage is obtained which is shown in the Figure.16. The voltage varies according to the rapid change of Solar Irradiance.

Figure15: Simulink Model of Interleaved Boost Converter using P&O Algorithm
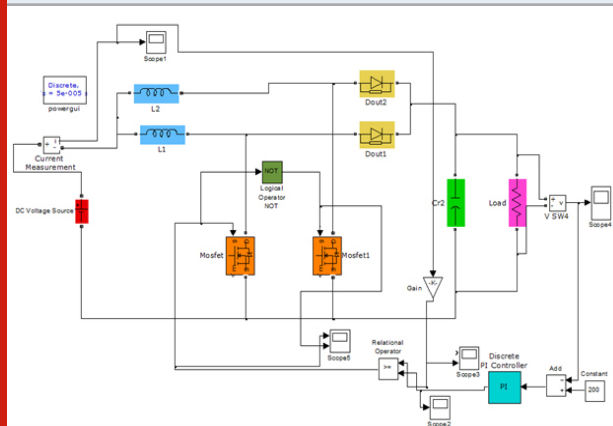
Figure 16: Voltage of IBC using P&O Algorithm
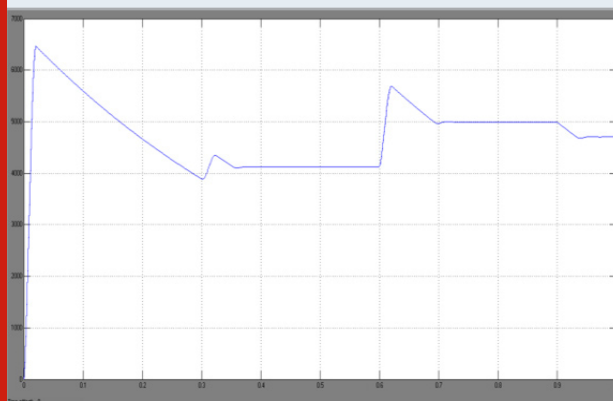
Table 1. Fuzzy Rule Table

E./CE.	NB.	NS.	Z.	PS.	PB.
NB.	NB.	NB.	NB.	NS.	NS.
NS.	NB.	NS.	NS.	NS.	PS.
Z.	NB.	NS.	Z.	PS.	PB.
PS.	NS.	PS.	PS.	PS.	PB.
PB.	PS.	PS.	PB.	PB.	PB.

The Fuzzy Logic Controller (FLC) is used in place of P&O Algorithm. It tracks MPP accurately and complexity of search algorithm is reduced. Fuzzy logic is used to obtain the MPP operating point faster and have more stable PV output power. Table.1 shows the fuzzy rules which is used with 5 membership functions. All the input and output

variables are indicated by 5 fuzzy levels: NB. (negative big), NS. (negative small), ZE. (zero), PS. (positive small), and PB. (positive big) and it consists of 25 rules.

Figure 17: Membership function for (a) input of error, E, (b) input of change of error, CE and (c) output of duty cycle, D.
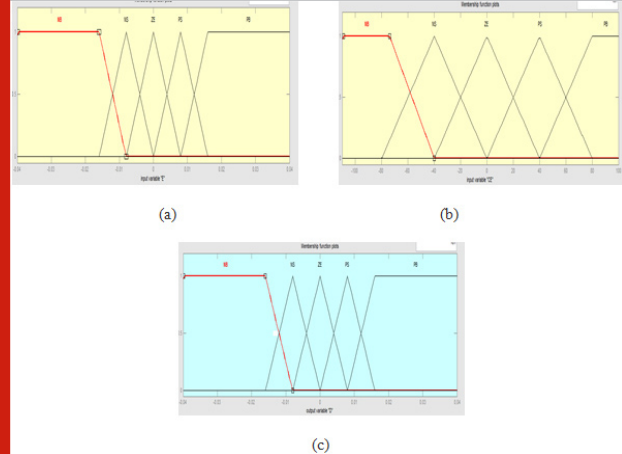
Figure 18: Output Voltage using FLC
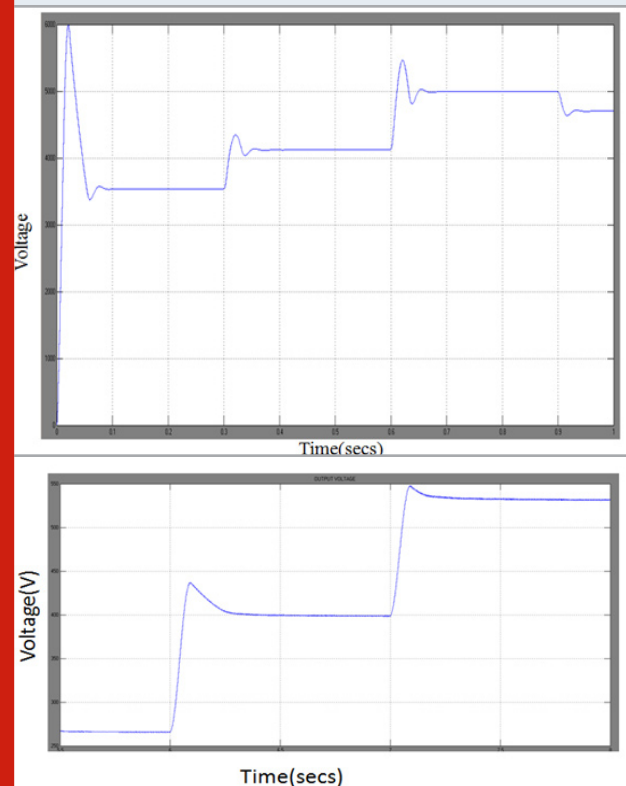
For the different irradiation signal, the load side voltage is increased correspondingly. When the solar irradiance is about 85Watts per sq.cm, the output voltage is stepped up to 5000V.

Similarly for other irradiation, the voltage is changed accordingly. Figure.16 and Figure.18 shows that

fuzzy logic MPPT has better performance than P&O technique. Thus Fuzzy MPPT can track MPP faster than conventional MPPT even in rapid changes of solar irradiance.The performance of MPPT using the FLC and the simple P&O techniques is verified by operating them under the variation of irradiance. Figure. 19 shows the transient responses of the tracking power curves obtained from both control algorithms. As seen in the figure, the proposed response is much faster than that of the conventional MPPT while the overshoots of the system are almost the same.

Figure 18a: Tracking curves by the FLC and P&O Methods
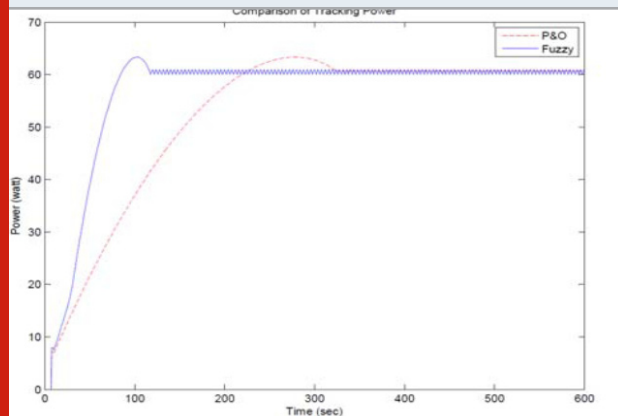
CONCLUSION

Thus from the above results, it is observed that the interleaved boost converter provides good efficiency compared to the conventional converters (Hairul Nissah Zainudin et al, 2010). The MPPT technique was used to track the maximum power point in an easier way. At steady state, the operating point oscillates around the MPP giving rise to the waste of some amount of available energy and the system accuracy is low. Incremental Conductance method has measurement parameters as same as P&O method. However, from derivation of this method, it can be seen that it has no consideration about change of temperature. In a nutshell, in fast changing environment these conventional MPPT methods face a great deal of difficulty to track the actual MPP. To overcome the difficulties of commonly used MPPT methods a unique Fuzzy Logic Controller (FLC) can be used. This controller can track the MPP not only accurately but also its dynamic response is very fast in response to the change of environmental parameters in comparison with the conventional MPPT algorithms.

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Symmetric Particle Based Feature Detection in Medical and Natural Images

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ABSTRACT

Unexpected splendor changes, ridge and mass identification plays an especially significant job in the determination of therapeutic images. In this paper, Symmetric particle based component finder technique is actualized on CTA restorative picture, Retinopathy Images. Retinal picture and Natural pictures were used for better understanding of Image perception. Regularity based alpha parts for Edge; Ridge and Blob identification is utilized to discover the edges, ridges and masses from Medical CTA picture, Retinopathy and Natural Images. Existing strategies are Sobel, prewitt, LoG and Canny edge locator techniques. Yield Image of Sobel, prewitt, LoG and Canny edge identifier gives edges with brimming with discontinuities and edges are not appeared in an unmistakable manner. So as to defeat those disadvantages the Symmetric particle based element finder technique is proposed. The yield results give more experiences about the pictures, edges and masses the general extent of discovering more discernments. Novel methodologies for the edge, ridge and masses indicator are displayed in this paper.

KEY WORDS: ABRUPT SPLENDOR CHANGES, BLOB, COMPUTER TOMOGRAPHY ANGIOGRAPHY, MEDICAL IMAGE, RETINOPATHY IMAGE ,RIDGE, SYMMETRIC PARTICLE BASED COMPONENT DETECTOR.

INTRODUCTION

The two main significant responsibilities in Medical image processing with an overwhelming number of applications are the correct localization of the significant structures in an image and precise characterization of their geometry. Now a days the advent of Medical Image Processing leads to lot of research related to growth and analysis of algorithms for the finding and classification of features such as edges, ridges, and blobs. In many practical situations, highly optimized implementations of popular methods such as the Canny edge detector, approaches that are based on directionally sensitive filters. Multiscale systems of anisotropic functions are not always capable of reliably identifying the features in query. It is often the situation for images which are heavily distorted by noise, in which different features are strongly overlapping, or where the geometry of the considered features is considered by a high dissimilarity and anomalies such as bend points. It is also noted that feature detection in general is a task in which computer is outperformed by humans.

Researchers are facing problems when developing methods for feature detection and to identify universal, computationally tractable properties that are characteristic of unique to points at which a certain feature is localized. For edge detection, the most elementary observation

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was that edges are typically connected with changes in contrast and can thus be identified by considering points with large image gradients. This method led to the development of first edge enhancement filters such as the operators of Sobel, Prewitt, Roberts, LOG and Canny. The consideration of the magnitude of gradient filters is highly sensitive to noise and also variations in image illumination.

Marr and Hildreth were proposed a big step towards capturing the structural nature of edges. Marr and Hildreth noticed that edges coincide with zero-crossings in the second directional derivative of the image intensities while Canny established an algorithm for edge detection which identified the points at which the image gradient grasps a local maximum. The Canny edge detector is also based on a gradient filter and the Marr-Hildreth-operator applies a discrete Laplace filter. Gradient filter and discrete Laplace filter are not just evaluating whether a magnitude exceeds a certain threshold but consider local structural properties by testing for zero-crossings and local maxima. In the late 1980's dimensionless approach was proposed to detect features such as edges and ridges. Dimensionless approach was also called as local energy model that also postulates the location of features coincides with points in an image for which the Fourier components are maximally "in phase".

Dimensionless is due to the values generated by the measures are not relating to the physical quantities such as image intensities. It is required to optimize a certain value over inputs from a continuous interval for every point in an image to precisely calculate the degree of phase congruency. Kovesi formulated the procedure as computationally high and also shown that an equivalent measure can be formulated in terms of convolutions with differently scaled and concerned with complex-valued wavelet filters. The paper is organized as follows: Section II provides the literature survey of Edge, Ridge and Blob detection of Medical Images and methodologies. Proposed method of Edge and Ridge and Blob detection is presented in section III. Finally, Section IV concludes the entire work in the implemented concept.

MATERIAL AND METHOD

Literature Survey: This section highlights the literature survey of various approaches used by different researchers in the field of Edge and Ridge detection (Erik Bekkers et al,. 2014) dealt with retinal vasculature extraction based on biologically inspired multiorientation analysis. In this paper multi-orientation analysis through supposed invertible orientation scores, modeling the cortical columns in the visual system of higher mammals. Multi-orientation analysis permits to generically deal with many hitherto complex problems inherent to vessel tracking. Complex problems inherent to vessel tracking are crossings, bifurcations, parallel vessels, vessels of varying widths and vessels with high curvature. In this paper approach related to tracking in invertible

orientation scores via a novel geometrical principle for curve optimization in the Euclidean motion group was presented. This method runs entirely automated and provides a exhaustive model of the retinal vasculature, which is critical as a wide-ranging basis for further numerical analysis of the retina, especially in screening applications. A new algorithm that tracks vessel edges through the orientation score of an image (ETOS) was presented in this paper.

Cake wavelets and Gabor wavelets along with ETOS algorithm were used for both invertible and non-invertible orientation scores. Edges through orientation score (ETOS) algorithm was used as a basis for vasculature tracking algorithm to construct comprehensive ordered models of the retinal vasculature. (E. J. King et al,. 2015) dealt with the Shearlet based edge detection along with flame fronts and tidal flats. Shearlets are multi tenacity analysis systems which are well suited for handling symmetrical features in multi-dimensional data than early wavelets. A new method for edge and line detection is in the spirit of phase congruency. In this paper Complex Shearlet transform, this method is used for an approximate tangent direction of detected discontinuities as a result of the computation, which then yields local curvature estimates.

This paper gives detail about the flame fronts which are transient or weak and the images are noisy. Shearlet-based edge measure yields good results as well as an accurate approximation of local curvature. In this paper edges of features like fields or islands in the SAR images were detected. The complex Shearlet edge measure works well on noisy, real-life data. This method works quite well on flame front data .Complex Shearlet transform requires more work via the addition of further image processing procedures like sophisticated handling of the speckle noise and a powerful segmentation algorithm in order to completely automate the task of determining the boundaries of tidal flats. This method can be easily altered to detect lines, which appear in experimental data. Shearlets have an isotrophic feature which permits the method to give local geometric information of edges and lines, like tangent and curvature

(Cihan Bilge Kayasandik et al,. 2016) described an improved detection of soma location and morphology in fluorescence microscopy images of neurons. In this paper, an innovative algorithm for the detection and extraction of somas in fluorescent images of networks of cultured neurons was presented. Somas and other structures were existing in the same fluorescent channel. This innovative algorithm depend on a new geometrical descriptor called Directional Ratio and a collection of multi scale orientable filters to compute the level of local isotropy in an image. Multiscale anisotropic filters were used to optimize the application of this approach. Multiscale anisotropic filters were implemented by separable convolution. This algorithm facilitated the development of automated platforms for high content neuron image processing. In this paper, higher reliability

(much fewer somas are missed or misidentified), much faster detection and significantly more accurate soma extraction were perfectly done in neural images.

(Bolkas et al,. 2017) described Detection of Rock Discontinuity Traces Using Terrestrial LiDAR Data and Space-Frequency Transforms. Space frequency illustrations are ideal for detecting singularities due to their localization in space and frequency. Space-Frequency Transforms allow multiscale analysis, which is used for isolating LiDAR-data noise and weak traces in lower scales. Shearlet, Curvelet and Contourlet transforms were evaluated in this paper. Existing edge detection operators like Sobel, Prewitt, and Canny operators were used for comparison purposes Numerical and visual assessment disclosed that Contourlets and Shearlets accomplished the highest agreement with manually-extracted traces that are used for validation. They were used along with minimal user interaction in order to increase the efficiency of rock mass mapping and geometric modelling in stability assessment of tunnels, mines, slopes, and related applications.

(Halehkarbalaali et al,. 2018) described Edge detection using 3D Shearlets on Seismic channel that is a study on synthetic and real channelized 3D seismic data. In this research paper, Shearlet transform was used as a multi-scale and multi-directional transformation for detecting anisotropic singularities in two and higher dimensional data. Frequencies occur as edges in seismic data, which can be perceived based on maximizing the Shearlet coefficients through all sub-volumes at the optimum scale of decomposition. The perceived edges may need further enhancement through the application of a thinning procedure. A volume element pyramid-adaptation of efficiently supported Shearlet transform was applied to artificial and actual channelized, three-dimensional post-stack seismic data in order to weakening the information into different scales and directions for the purpose of frequency boundary recognition. Three-dimensional Shearlet transform is required to achieve effective results in comparison with some famous gradient-based edge detectors, such as Sobel and Canny, a thresholding scheme. The three-dimensional Shearlet edge detection algorithm achieved with virtuous results rather than Sobel and Canny operators even in the presence of Gaussian random noise.

Proposed Method
Symmetric Particle Based Feature detection: The symmetry and self-similarity properties that label edges and ridges in the one-dimensional setting can also be used to extract features from two-dimensional signals with small adjustments. A function relating a two-dimensional image is locally odd-symmetric at a point lying on an edge with respect to the tangent of the edge contour. Similar to wavelet systems, Shearlet systems are constructed by modifying generator functions. Generating functions are considered as tensor products of the Gaussian with one-dimensional odd- or even-symmetric wavelets to detect two-dimensional edges

and ridges from the sets Ψe and Ψo. Tensor products of two even-symmetric wavelets are considered for blob detection.

Two-dimensional Edge measure is given by

$$\breve{E}(f,y) = \frac{\left| \sum_{j \in J} \langle f, m^o_{j,\theta^*(y),y} \rangle \right| - \left| \sum_{j \in J} \langle f, m^e_{j-j^e\theta^*(y),y} \rangle \right| - \beta N_J K \psi^o}{N_J \left| \sum_{j \in J} \langle f, m^o_{j^*(y),\theta^*(y),y} \rangle \right| + \varepsilon}$$

$\in > 0$ prevents division by zero. for the one-dimensional wavelet ψo corresponds to the odd-symmetric coecient at the location of an ideal edge with jump-size one. Edge measurement for one dimensional is given by

$$E(f,y) = \max\{ 0, \breve{E}(f,y)\}$$

From the equation it is proved that L1-normalization precisely neutralizes the decay of shearlet coecients at points that lie on smooth boundary curves instead of L2 normalization.
Local height measure for edge is given by

$$H_E(f,y) = \frac{\langle f, m^o_{j^*(y)}\theta^*(y),y \rangle}{K\psi^o}$$

A two-dimensional ridge measure is obtained by simply interchanging the roles of the odd- and even-symmetric molecules mo and me in the equation of the edge measure E(f,y).

$$H_R(f,y) = \frac{\langle f, m^e_{j^*(y),\theta^*(y),y} \rangle}{K_{g^e}(f,j^*(y),y)}$$

where > 0 prevents division by zero, $\beta > 0$ is a soft-thresholding parameter, and $jo \in_R$ denotes the scaling oset between even- and odd-symmetric molecules.
Ridge measurement is given by

$$R(f,y) = \max\{0, \breve{R}(f,y)\}$$

The Edge and Ridge measures perceive features that show symmetry properties that are locally defined by a singular symmetry axis, specifically the normal of the tangent of an edge contour or the centerline of a ridge. The same approach can be used to detect features in two-dimensional images that have less anisotropic symmetry properties in the sense that locally, the center of such features is a point of symmetry for more than one or even all possible directions.
The height of the blob is measured by

$$H_B(f,y) = \frac{\langle f, \widetilde{m}^e_{j^*(y)\theta^*(y),y} \rangle}{\widetilde{K}\widetilde{g}^e(f,j^*(y),y)}$$

Two dimensional Ridge Measure is given by

$$\breve{B}(f,y) = \frac{\sum_{j\in J}\min_{j}\text{sgn}(H_s(f,y))\langle f, \tilde{m}^e_{j,s,j}\rangle\} - \sum_{j\in J}\max_{j\in R^{m\times n}}|\langle f, m^t_{j-p\cdot e(j),j}\rangle\} - \beta N_s \breve{R}_x(f,j^*(y),y)}{\sum_{j\in J}\max_{j}|\langle f, m^t_{j,s^*(j,j)}\rangle| \cdot |H_s(f,y)| \breve{R}_{s^*}(f,j,y)\}}$$

where $\varepsilon > 0$ prevents division by zero.
For Blob detection it is given by

$$B(f,y) = \max\{0, \breve{B}(f,y)\}$$

RESULTS AND DISCUSSIONS

In order to observe the feature detection algorithm, various images are tested and observed the characterization of features such as edges, ridges, and blobs in two-dimensional images. The following Figure-1 shows the effectiveness of the proposed method for CTA image.

Figure 1: CTA Image

(a) Input Image of CTA (b) Edge detected Output

(c) Ridge detected Output (d) Blob detected Output
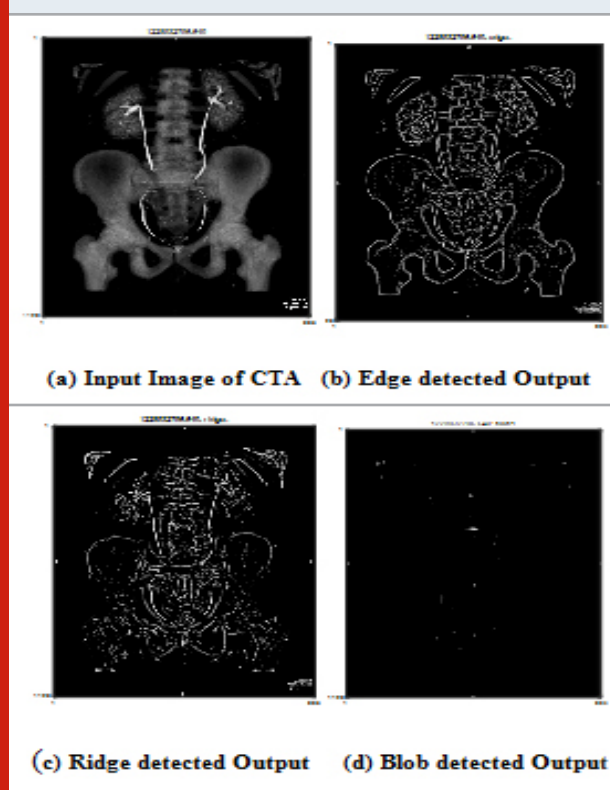
From this image shown in Figure 1 (b), various possible defects in the kidney at the edges can be easily diagnosed and in 1 (c) minute blood vessels, Bone defects and nerve defects internally can be diagnosed clearly. From 1 (d) the location of Malignant or Benign Tumors in the image can be easily detected. Next, the above proposed procedure can be applied to the image of retinopathy and found the effectiveness in the detection of features effectively. Figure 2 (a-d) shows the input, edge detected output, Ridge detected Output and Blob detected Output of retinopathy image.

From this image shown in Figure 2 (b), various possible defects in blood vessels with respect to the edges can be

easily diagnosed and in 2 (c) minute blood vessels and their internal defects can be diagnosed clearly. From 2 (d) shows the blob detected image. Next, the proposed work is extended to check for natural images. Figure-3 shows the original image of peppers. From which, in the first row second image shows the Canny edge detector output and third one is the sobel method output. From the second row, the first image is the output of existing method and second Image is obtained with the threshold of 45 degree. Third Image is the output by carryout of the morphological operations. Table 1 shows the comparison output of various Edge detector operators and methods. From that table, it is concluded that the symmetric particle based feature detector gives excellent results in perceiving Edges, ridges and blob of medical as well as natural Images.
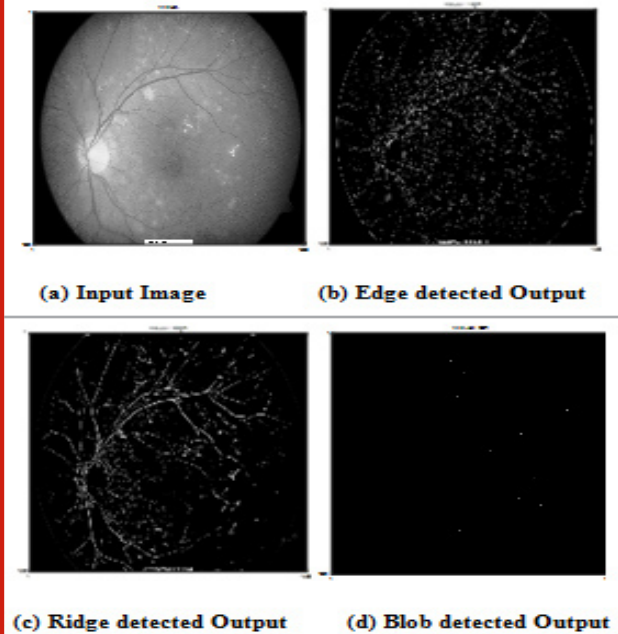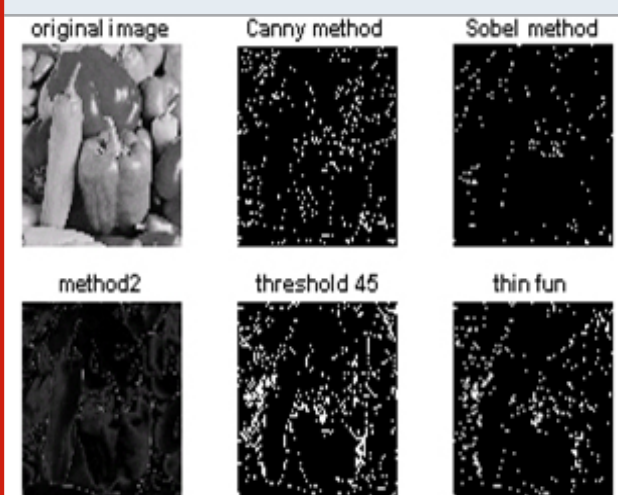

Figure 2: Retinopathy Image

(a) Input Image (b) Edge detected Output

(c) Ridge detected Output (d) Blob detected Output

Figure 3: Natural Image: Peppers Image

original image Canny method Sobel method

method2 threshold 45 thin fun

Table 1. Comparison Table

S.No	Name of the Image	MSE	Edge Detection Operator or Method	PSNR	Processing Time (Seconds)	Remarks
1	CTA	0	Sobel	Inf	315.13	Poor
		0.0748	Canny	11.26		
		0.0671	Morphological	11.73		
2	Retinopathy	0	Sobel	Inf	584.27	Very Poor
		0.0519	Canny	12.85		
		0.0513	Morphological	12.90		
3	Natural Image: Peppers	0	Sobel	Inf	8.36	Fair
		0.600	Canny	12.22		
		0.624	Morphological	12.04		
4	CTA	19.29	Symmetric Particle based feature detector	35.31	38.5	Excellent

CONCLUSION

A new framework for the detection and characterization of features such as edges, ridges, and blobs in two-dimensional images were presented. Existing edge detection operator gives the output image with very much noise. Existing methods like Canny, Sobel, prewitt, LoG and Roberts does not give accurate results in the presence of noise.But Symmetric molecule based feature detector gives very good result with full elimination of noises with respect to noises in the background of the images. Even- and odd-symmetric analyzing functions are considered which are sensitive to scaling and orientation, the measures Edge, Ridge, and Blob which are strongly stimulated by functional properties that are known to be revealed by neurons in the early human visual system. Exact Edge,ridge and blob detection in CTA and Retinopathy images gives more information in diagnosis of various diseases related to nerves and blood vessels. By applying the symmetric Particle based feature detector accurate determination of Edges,Ridges and blobs were detected.

Future Scope: In Future Automatic detection of GUI based edge detection with lot of features may be developed. Processing time may be within seconds. This will reduce the time of physicians to diagnose various kinds of diseases like Osteoarthritis, Broken hip etc.

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Sugarcane Bagasse Moisture Monitoring and Control in Sugar Industries

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ABSTRACT

The present industrial project is related to measuring of bagasse moisture content and controlling of bagasse using dryer. Sugarcane is one of the most widely cultivated crops in the world. The extraction of sugar from this crop generates several residues that are often disposed improperly especially where sugar mills use basic process technology. The huge quantities of solid waste are often destroyed or burned inefficiently causing environmental pollution. Currently, Bagasse is mainly used as a fuel in the sugarcane industry to satisfy its own energy requirements. Hence, the moisture content of bagasse to be controlled necessarily for sufficient combustion and the released flue gas are used to dry the moisture content of bagasse for efficient combustion. Burning or incineration in a boiler for steam generation is the most common application of bagasse. In many sugar industries, bagasse moisture content is measured and controlled by NIR Moistech sensor. Since the NIR Moistech sensor is of high cost and requires high maintenance, it is proposed an idea of using capacitive humidity sensor for moisture measurement of bagasse the moisture of bagasse are continuously monitored and set point is fixed as 48. If the moisture content of the bagasse is above 48, the conveyor speed is reduced and the dryer automatically gets ON by producing hot air for drying, thus providing required bagasse with needed moisture for efficient combustion.

KEY WORDS: BAGASSE, MOISTURE, HUMIDITY SENSOR, AND DRYER.

INTRODUCTION

Sugarcane mills are one among the main industrial facilities in tropical and developing countries, generating income and jobs within the rural agricultural sector. These important industrial systems are evolving from single product process producing sugar to sweeten drinks and food, to sugar and bio energy generation within the sort of electricity and also bio-fuels. The valorisation of sugarcane bagasse is used as a resource for energy for the angle of energy ratio and emissions. Trade-offs between bagasse applications are found with incineration for power generation being favourable toward reducing potential impacts of global warming.

Sugarcane solid residues include bagasse and filter cake. Bagasse as shown within the above figure 1 is that the solid residue resulting after the juice extraction from the sugarcane stalks and contains the fibrous lignocellulosic material of the stalks. The precipitate within the type of sludge slurry after filtration of the sugarcane juice is that the filter cake. Every 1000 truck load of processed sugarcane generates about 270 truck load of bagasse and 34 truck load of cake. Approximately, 1.81 billion truck load of sugarcane were produced worldwide in 2015, and this is expected to achieve quite 2.21 billion truck load

by 2024. supported these values, the world's potential generation of sugarcane bagasse will reach 0.6 billion truck load, which could be valorised into bio energy, bio fuels, and other products.

Figure 1: Sugarcane Bagasse

MATERIAL AND METHOD

Currently, bagasse is particularly used as a fuel within the sugarcane industry to satisfy its own energy requirements. Hence, the moisture content of bagasse to be controlled is vital for sufficient combustion. However, there is a surplus of this bagasse which could be diverted to other uses just like the assembly of single cell protein, ethanol, enzymes and food additives like vanillin and xylitol. The sugarcane bagasse surplus is used in additional than 40 different applications, including pulp and paper, boards, animal feed, and furfural. Charcoal from sugarcane bagasse is another possible source of heating and cogeneration of energy, and should be produced according to the next simplified process. Bagasse is collected and skilled a pyrolysis step where it gets fully carbonized. The resulting powder is mixed with a binding material like starch then boiled with water so as that it is often extruded to form briquettes or other desirable shapes of charcoal as a solid fuel.

Figure 2: Existing method of bagasse moisture monitoring and control using NIR Sensor

Burning or incineration during a boiler for steam generation is that the foremost typical application of bagasse employing a cogeneration system for steam and power generation. This permits supplying heat and power to the sugar and ethanol process and exporting any excess. The IR-3000 Near Infrared (NIR) online moisture detector and software is meant to measure moisture at any point within the bagasse drying process. Light energy is transmitted from the analyser to the

merchandise being measured. The transmitted energy is absorbed by the merchandise in proportion to the number of moisture contained within the product. The remaining energy not absorbed by the moisture within the product is backscattered back to the analyser. The backscattered energy is then compared to energy source and this is how the moisture is measured as shown in Figure 2.

On-line NIR systems were developed based on the NIR Systems 5000 scanning monochromators with direct light attachment and the Infra soft International (ISI) chemo metrics package. The attached scanning head is sealed against the mill chute for both CAS and BAS installations while, for the SAS configuration, it is mounted above the conveyor belt which transports raw sugar from the dryer. For all configurations, the substrate is scanned through a heat-treated toughened glass window mounted within a stainless steel housing. Vibration dampening systems are installed within both the scanning head unit and the NIR instrument cabinet, which is also fitted with an air-conditioning system and an uninterruptible power supply. The system is integrated with the mill payment and control computers, and software was developed to process relevant mill signals, control scanning equipment and to distribute data to the appropriate mill Bagasse Analysis System (BAS).

The development of BAS instrumentation has been described by Staunton and War drop in 2006 and the system will be available commercially in the near future. The system development, sampling, analysis and preliminary factory applications for calorific value estimation of bagasse to aid boiler operation as well as the determination of online pol extraction across the milling train where both CAS and BAS are present. Here data are presented for online pol extraction from the 2008 crushing season obtained from the two prototype BAS installations at Mulgrave Central Mill (Australia) and Costa Pinto Mill (Brazil), where both milling trains also have CAS installations at the front end. Early developmental work on an online lignin determination on bagasse is also presented. The above method is followed in all sugar industries. From the visited industry of Sugar manufacturing, it is observed that the impossibility of using NIR moisture analyzer due to high cost, it is proposed to provide cost effective method to measure and control the moisture of bagasse for which capacitive humidity sensor is to be used for cost reduction.

Hardware Development For Moisture Monitoring and Control of Sugarcane Bagasse: To develop the hardware for sugarcane bagasse moisture monitoring and control in sugar industries, there are several hardware accessories to the arranged as shown in Figure 3. Conveyor arrangement for carrying the sugarcane bagasse, where humidity sensor for senses moisture and the value obtained is amplified to display in LCD. Nano aurdino is used for programming where set point is fixed for control of moisture. Based on the moisture content, if it is above 48 % the motor speed is reduced for slow movement of conveyor for drying of bagasse and automatically dryer

gets on. And if it is below, the conveyer movement is fastened to boiler unit for efficient burning of bagasse as bio fuel.

Figure 3: Hardware Arrangement of Sugarcane Bagasse Monitoring and Control the following figure 4 shows the overall block diagram of the proposed work.
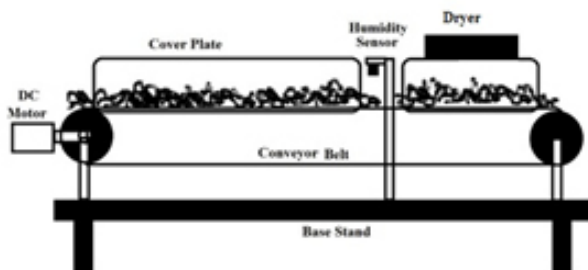

Figure 4: Block diagram of Sugarcane Bagasse Moisture Monitoring and Control
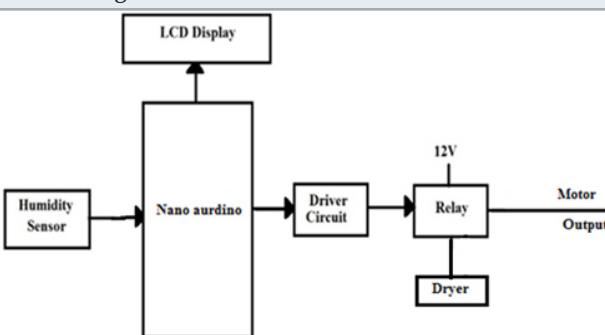
Table 1. Moisture Measurement Analysis

Load Type	Time (Seconds)	Moisture Content (in %)	Dryer (ON / OFF)
I			
	5	47	OFF
	10	49	ON
	15	50	ON
	20	48	OFF
	25	45	OFF
II			
	5	42	OFF
	10	44	OFF
	15	46	OFF
	20	49	ON
	25	47	OFF
III			
	5	50	ON
	10	52	ON
	15	49	ON
	20	47	OFF
	25	49	ON

Humidity sensor is used for moisture measurement in Sugarcane bagasse. The value will be displayed in the LCD display. The Nano aurdino is used as a controller and it performs actions according to the programming done. Potentiometer is used to adjust its desired set point. When the moisture reading is above 45%, the conveyor speed is reduced and the dryer is actuated. Dryer is used to reduce the moisture content of bagasse for efficient combustion. Battery is used for power supply. DC Motor is used for movement of conveyor and relay is used for switching of various operations.

RESULTS AND DISCUSSION

The following Table 1 shows the moisture measurement analysis. From the analysis done in the moisture content of bagasse, the following output resulted. Since for the set point 48% above, when the moisture content is sensed above 48% , the dryer gets ON and the bagasse moisture content is decreased.

CONCLUSION

The proposed project proved as a cost efficient solution for sugarcane bagasse moisture monitoring and control. It had together large amount of data pertaining to the monitoring and controlling of bagasse moisture for research to know which combination of different factors yields the best results. Based on trials for multiple inputs factors, it is observed that this is an ideal method for controlling the bagasse moisture for efficient energy production by dc motor in means of adjusting conveyor speed and proper drying method of moisture. The proposed system opens up the door to a whole new range of commercially sold products which can be economically sold to all sections of the demographic. It is only a basic prototype and research could lead to advancements in features using emerging technology.

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Road Sign Detection Using Rfid

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ABSTRACT

The following project documents the development of an RFID based system that alerts vehicle drivers about approaching road oddities at an optimum distance before encountering them. Radio-frequency identification (RFID) is a technology that uses communication via electromagnetic waves to exchange data between a terminal and an object such as a product, animal, or person for the purpose of identification and tracking. Some tags can be read from several meters away and beyond the line of sight of the reader. The objective is to design a wireless system that delivers road signs (and other road-related information) to the commuter inside his/her vehicle visually and aurally, at an appropriate distance before encountering the corresponding road aberrations. The final aim is to bring about a change in the current road safety paradigm by providing a more efficient and ergonomic electronic alternative to static road signs. In addition to reducing dependency on road signs, the device will also aid in averting accidents and traffic jams, and in better implementing traffic law and order.

INTRODUCTION

The hassles of vehicular commuting in crowded metropolitans in developing countries are many – having to wait hours together in traffic jams, taking tortuous detours due to on road construction, trying to spot speed breakers, navigating blind turns, one-ways and so on. Forked roads, railway crossings, sudden reverse bends and steep ascents and descents are just few of the road oddities that one may encounter on the average drive. At times, such road oddities are accompanied by road-signs. However, most vehicle drivers miss road signs more often than not.

It is understandably difficult to keep an eye out for road signs when one should be focused on driving. The inconvenience is augmented by inadequately placement and poor noticeability of the signs. The problems pervade much deeper than our daily hassles. Over 1, 30,000 fatalities due to road accidents are reported annually in India alone. (National Crime Records Bureau). With rapid increase in road transport throughout the world, there emerges a need for novel concepts and intelligent systems that enhance driving safety and convenience. The preliminary concept hasbeen described in details an RFID based in vehicle Alert System for Road Oddities.

MATERIAL AND METHOD

Software:
1)Arduino IDE: Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators. The microcontroller on the board is programmed using the Arduino programming language (based on Wiring) and the Arduino development environment (based on Processing). Arduino projects can be stand-alone or they can communicate with software on running on a computer (e.g. Flash, Processing, MaxMSP). Arduino is a cross-platform program. You'll have to follow different instructions for your personal OS.

The Development Process
Here is the process for creating a program to run on your Arduino:

1. Create the sketch in the Arduino software
2. Verify the sketch
3. Correct any errors that are indicated (like typos or misspelled variable names)
4. Compile the sketch
5. Upload the resulting program to your Arduino
6. Test your program
7. Rewire or rewrite code as needed
8. Return to Step 2

In the Arduino software, you will notice that 4 and 5 occur at the same time. You will probably notice that Steps 3 and 7 are the most frustrating and time consuming, but they are.

The first step is to plug the square end of a USB data cable into your Arduino, and the other end. into your computer Next, start the Arduino program. You firewall may block it, but you need to give it permission to be allowed through the firewall. Next, you will see the Arduino development interface.

Project Creation Process: In this we are going to look at the Arduino project creation process for programming and using an Arduino microcontroller. We are going to study the phases involved, then revisit the simple example from the previous.

Introduction
There are phases to creating a working microcontroller project:

1. Specify
2. Design
3. Prototype
4. Algorithm
5. Sketch
6. Compile and Upload
7. Test and Debug

Now we are going to look at these phases in more detail

Specify: Before you can create a good microcontroller project, you must decide exactly what it needs to accomplish. Then, ask things like this: What kind of input does it need? What kind of output needs to be achieved? What will you do with the input? How will you generate the output?

Design: You will need to design a circuit, within the limitations of your Arduinio board, to achieve the input and output. At this stage, you will begin to look what kind of electrical or electronic parts you will need, such as resistors, sensors, etc. Make a list of what you need, and research what you don ' t know. You will also need to select which pins you want (or must) use.

Prototype: The next step is to build a prototype of your circuit. You can do this directly on the breadboard, or if you prefer you can use an online prototyping tool.

Algorithm: This is an often neglected aspect of program development. Before you dive into writing sketch code, take some time to think through what you sketch needs to do. When you open up the Arduino environment to create a new Sketch,

this is what you see:

Figure
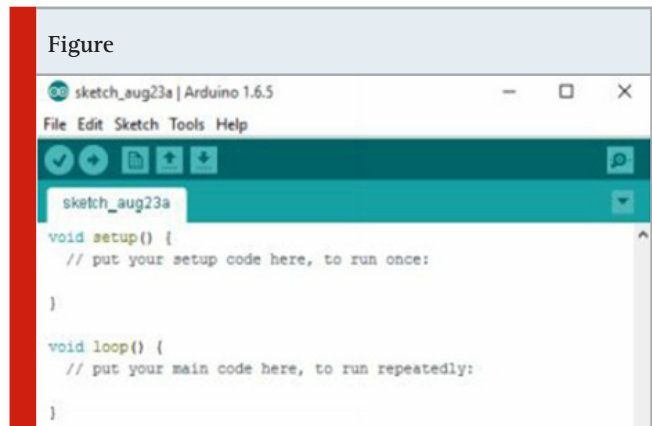
The Sketch is divided into two parts: setup and loop. Consider this their first guidelines on how to develop a working sketch. The setup portion is where you put code that needs to run only once. This includes things like setting certain pins to HIGH, specifying whether a pin should be used as input or output, assigning certain values to variables, etc. This code will run once each time the Arduino board is powered up. Decide what commands need to run once, and plan to place them here.

The loop section is the main portion of the code that will keep running until you power off the Arduino. This is the more challenging part of developing the algorithm.

Sketch: Here is where you begin to type in the actual commands, being careful about spelling and syntax.

Compile and Upload. In the example, we saw that we

could verify and compile the code at the same time. This is a step that takes place under the hood, so to speak. As long as we have typed in the code in a way the computer can understand, then there shouldn't be any issues with compiling. Next, the code must be uploaded to the Arduinio. It doesn't do you any good until it is uploaded.

RESULTS AND DISCUSSION

Test and Debug

This is the most time consuming part of programming. When you run you test, why doesn't it work correctly? I would start first by checking the code again, then checking the circuit.

Basic Arduino Command Library

There are a set of basic commands needed to interact with the Arduino board. In this chapter, we look at the most common digital and analog I/O functions you would use in a sketch for the Arduino.

Digital I/O Functions: There are three functions for digital input and output: one to set the mode of the pin (is it going to be an input pin or an output pin), one to write to the pin (is it going to be set to HIGH or LOW), and one to read the current status of the pin (is it set at HIGH or LOW). The commands and their basic structure are shown below. The values that are italicized are called parameters and are used to provide information to the functions so that they can work properly. pinMode(pin, mode)

The pin number must be an integer value
There are three possible modes: INPUT, OUTPUT, INPUT_PULLUP
digitalWrite(pin, value)
The pin number must be an integer value
The values are either HIGH or LOW
digitalRead(pin)
The pin number must be an integer value
Will return a value of HIGH or LOW
Analog I/O

As discussed earlier, the Arduino boards include pins for performing analog input and output. One command is used to set a reference voltage (the value used as the maximum range of the input voltage), another is used to read the analog voltage, and the last is used to write the analog voltage.

Here are the commands:
analogReference(type)
You can choose from 5 options
DEFAULT is going to be 5 volts (on 5V Arduino boards) or 3.3 volts (o
3.3V Arduino boards)
INTERNAL is a built-in reference that varies with the type of processor
INTERNAL1V1 is a built-in 1.1V reference, but is only available on the
Mega
INTERNAL2V56: is a built-in 2.56V referenced hat is

also available only on
the Mega
EXTERNAL: this means that you will use whatever voltage is applied to the
AREF pin for the reference voltage
analogRead(pin)
This reads whatever the analog voltage level is at pin
It returns an integer value representing the voltage reading at the pin
analogWrite(pin, duty cycle)
This command writes a PWM value to the pin
The duty cycle is a value between 0, which means always off, and 255,
which means always on
This can be used for things like strobing a LED light

Hardware:

Arduino board: An Arduino microcontroller board can be thought of as a user-friendly, open-source input-output system. An input can range from anything from a finger pressing a button to a change in light intensity, and outputs can range from lighting up a simple LED light to sending out a Twitter message.

Technical features of Arduino

- Microcontroller ATmega328
- Operating Voltage 5V
- Input Voltage (recommended) 7-12V
- Input Voltage (limits) 6-20V
- Digital I/O Pins 14 (of which 6 provide PWM output)
- Analog Input Pins 6
- DC Current per I/O Pin 40 mA
- DC Current for 3.3V Pin 50 mA
- Flash Memory 32 KB of which 0.5 KB used by
- bootloader
- SRAM 2 KB
- EEPROM 1 KB
- Clock Speed 16 MHz

CONCLUSION

By the realization of the above proposed system one can learn many aspects of a digital electronic circuit. This will give the complete knowledge of designing microcontroller-based system and developing embedded software.

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Employment of Matrix Converters in Multi-Mode Electric Vehicle Charging Station Using Venturini and PWM Algorithm

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ABSTRACT

The major concern of today's situation is the increase in global warming due to high pollution level. The basic human necessities such as transport sector, commercial sector and the industrial sector are the reasons for these environmental pollutions. In particular, the transport sector, emits nearly about 87% of green house gases (GHG) in India. Electric Vehicles (EVs) could be the remedial solutions for the transport sector issue. EVs, which are energized by a battery storage system, are becoming very attractive because they keep the environment clean. Furthermore, in due course the cost of EVs is also becoming cheap, when the production increases. The proposed EV charging station supplies four modes of regulated power. A synchronized three phase power is extracted using three phase matrix converter (TPMC), a single phase matrix converter (SPMC) is also utilized to act as a power electronic converter for extracting regulated DC power and single phase AC power. Venturini algorithm integrated with vector control is proposed here for TPMC, PWM technique is proposed for SPMC. A simulated EV charging station is assessed in MATLAB/ Simulink platform. The results obtained here show a better power transfer to charge for a variety of EVs. Concluding that, the proposed charging station is able to provide a constant and convenient charging voltage, with prescribed total harmonic distortion (THD).

KEY WORDS: BATTERY CHARGING STATION, ELECTRIC VEHICLE, PWM TECHNIQUE, SINGLE AND THREE PHASE MATRIX CONVERTER, THD, VENTURINI ALGORITHM.

INTRODUCTION

Most of the vehicles running in the transport sector are still depends on liquid fossil fuels, which are slowly being depleted. Fifty percent of crude oil produced in the world are utilized by the vehicles in the transport sector. The continuous consumption of liquid fossil fuels will lead to increase the atmospheric absorptions of green house gases, such as carbon dioxide, carbon monoxide and nitrogen oxide. To sustain the green earth, electric vehicles (EVs) are started evolving, where emission of green house gases and the consumption of liquid fuels will be in decreasing order. In this perspective, full electric vehicle (EV) or hybrid electric vehicles (HEV) have attracted attention as good solutions for the problems cited above. [Ali Saadon et.al,. 2019].

An electric motor produces traction power in vehicle, where batteries supplies electrical power to the motor. The battery charger receives power from the external electrical sources that charges the battery of the electric vehicle. The motor acts as a generator and provides power back to the batteries during regenerative braking. When compared to the battery discharging the vehicle slows down accordingly. As per the size and the recharge time of the battery, the speed and the driving range are limited. This depends on the charging method and the type of the battery [Clemente and Ottorino et al., 2015]. There are two charging techniques available for EVs, namely AC and DC charging. For AC charging, single-phase or three-phase regulated AC power is required to an on-board AC–DC power converter in the EV. For DC charging, the DC power is directly fed to the battery of the EV through an off-board AC–DC power converter [Kawamura et.al,. 2012], [Arancibia et.al,. 2012].

The utilization of on-board chargers will certainly increase the effortless charging methods of the vehicle; meanwhile, off board chargers permit all usage of battery charging techniques with even higher rating circuits. As the name indicates, on-board charger is the comparatively faster than off board since it is a part of EVs, whereas an off board is an external unit belongs to a charging station. A typical off board charger may consist of multiple charging units, and is capable of supplying a preferred level AC / DC charging voltages.

The design of a consistent, proficient, high power capacity and variable level off board charging unit has become a great challenge, due to the cutting edge technologies in the production of EVs. The charging units of EVs consist of power electronic converter, which normally induces harmonics. The harmonics creates power quality (PQ) issues of the low-voltage (LV) distribution networks surrounded by the charging station. Hence for a reputed charging station, the quality of power delivered should be good, and more over it should not affect the quality of the distribution network.

Figure 1: Schematic representation of Electric Vehicle Charger
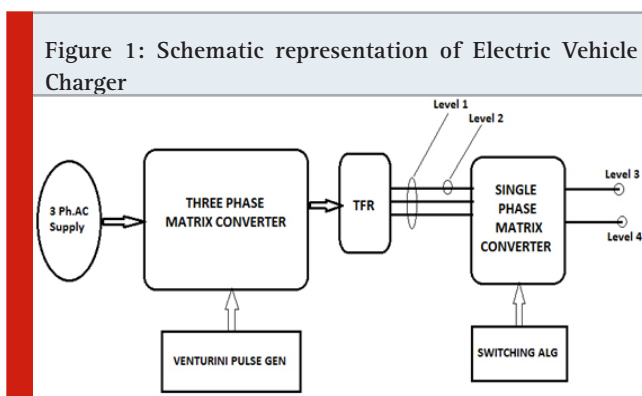
The existing EV chargers are capable to charge only in one level, and hence there is need of providing multi-modes of EV charging station. Level 3 charging can draw

1.4–1.9 kW of power and the time required for charging is 6–8 hours. This may be a DC power. The DC power here may be controlled voltage or uncontrolled voltage. Level 2 charging power is 7.7–25.6 kW, and it requires 4–8 hours to fully charge the batteries of middle level EVs. The EV may be an electric car, where a single phase AC supply may be required. The Level 1 charging can draw a three phase power of 50–100 kW, and it requires 1–3 h to fully charge the battery of a heavy duty EVs. [NREL Book 2013], [Mehta Book 2010].

Matrix Converter: Matrix converter is employed for EV charging station [Harish et.al,. 2012]. Matrix converter is a single stage power transferring device capable of converting AC to AC. One of the prime advantage of matrix converter is it fulfills the necessities to provide a sinusoidal voltage at the load side and, it is also possible to vary to maintain unity power factor on the supply side. There is no DC link in matrix converter, as in the case of converter – inverter combination circuit and the matrix converter can be built in a full- one silicon structure [Venturini et.al,. 1989].

Three phase matrix converter (TPMC) consists of nine bi-directional switches which are arranged in terms of three sets of three. This arrangement makes that any of the three input lines can be connected to any of the three output lines. The inputs phase are V_{i1}, V_{i2}, V_{i3} and the outputs phase are V_{o1}, V_{o2}, V_{o3}. The matrix switching components s_{11}, s_{12}, ..., s_{33} represent nine bi-directional switches which are accomplish blocking of voltage in both directions and connects the switching without any delays. The matrix converter converts the three given inputs of constant amplitude, V_i and constant frequency, f_1 into controllable amplitudes, V_o and controllable frequency, f_o as output. This is possible in accordance with pre-calculated switching angles.

Several switching algorithm are available for TPMC, where Venturini's modulation algorithm is most prominent algorithm with more flexibility. This algorithm also provides unity fundamental displacement factor at the input regardless of any load displacement factor. In Venturini algorithm, a set of three-phase input voltages with fixed amplitude and fixed frequency is considered, for manipulating the duty cycle of each of the nine bidirectional switches. The result thus obtained and when implemented allows the generation of a set of three-phase output voltages by sequential piecewise sampling of the input waveforms [Sunter et.al,. 2003].

Single phase matrix converter (SPMC) was derived by Zuckerberger earlier [Zuckerberger et.al,. 1997]. It has been shown that the SPMC could be realized as a direct AC-AC single-phase converter [Idris 2006], DC chopper, rectifier and inverter [Senthil Kumar et.al,. 2017]. For AC-DC and DC-AC conversion different converters are

used, but in certain applications like uninterruptable power supply, two converters are required, one acting as rectifier, used to convert AC into DC for charging the batteries and another acting as inverter, used to supply regulated AC power from battery. [Ajay kumar Gola et.al,. 2009]

MATERIAL AND METHOD

The proposed EV charging station consist of Three Phase Matrix Converter (TPMC), Single Phase Matrix Converter (SPMC), Isolation Transformer, Venturini Pulse Generator for TPMC, PWM Pulse Generator with modified switching algorithm and other supplementary components. The schematic representation is shown in figure 1. Here four modes of output voltages are considered as charging points. The four charging points are mentioned as level 1, 2, 3 and 4. The output of level 1 is regulated three phase AC supply, level 2 is single phase AC variable frequency supply, level 3 is unregulated DC supply and level 4 is regulated DC voltage. Therefore this charging unit is called as Universal EV charging station, which is suited for a multi mode off board charger. Two stage converters are proposed here, where TPMC transfer three phase AC input into variable three phase AC output as one stage. SPMC transfer single phase AC into variable AC/DC voltages as second stage. A unique PWM algorithm is generated and it is given to SPMC in order to perform as a rectifier unit and controlled converter unit.

Venturini Control Algorithm: A modified version of the Venturini algorithm is used here. This algorithm is distinct in terms of the three-phase input and output voltages at each sampling instant and is also convenient for closed loop operations [Sunter 1995]. For the real-time implementation, any two of the three input voltages are to be measured. Then, V_{im} and ω_{it} are calculated as shown in equation (1) and (2).

$$V_{im} = \tfrac{4}{9}\left(v_{AB} + v_{BC} + v_{AB}v_{BC}\right)\ldots\ldots\ldots\ldots\ldots\ldots .(1)$$

$$\omega_{it} = \arctan\left[\frac{v_{BC}}{\sqrt{3}\left(\tfrac{2}{3}v_{AB} + \tfrac{1}{3}v_{BC}\right)}\right]\ldots\ldots\ldots\ldots .(2)$$

$$V_{om} = \tfrac{4}{9}\left(v_a + v_b + v_c\right)\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

$$\omega_{ot} = \arctan\left[\frac{v_b - v_c}{\sqrt{3}(v_a)}\right]\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Similarly the target output peak voltage and the output position can be calculated as in equation (3) and (4), where V_{AB}, V_{BC} are the instantaneous input line voltages and v_a, v_b, v_c are the output voltages per phase. Alternatively, in a closed loop system, voltage magnitude and angle may be direct outputs of the control loop. Then, the voltage ratio is calculated as in equation (5).

$$q = \sqrt{\frac{V_{om}}{V_{im}}} \qquad (5)$$

where q is the desired voltage ratio, and V_{im} is the peak input voltage. Triple harmonic terms are found

$$k_{31} = \tfrac{4}{9} \times \tfrac{q}{q_m} \sin(\omega_{it})\sin(3\omega_{it})\ldots\ldots\ldots\ldots\ldots (6)$$

$$k_{32} = \tfrac{4}{9} \times \tfrac{q}{q_m} \sin\left(\omega_{it} - \tfrac{2\Pi}{3}\right)\sin(3\omega_{it})\ldots\ldots\ldots .(7)$$

$$k_{33} = \sqrt{V_{om}}\left[\tfrac{1}{6}\cos(3\omega_{ot}) - \tfrac{1}{4} \times \tfrac{1}{q_m}\cos(3\omega_{it})\right].(8)$$

where q_m is the maximum voltage ratio (0.866). Then, the three modulation functions for output of phase 'a' are given as

$$M_{Aa} = \tfrac{1}{3} + k_{31} + \tfrac{2}{3V_{im}}\left(v_a + k_{33}\right)\left(\tfrac{2}{3}v_{AB} + \tfrac{1}{3}v_{BC}\right)\ldots(9)$$

$$M_{Ba} = \tfrac{1}{3} + k_{32} + \tfrac{2}{3V_{im}}\left(v_a + k_{33}\right)\left(\tfrac{1}{3}v_{BC} - \tfrac{1}{3}v_{AB}\right)..(10)$$

$$M_{Ca} = 1 - (M_{Aa} + M_{Ba})\ldots\ldots\ldots\ldots\ldots\ldots .(11)$$

The modulation functions for the other two output phases, 'b' and 'c' are obtained by replacing v_b and v_c with v_a, respectively in equation (9) and (10). Note that the modulation functions have third harmonic components at the input and output frequencies added to them to produce output voltage, v_o. This is a prerequisite to get the maximum possible voltage ratio. It should be noted that in equation (3) there is no prerequisite for the target outputs to be sinusoidal. In general, three phase output voltages and input currents can be defined in terms of the modulation functions in matrix form as

Output voltage per phase = M function*Input voltage per phase

$$\begin{bmatrix} v_a \\ v_b \\ v_c \end{bmatrix} = \begin{bmatrix} M_{Aa} & M_{Ba} & M_{Ca} \\ M_{Ab} & M_{Bb} & M_{Cb} \\ M_{Ac} & M_{Bc} & M_{Cc} \end{bmatrix}\begin{bmatrix} v_A \\ v_B \\ v_C \end{bmatrix} \quad (12)$$

Input current per phase = Transpose of M function*Output current per phase

$$\begin{bmatrix} v_a \\ v_b \\ v_c \end{bmatrix} = \begin{bmatrix} M_{Aa} & M_{Ba} & M_{Ca} \\ M_{Ab} & M_{Bb} & M_{Cb} \\ M_{Ac} & M_{Bc} & M_{Cc} \end{bmatrix}\begin{bmatrix} v_A \\ v_B \\ v_C \end{bmatrix} \quad (13)$$

where the superscript T mention a transpose vector, and M is the instantaneous input per phase to output per phase transfer matrix of TPMC. v_{iph} and v_{oph} represent the input and output phase voltage vectors, and i_{iph} and

i_{oph} represent the input and output phase current vectors. From Eqs. (12) and (13), the output-line voltages and input-line currents can be expressed as

Output line voltage = m-function*Input line voltage

$$\begin{bmatrix} V_{ab} \\ V_{bc} \\ V_{ca} \end{bmatrix} = \begin{bmatrix} m_{Ab} & m_{Bb} & m_{Cb} \\ m_{Ac} & m_{Bc} & m_{Cc} \\ m_{Aa} & m_{Ba} & m_{Ca} \end{bmatrix} \begin{bmatrix} V_{AB} \\ V_{BC} \\ V_{CA} \end{bmatrix} \quad (14)$$

Input line current = Transpose of m-function*Output line current

$$\begin{bmatrix} i_{AB} \\ i_{BC} \\ i_{CA} \end{bmatrix} = \begin{bmatrix} m_{Ab} & m_{Ac} & m_{Aa} \\ m_{Bb} & m_{Bc} & m_{Ba} \\ m_{Cb} & m_{Cc} & m_{Ca} \end{bmatrix} \begin{bmatrix} i_{ab} \\ i_{bc} \\ i_{ca} \end{bmatrix}. \quad (15)$$

$$\begin{aligned}
m_{Ab} &= \tfrac{1}{3}(M_{Aa} - M_{Ab}) - \tfrac{1}{3}(M_{Ba} - M_{Bb}) \\
m_{Bb} &= \tfrac{1}{3}(M_{Ba} - M_{Bb}) - \tfrac{1}{3}(M_{Ca} - M_{Cb}) \\
m_{Cb} &= \tfrac{1}{3}(M_{Ca} - M_{Cb}) - \tfrac{1}{3}(M_{Aa} - M_{Ab}) \\
m_{Ac} &= \tfrac{1}{3}(M_{Ab} - M_{Ac}) - \tfrac{1}{3}(M_{Bb} - M_{Bc}) \\
m_{Bc} &= \tfrac{1}{3}(M_{Bb} - M_{Bc}) - \tfrac{1}{3}(M_{Cb} - M_{Cc}) \\
m_{Cc} &= \tfrac{1}{3}(M_{Cb} - M_{Cc}) - \tfrac{1}{3}(M_{Ab} - M_{Ac}) \\
m_{Aa} &= \tfrac{1}{3}(M_{Ac} - M_{Aa}) - \tfrac{1}{3}(M_{Bc} - M_{Ba}) \\
m_{Ba} &= \tfrac{1}{3}(M_{Bc} - M_{Ba}) - \tfrac{1}{3}(M_{Cc} - M_{Ca}) \\
m_{Ca} &= \tfrac{1}{3}(M_{Cc} - M_{Ca}) - \tfrac{1}{3}(M_{Ac} - M_{Aa}).
\end{aligned} \quad (16)$$

where $M_{A\alpha}, M_{Ab}$, are calculated as the displaced vectors of M_{Aa}, M_{Ab}, M_{Ac} respectively. Similarly modulation index values of other two phases are calculated as given in equation (16).

Figure 2: Block diagram model of TPMC
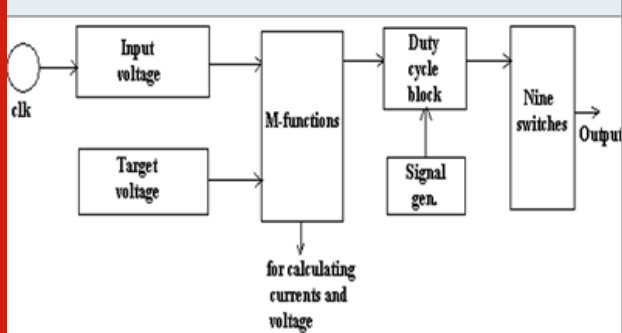
Three Phase Matrix Converter Model: Figure 2 shows the model block diagram of the three phase matrix converter. The input variables of the matrix converter are the clock, input voltages (Vi) and target output voltages obtained from any controller, here the target voltages is given as second input (Vo). The input voltage block represent Eqn.(1) and (2). The target output block represents Eqn (3) and (4). The M function blocks, represent Eqs. (9), (10), and (11) for one phase, and similar three phase calculation are performed. "M functions" consists of the modulation functions and is taken out for calculating the output voltages and input currents using Eqs. (14) and

(15) respectively. The switching frequency of the matrix converter is determined by the signal generator block (in this case fs = 2 kHz).

The block duty cycle generator, consist of logic gates and simple mathematical algorithms. Here the modulation functions are compared with the signal generator waveform, probably square or saw tooth at the input and arranged to have logic levels. Logic gates are used at the output to get three gate signals proportional to the duty cycle of the power switches for one output phase. It has three inputs [in (1), in(2) and in(3)] and one output. It operates in accordance with the following logic:

--- if in(2)>0 then the output signal is in(1)
--- else output signal is in(3).
Similarly nine switches are used in the "switch block" such a manner that the three phase output voltages is obtained. The simulated model of TPMC using MATLAB / Simulink is shown in Fig.3. All the switches utilized are ideal switches. Three phase uncontrolled AC power is transferred into controlled AC power.

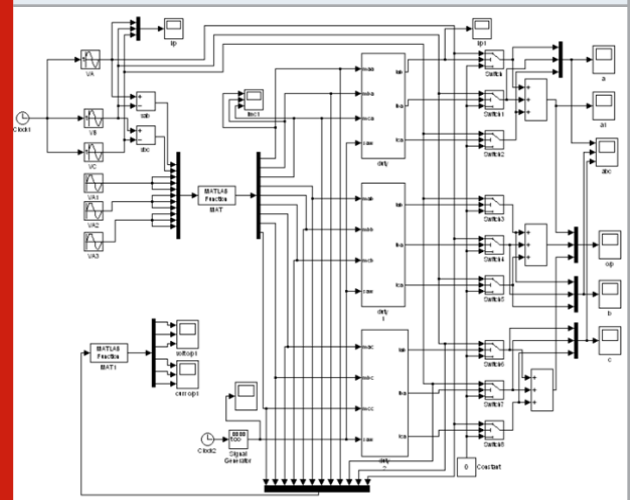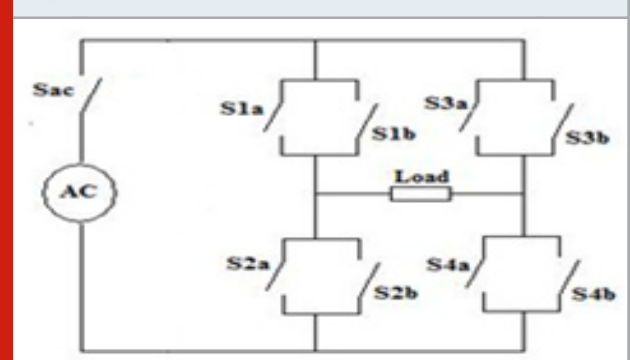Figure 3: Simulation of three phase matrix converter (TPMC)

Figure 4: Basic circuit of a SPMC

Single Phase Matrix Converter Model: Single phase matrix converter (SPMC) consists of four bi-directional

switches and a simple switching logic. A unique PWM algorithm is being developed to realize this converter as a single stage total power electronic converter. The basic circuit of single-phase matrix converter is shown in figure 4. It consist of four bi-directional switch connected in between a single phase AC input and to single phase AC output (load).

The four ideal switches are S_1, S_2, S_3 and S_4 capable of allowing current in both the directions, blocking forward and reverse voltages and also switching between its states. Each bi-directional switch consisting of two diodes and two IGBTs connected back to back [4]. The bi-directional switches have two basic rules: (i) do not connect two different input lines to the same output lines to avoid short circuit and (ii) do not disconnect the output lines to avoid open circuit. Normal sinusoidal PWM with a unique algorithm is used to amalgamate this converter. The converter is then executed in computer simulation model to explicate its basic behavior. The instantaneous input voltage is V_i (t) and its output voltage is V_o (t). The AC input voltage is converted into variable amplitude or variable frequency AC voltage by varying the modulating frequency.

If the input signal is
Vi (t) = Vim cosωi t   (17)

Then, the fundamental output voltage will be
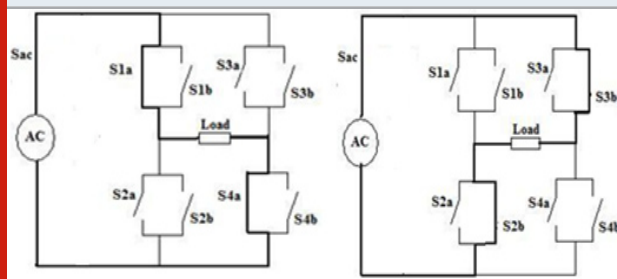
Vo(t) = Vom cosωot   (18)

With a fundamental frequency

fo= fm– fi   (19)

where, fo=Output Frequency, fm=Modulation Frequency, fi=Input Frequency.

Table 1. Switching strategy for SPMC

CONVERTER	INPUT SUPPLY	SWITCHING PULSE	OUTPUT NATURE
Rectifier	AC	S1a, S4a (positive half cycle) S2b, S3b (negative half cycle)	DC (un-controlled)
Converter	AC	S1a, S4a (positive half cycle) S2b, S3b (negative half cycle)	DC (controlled)

Realization as rectifier and controlled rectifier (converter) is shown in figure 5, where input is AC and the output is either un-controlled DC or variable DC. Variable output is obtained by giving switching pulse at a delay. Figure 5(a) represents for positive half cycle and 5 (b) for negative half cycle. The bold line signifies the current conduction.

The Switching strategy for matrix converter acting as uncontrolled and controlled rectifier is represented in the table 1 above. The simulation of SPMC is presented in figure 6. It has four bi-directional switches, a pulse generation block and a clamp circuit.. A clamp circuit does not restrict the peak-to-peak expedition of the signal, but moves it up or down by a fixed value. Diodes are used for clamping and a capacitor is used to maintain an altered dc level at the clamper output. Hence the clamp circuit acts a protective device for converter. For simplicity, a resistive load is connected. Two way realizations are performed to extract uncontrolled rectifier and controlled rectifier.

Figure 5: (a) and (b)Switching states as Rectifier and Converter

The switching combinations for a matrix converter are explained as, the state of the 4 bi-directional switches Sij(i = 1,2,3,4 and j = a,b) where 'a' and 'b' represent driver one and two respectively following the rules [4] below; At any time 't', any two switches S_{ij} below will be ON.
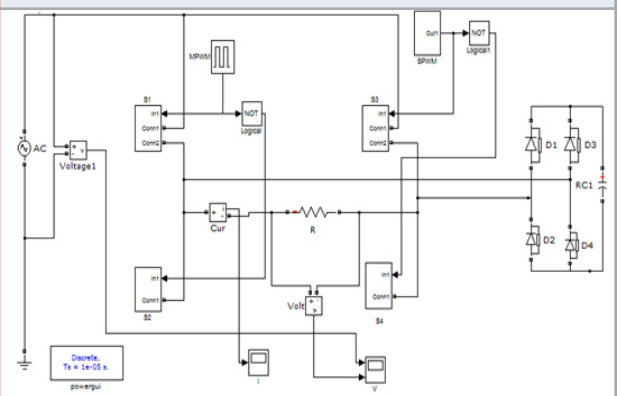
Figure 6: Simulation of single phase matrix converter (SPMC)

RESULTS AND DISCUSSION

Simulation result of TPMC (Level 1 & 2): The total EV charging station is realized in simulink platform and the results obtained are discussed here. The input three

phase AC supply is given to TPMC, whose specifications are listed below.

Input specifications of TPMC: Input waveform is represented in figure 7.
Input Voltage, Vi = 311 V
Input Frequency, fi = 50 Hz
Vo/Vi = 50 %

Output target specifications of TPMC:
Switching Frequency, fs=2000 Hz
Output Voltage, Vo=155 V
Output Frequency, fo=50 Hz

Level 1 output current = 5 A, 50 Hz with THD content of 8.62%
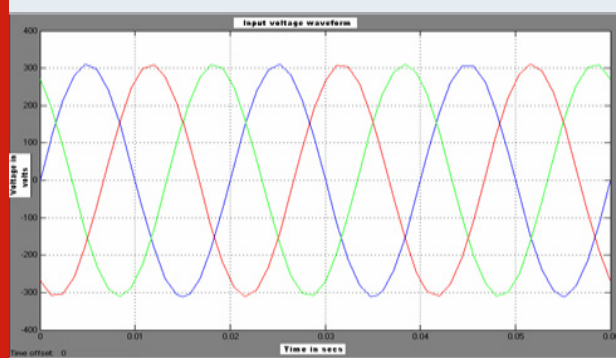

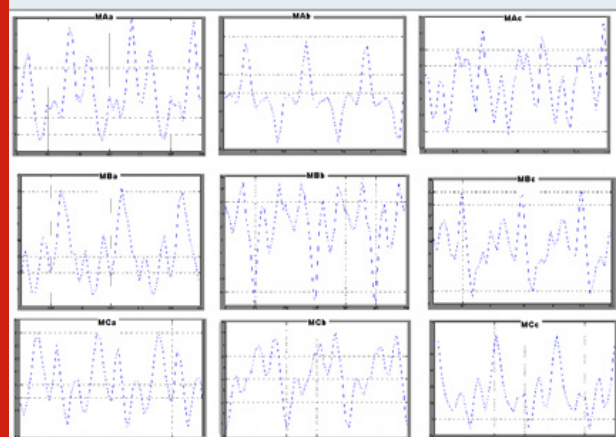Figure 7: Three phase AC input supply

Figure 8: Nine M – function waveforms of TPMC

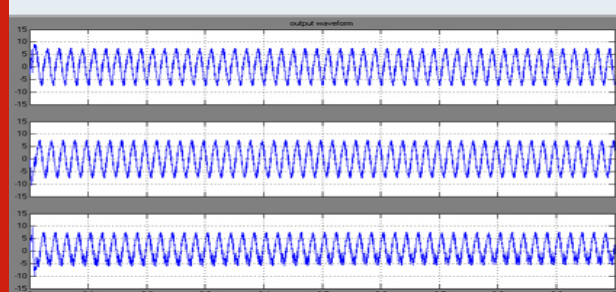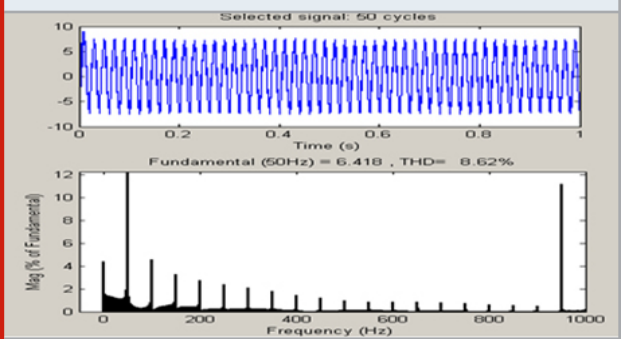Figure 9: Level 1 output current for phase A,B and C

Figure 10: Level 1–THD of one phase (A)

The modulation function created by venturini algorithm is shown in figure 8. These functions are used to create triggering pulses which, then are fed to the nine bidirectional switches of TPMC. The level 1 three phase currents are exposed in figure 9 and its THD component of one phase is depicted in figure 10. A single phase AC output of TPMC is taken outside as level 2. With suitable algorithm, the derived frequency is 10 Hz, which is represented in figure 11. This is level 2 type of charging.

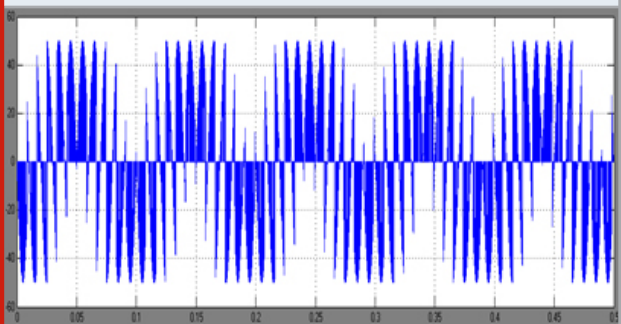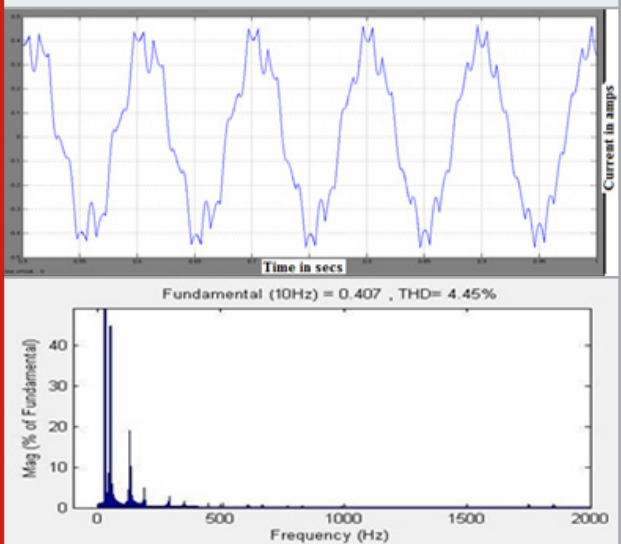Figure 11: Level 2 – variable frequency single phase AC voltage

Figure 12: Level 2 THD of variable frequency single phase AC

The current waveform with its THD component of level 2 is extracted as 4.45% which is in the prescribed limit of IEEE standards and is also depicted in figure 12.

Simulation result of SPMC (Level 3 & 4)

The specifications of SPMC: Input power is 100 V, 50 Hz for SPMC, which is obtained from TPMC. The PWM signal is generated with an amplitude of triangular wave, Vc =1v and the amplitude of sine wave, Vref = 0.75v is compared. The modulation index is,

Mi=Vc/Vref=1/0.75=0.75. The switching frequency, fs =1.8 KHz. Resistive load, R = 10 Ohms.

SPMC acted as rectifier is depicted in figure 13, whose values are given below, which represents level 3 charging unit. It is noted that the voltage magnitude is fixed.

Output Voltage, Vo = 100 V, DC
Output Current, Io=Vo/R=100/10 =10 A, DC in nature.

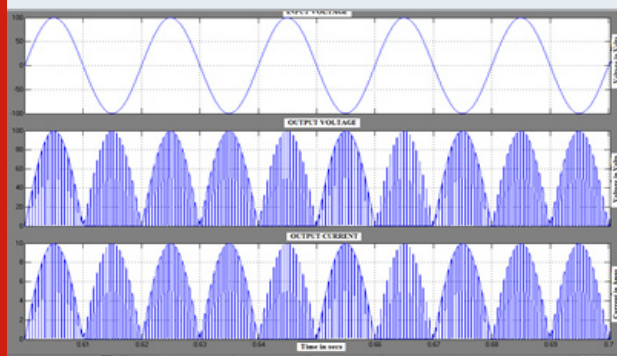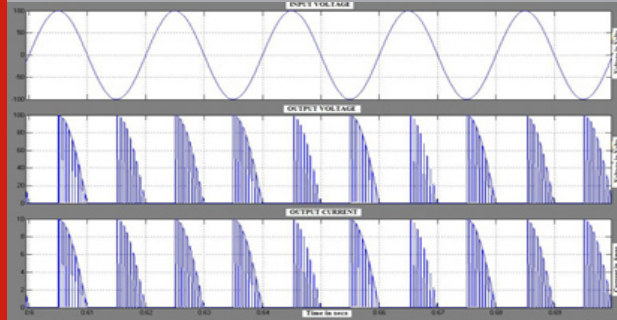Figure 13: Level 3 voltage and current waveforms of rectifier

Figure 14: Level 4 voltage and current waveforms of controlled rectifier (converter)

SPMC acted as converter is depicted in figure 14, whose values are given below, which represents level 4 charging unit. Here the voltage magnitude can be varied by applying suitable triggering pulse.

Output Voltage, Vo = 100 V, DC, at 900pulse triggering (π/2 rad)

Output Current, Io=Vo/R=100/10 =10 A, DC at 900pulse triggering (π/2 rad)

CONCLUSION

The proposed multi mode EV charger was successfully simulated in simulink platform. The EV charger is able to provide a controllable and constant charging voltage for various EVs and is composed of four levels of charging: (i) Three phase variable magnitude AC supply, (ii) Single phase variable frequency AC supply, (iii) Fixed voltage DC supply and (iv) Variable voltage DC supply. A modulated Venturini algorithm satisfies accurate operation of TPMC for first two levels of charging. A new modulated switching strategy of SPMC gives the second two levels of charging states. It is clear that the control algorithm perfectly regulates the output voltage of both TPMC and SPMC. At the same time, it also ensures a sinusoidal output current with minimum switching ripples and a prescribed low THD content. The results obtained demonstrate high performance total (multi mode) EV charging station. Thus all of the intension of an ideal EV charging was derived.

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