SPECIAL ISSUE VOL 12 NUMBER-3 MAY (2019)
Print ISSN: 0974-6455
Online ISSN: 2321-4007
CODEN: BBRCBA
www.bbrc.in
University Grants Commission (UGC)
New Delhi, India Approved Journal

BBRC

Bioscience Biotechnology Research Communications

Special Issue in Communication and Information Technology

Recent Trends in Biosignal Processing and Biomedical Instrumentation

An International Peer Reviewed Open Access Journal For Rapid Publication

Published By:
Society for Science & Nature (SSN)
Bhopal India
Indexed by Thomson Reuters, Now Clarivate Analytics USA
ISI ESCI SJIF 2018=4.186
Online Content Available: Every 3 Months at www.bbrc.in

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Bioscience Biotechnology Research Communications
SPECIAL ISSUE VOL 12 NUMBER-3 MAY (2019)

Published By:
Society For Science and Nature
Bhopal, Post Box 78, GPO,
462001 India

ISSN 0974-6455
9 770974 645002

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SPECIAL ISSUE VOL 12 NUMBER-3 MAY (2019)
Print ISSN: 0974-6455 Online ISSN: 2321-4007 CODEN: BBRCBA

Special Issue in Communication and Information Technology

Recent Trends in Biosignal Processing and Biomedical Instrumentation

Guest Editors

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Biosci. Biotech. Res. Comm. Special Issue Vol 12 No (3) May 2019

Recent Trends in Biosignal Processing and Biomedical Instrumentation

Editors Communication

Bioscience Biotechnology Research Communications has provided an exciting opportunity to consider high quality research articles presenting original and novel contributions for its special issue on Recent Trends in Biosignal Processing and Biomedical Instrumentation. The main objective of this special issue is to publish up-to-date, high-quality research papers alongside relevant and insightful reviews. As such, the journal aspires to be vibrant, engaging and accessible, and at the same time integrative and challenging. This special issue aims to provide a forum that brings together researchers from academia, practicing engineers from industry, standardization bodies, and government to meet and exchange ideas on a very interesting area of research: Biomedical Signal Processing, Medical Imaging and Health Care Monitoring System.Wide scope of interests is an advantage for a journal pursuing wider visibility. Most reputed and refereed journals like *Bioscience Biotechnology Research Communications* actively publish peer reviewed, well documented, unique, comprehensively discussed and educational case reports, which, apart from being highly readable, enhance healthcare and timely diagnosis of rare disorders through wireless medium.

This Special issue (Volume 12, Special Issue No 3, May 2019) of *Biosc.Biotech.Res.Comm.* contains 15 selected articles. For your convenience, below are a few words to let you know what we think you can expect from each of these articles. This Special issue on Recent Trends in Biosignal Processing and Biomedical Instrumentation aims to gather recent quality work on the topic of Current Research Trends in the field of Biomedical Signal Processing, MRI/CT Imaging and Telemedicine which will provide the readers a view of lab work with an evaluative discussion. Some of the important research issues discussed in this special issue are magnetic resonance imaging, bio-medical healthcare system for mobile patient, wireless body area networks, wireless capsule endoscopy, various filters using CT images, cognitive radio system in healthcare environment, implantable antennas, patient monitoring system, biomedical sensors, analysis of medical images, heart rate variability analysis and the recently launched compact wearable applications, which we have briefly analyzed and discussed.

This special issue has called for papers from researchers making inroads in this interesting area so that we can gather a state-of-the-art account for future directions. All submissions are well supported by proof of the concept studies with a direct and simulated comparison to the technical solutions, designs and implementations.

Best wishes and thank you in advance for your contribution to this special issue of Bioscience Biotechnology Research Communications!

Happy Reading!

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Internet of Things Based Environmental Safety and Communication through Integrated Multi Sensors by Esp8266 for Industries

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ABSTRACT

The proposed work deal with the scenario that we come across in industries. The primary thing in all types of industries is safety, in this paper the concept enhanced the program based control of the parameters like heat, wateretc to be monitored at proper levels. Here the scenario has been developed in such a way that prefixed ranges of temperature, level of height, humidity level in particular place with above range prefixed crossed then they must alert us. So there will be instantaneous alert of a place. The system mainly comprises of ESP8266 which acts as a overall controller of all the sensors to sense the parameters at proper time periods. Thus the system has a proximity sensor, gas sensor, temperature sensor. A Bluetooth module share the information the information of sensor sensed parameter and send the information alert point react whether there is some sort of alert needed thus the alert given by indicating system. The results clearly shows that when the system has some response from the sensors it will immediately alert the personal with alarm and also helps to protect the industry from danger and ensure complete protection. The estimation of results shows that the temperature limit was set as 25 degrees and humidity level were monitored in detail

KEY WORDS: BLUETOOTH MODULE, ESP8266, PROXIMITY SENSOR

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Received 3rd Dec, 2018
Accepted after revision 22nd Feb, 2019
BBRC Print ISSN: 0974-6455
Online ISSN: 2321-4007 CODEN: USA BBRCBA
Thomson Reuters ISI ESC / Clarivate Analytics USA and Crossref Indexed Journal
NAAS Journal Score 2019: 4.31 SJIF 4.196

Online Contents Available at: http//www.bbrc.in/
DOI: 10.21786/bbrc/SI/12.3/1

INTRODUCTION

Many global industries are seeking for proper safety protection of machineries and their people. They normally require manual operating unit which is ancient piece of model. But the large scale industries usually make possible of SCADA based control which is favorable for the higher end industries. And the SCADA is quite complex in design perspective.So in order to make a module which is conventional and also simplistic in the size and cost. (Saranya A., Dinesh kumar S. (2017))

This lead to development of smart module control of the IoT platform which will have a quick response once the sensor senses the value based on the programming system which will intimate the buzzer alarm if any one of the parameter considered exceed the limit. And the display unit made up of LCD will clearly indicates the value currently recorded in sensors. (Suresh, Balaji. Anto, Jenith (2014). Hence user can clearly have better control and hence forth he will be able to monitor periodically on all sorts of danger, (Leong, 2017)

The controller should be programmed proper that it should provide not only the values sensed and time of sensing but the most important work was to alert when the range goes beyond the fixed. Safety measure are essential in All references must be without variousindustry. IoT based safety operating device is new technology that is incorporate to societal, environmental sustainability and development of new technology reduce the risk in industrial operating device.

The system developed may be useful in protection of filter design circuits. (Shajahan. A. H., Anand A. (2013)). It may be also managed to develop voltage stability in system process. Thus power sector where protection is vital it is mandatory to have the similar system in power sector also.

MATERIALS AND METHODS

EXISTINGSYSTEM

The existing system has coordination disadvantages that they are sending and receiving information was not shared properly. Especially in the case of the micro controller and ARM processors even it was based on the programming in C. Sometimes this will make some serious issues imbalance in alerting the system controlling region. Another major issue is there in the designing without any interruption in supply for control unit.

The system parameters are analyzed in the technical point of view. The most essential control in operating the device is very critical due to many boundaries. Temperature level in devices is varied based on ambient temperature and running of device cause major route case of this problem. The system is embedded with sensors. Most of the industrial safety is ensure by a safety engineers. The web server is also a major role in the system. Controller function in time of operation is also an important device.

IMPLEMENTATION

The complete module of the system is shown in block diagram (Shajahan and Anand 2013). The bluetooth module is very critical such that it make clear communication to all parts of the system based on the program embedded in the controller ESP8266. So the clear idea is to utilize all the sensors in a proper way to alert the system working in the robust.

Figure 1 clear portrays that the system is vital in guarding the accessories in any type of industries which need a safety as their primary goal. In this framework, the user can utilize the sorts of danger that can arise in their working places that will be minimized and alert them in all type of danger like temperature rise, gas discharge and also water level indication and interruption in the given place (Dinesh kumar, Praveen Daniel Senthilnathan, 2015). Also IR sensors provides guide lines towards radiation intervention in the place, The information which we have displayed in LCD can also be viewed by means of the simple software which can have message alert in it.

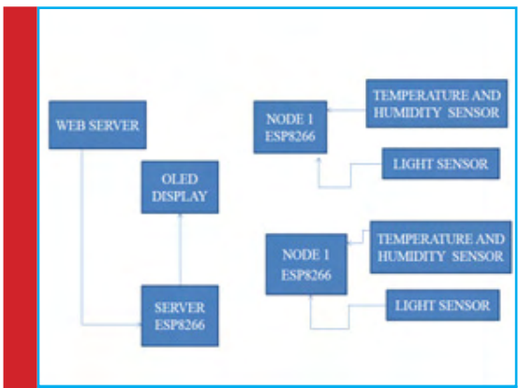

Figure 1. Proposed System

By sending a character from our mobile phone we can monitor the appliances in industry.

1. Temperature sensor
2. Gassensor
3. IRsensor
4. Bluetooth
5. Water level sensor
6. GPRS
7. LDR

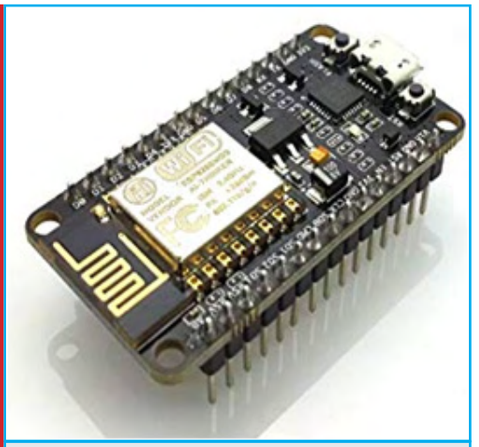

Figure 2. UNO Board

RESULT AND DISCUSSION

Figure 3 Gives a clear clarity on sensor monitoring the humidity and temperature measurement at nominal level.

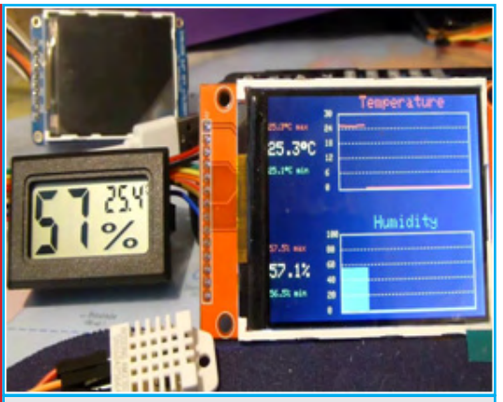

Figure 3. Humidity and Temperature measurement

Bluetooth:

Bluetooth Module is well designed with Bluetooth SPP (Serial Port Protocol) module, proposed for clear remote serial affiliation setup.

Water level sensor:

The sensing probe is attached with the system where the indication water level was clearly judge.

OLED:

An organic light emitting diode (OLED) is a light emitting diode (LED) in which the electric illumination of light is emitted by means of component which is specially portrayed.

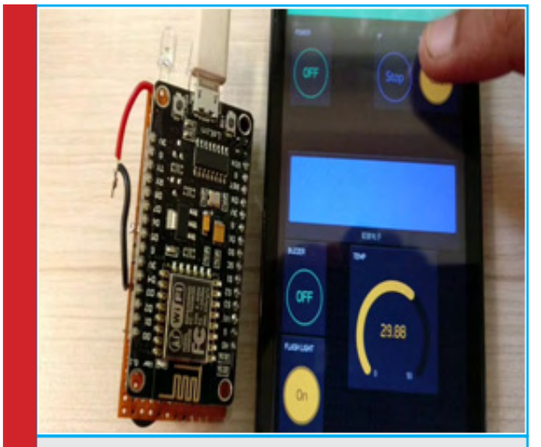

Figure 4. Mobile application based control

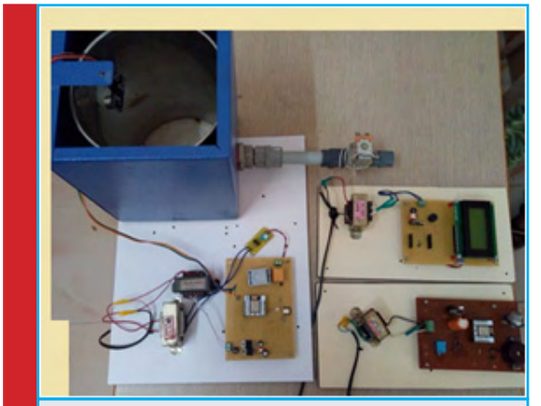

Figure 5. Proposed System Setup

DHT:

A distributed hash table (DHT) it provides decentralized approach towards the working of look up table to get the information, (Suresh Balaji, Anto; Jenith, 2014).

COMPONENTS RATING:

Component name	Ratings
Temperature and humidity sensor	5V
Gas level sensor	5V
Water level sensor	5V
IR sensor	5V
ESP8266	12 E module
Transformer	9V

PROPOSED SYSTEM SETUP

A clear clarity on sensor monitoring the humidity and temperature measurement at nominal level, (Ramlee Leong 2017). The proposed system measure temperature

rating upto alimit of 25 degree after which if there is a rise in temperature will be alerted through buzzer. The overall proposes system is given below in figure 5.

CONCLUSION

The major purpose of paper is to control the various sensors and parameters in industries. If any emergency occurs in the industries like leakage of gas, reduction in water level will be intimated automatically to the server then the information will be sent to the client through IOT for controlling purpose. From the hardware results seems the better result compare to other system. Each of system parameter is analyzed. From Each of sensor is gave the accurate value of measure for safest operation of system, every aspect in the control parameters gave good respond to system.

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Research Communications

Control Algorithm Based for Secure Diabetic Treatment

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ABSTRACT

Around the world, the magnitude of individuals predisposed by diabetics is rapidly incrementing day-by-day due to aging population. Diabetics areaffected by the high blood sugar awareness in body. This disorder this can be preserved by providing insulin to body by an injection. Several organizations are existing to monitor the glucose level in body by continuous measuring. Spontaneous drug delivery scheme is suggested in prototype. When the drug is released, which the typical is automated constructed on the circumstance of patient body. The perfect model is time based performance which the time is varied based on patient. In this paper the analytical model to present the automated drug delivery system to the patients. The idea is focused to make them to feel like a normal person without worrying about their disorder in their body by providing time based delivery model.

KEY WORDS: ALGORITHM, SENSOR, FUZZYLOGIC CONTROLLER, REAL TIME CLOCK,IMPLANTABLE MEDICAL DEVICES

INTRODUCTION

In existing day therapeutic care is recovered commonly known as Implantable Medical Devices (IMDs). The improvements supported by these relaxed to consumption strategies have accompanied a great alteration in the natural life of the overall people. Implantable Medical Devices require prolonged the capability of doctors to diagnose and necessity infections, consequently-promoting patients through affecting them concerning security and their personal gratification. Insulin drives are one of the greatest broadly reprocessed Implantable Medical Devices in the market. These minor strategies are recycled toward impart medicine and additional nutrients intimate the patient's cardio vascular organizations to sustain glucose levels. They provide rigorous insulin dosage by distributing minor restrained amounts at recommended intervals in direction to assurance typical working of the body (Heena Rathore et al 2018).

The process of developing an Insulin delivering system with low cost, based on a syringe pump was attempted by researchers. A stepper motor was used as

ARTICLE INFORMATION:

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Received 12th Dec, 2018
Accepted after revision 26th Feb, 2019
BBRC Print ISSN: 0974-6455
Online ISSN: 2321-4007 CODEN: USA BBRCBA
Thomson Reuters ISI ESC / Clarivate Analytics USA and Crossref Indexed Journal
NAAS Journal Score 2019: 4.31 SJIF 4.196

Online Contents Available at: http//www.bbrc.in/
DOI: 10.21786/bbrc/SI/12.3/2

the actuation unit forthe syringe pump. The syringe has to be manually removed and refilled with insulin periodically. An insulin pump with high accuracy at lower cost can be achieved by using piezo electric material (Cui, C. Liu and X. Zha (2006). Paul N et al 2011) proposed a fuzzy controller based insulin delivery system. The level of glucose in blood is monitored continuously and insulin amount and the rate of delivery is decided by the fuzzy controller.

Two LM35 temperature sensors monitor the ambient and battery temperature correspondingly. The sensors are interfaced to the ADC of MSP430. Appropriate alarms and LED indications are provided if threshold values are overdone. The alarm modules consist of LEDs, Buzzer and Vibrator. The database records every dosage administered, alarms given and occlusion conditions with respect to time and date.

The inbuilt RTC module of MSP430F5438F is used to keep track of date and time. Each insulin pump is equipped with a unique ID to which patient records are entered in the database. The database provides an online portal for the doctor to monitor and update the values for each patient. The database was developed using the Firebase Real-time Database (Guillermo Cocha et al 2018).

Insulin is a hormone produced by pancreas to process and controls glucose level in human body. The irregularities in insulin production may lead to a group of metabolic disorder well-known as Diabetic Mellitus (DM). There are two variants of DM: Type-1 diabetes, where the body is powerless of producing adequate quantity of insulin and Category-2 diabetes, where body is incompetent to make use of insulin in a proper manner (Clemens A.H et al 2017). In both cases the treatment includes insulin injection via a syringe or using an insulin pump. Insulin can be injected in two ways: as bolus and as basal. Basal is a small dose of insulin injected in a regular interval. To avoid sudden raise in blood glucose level after a meal, a heavy dose of bolus is injected before the meal (Balakrishnan 2011). The proposed design includes additional features such as controller, Real Time Clock (RTC) based automated infusion. The architecture of the Arduino control unit and sensor are discussed and results of insulin infusion are obtainable.

MATERIALS AND METHODS

There also commercially obtainable insulin pumps but involve its programming via the operator and consequently, patient dependent. This task suggests an insulin pump enhancement at an inferior value than others attainable in the saleable market. There are two central categories of diabetes: Category 1 diabetes arises regularly in children and adolescent adults. Where, pancreas miscarries to stimulate to lerable quantity of insulin. Category 2 diabetes staysplentiful additional prevalent plus proximately 90-95% of adults decrease below this classification. Different infusion organizations like insulin pen and insulin pump need stood suggested injecting the insulin by unceasing observing of blood glucose level (Deepalakshmi M, Jayaparvathy 2016). These difficulties are overcome in the proposed coordination. Drug discharge stands the progression now in which drug translate into appropriate product form which is exposed to absorption, distribution, metabolism and evacuation.

The regression of insulin drives and glucose measuring device equipment has established a proportion beginning the days of the Biostator; the initial real-world apparatus advanced for glucose mechanism. Nevertheless, the glucose homeostasis be contingent on a plentiful quantity of hormones demanding towards assessment and then, there are quite numerous complications towards answer previously a fully real-world scheme reach the maturity securely for a completely computerized process, without any worker interpolation. Commencing a process instrumentation opinion of observation, it is promising to portion individual the intravenous (IV) or subcutaneous glucose (SC) nevertheless the glucose organization usages of huge amount of hormones, similar glucagon for occurrence but implementation or strain also disturbs the cell glucose metabolism or its deliverance from the liver. Consequently, using “based model control”, through non-measurable variables involves the growth of “state observers”. The database was developed using the Firebase Real-time Database. The control flow of the algorithm is described in Figure 1.

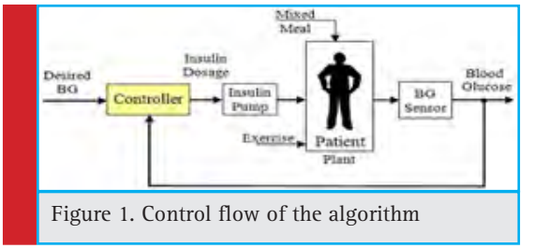

Figure 1. Control flow of the algorithm

RESULT AND DISCUSSION

It is proposed glucose measuring device as illustrated in Figure 2.

The Diabetes pumping mechanism is considered as shown in Figure 3, to work with its bag-style insulin reservoir. A mobile constituent inside the scheme—an insulin shuttle—slides concerning the reservoir, where it fills with insulin, and the infusion line, where it delivers insulin (Grant P 2007).

Idle state corresponds to the low power mode of MSP430. Once Bluetooth connection is established with

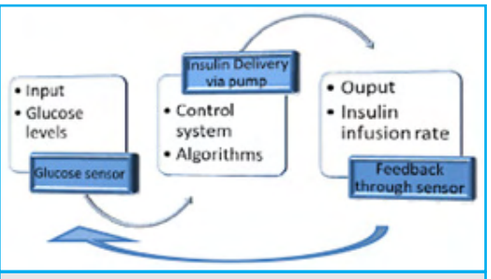

Figure 2. Proposed glucose measuring device.

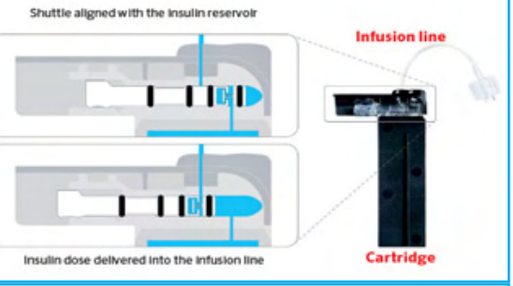

Figure 3. Diabetes pumping mechanism

the android device, the pump controller moves to Active non-execution state. In this state the controller monitors the insulin level in cartridge, temperature sensors values, battery level and waits for the dosage value from application. Once the user initiates insulin infusion, the pump controller goes into active execution state. Insulin pumping and occlusion pressure sensor values are read during this phase.

The insulin pump was powered from a 3V single cell battery and successful infusion of insulin was done. Figure 4 shows the transfer characteristics of the voltage booster circuit. Various dosage resolutions could be achieved by changing the input voltage of the booster

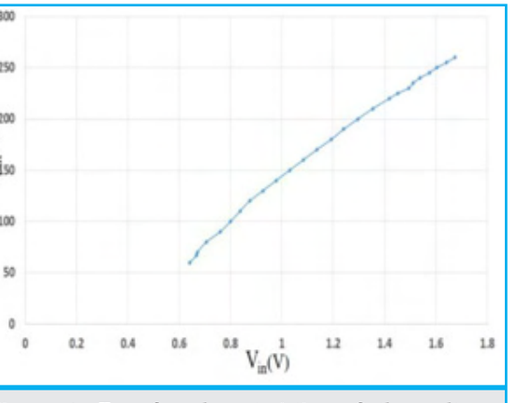

Figure 4. Transfer characteristics of the voltage booster circuit.

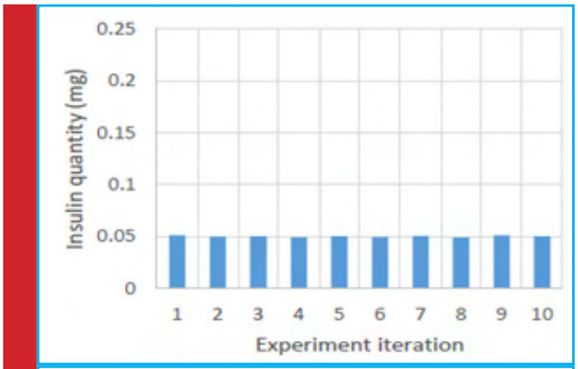

Figure 5. Quantity of insulin pumped over several experimental iterations

circuit. The quantity of insulin pumped was calibrated to 1 unit per cycle of pumping i.e. one period of the pulse waveform. The insulin pumped was measured with the help of a high resolution digital weighing scale. Different obstruction conditions were rivalled and the pump controller was able to identify all of them. The amount of insulin pumped for several experimental iterations applying 125V pulse are shown in Figure 5.

CONCLUSION

The well-ordered blood sugar flat is attained by intermittent assessment and affords dependable actual time insulin injection and performance as an artificial pancreas. Now this exertion, apiece quantity of the incorporated insulin infusion organization are exclusively demonstrated and incorporated by consuming the transfer function of perfect coordination. The circuit of an integrated insulin distillation arrangement as planned and infusion pump prototype execution has been prepared. We have designed this in a low budget, whereas in real time we can use nano- technology and make the prototype smaller. That may be costlier, but is very useful nowadays. The fact that drug delivery system with insulin injection has auspicious results in drug transfer technology and simplicity of manufacturing is an auxiliary advantage to the pharmaceutical industries. The Android application along with the database guarantees stress-free admittance of data and pump treatment for both doctor and the patient individually.

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Development of Bone Conduction Hearing Device using Nano Direct Current Drive

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ABSTRACT

This paper discusses about the development of new bone conduction hearing device using micro drive. The aim of this work is to help the people with hearing disability by developing a simple device with less cost. Technological development should be helpful to the needy. Bone conduction technology is used here to transmit sound from outside world to cochlea through teeth but without any surgery. The sound wave is converted into vibration by microphone and micro drive set up, when the micro drive is placed between teeth the signal is transferred from the teeth through the skull bones and into the cochlea. Thus the deaf people can hear the voice. The available bone conduction hearing devices are having disadvantages like surgery, cost and electrode metal inside the body etc., the proposed work is an attempt to overcome these problems. The device was tested in the laboratory and the converted electrical output signal is viewed with the help of oscilloscope.

KEY WORDS: BONE CONDUCTION, COCHLEA, NANO DC MOTOR

INTRODUCTION

As per the Census of India 2011, among the total population of India 26814994 number of people are having hearing disability. This is 2.21% of country's population. The count is high when compared to the 2001 census. When it comes under age group of 17 to 59 years, it affects the productivity of the nation and people with hearing disabilities put up with many problems especially in employment (Emmett and Francis, 2015; McKinnon, 2014). The problem in hearing is treated with many advanced technologies (Arpitha et al. 2017, Arun et al. 2017)

Basic reasons of hearing loss include-excessive noise exposure or usage of ototoxic medications and ageing-frequent damage sensory hair cells, reflects the initial stage of hearing person can be obtained by the clinical audiogram. Some of the recent studies of animal mod-

ARTICLE INFORMATION:

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Received 2nd Dec, 2018
Accepted after revision 29th Jan, 2019
BBRC Print ISSN: 0974-6455
Online ISSN: 2321-4007 CODEN: USA BBRCBA
Thomson Reuters ISI ESC / Clarivate Analytics USA and Crossref Indexed Journal
NAAS Journal Score 2019: 4.31 SJIF 4.196

Online Contents Available at: http//www.bbrc.in/
DOI: 10.21786/bbrc/SI/12.3/3

els suggested that before well known hearing loss, it is very harmful effect for all animals. This harmful effect interrupts the synaptic communication between sensory inner hair cells and subsets of cochlear nerve fibres. The harmful affected neurons changes auditory information processing, if accompanied by elevations of threshold or not, and is a contributor to various perceptual abnormalities, which includes difficulties in speech-in-noise, hyperacusis and tinnitus (Charles Liberman and Kujawa 2017).

Hearing impairment can be classified into four types- Auditory Processing Disorders, Conductive, Sensorineural and mixed. Only medicinal treatment is followed for Auditory Processing Disorders. For the other types of disorders hearing aids/Bone Conduction/Cochlear Implants/Hybrid Cochlear Implants are used. Both cochlear implants and bone conduction involves surgery and patient has to spend more money (Crowson et al. 2017; Lindemark et al., 2014; Semenov et al., 2012). The other disadvantages are common risks of surgery and electrode metal inside the body. In this proposed work, a simple technology that does not involve surgery is used to hear the sound by deaf people.

MATERIALS AND METHODS

A. Function of Ear

Normally the sound wave in the air has small vibrations. These vibrations as sound waves will travel to eardrums through air and the eardrums convert the sound waves into a various forms of vibrations. The vibrations are received by the inner ear called cochlea which is connected to the auditory nerve that transmits the sounds to the brain. The problem in hearing is treated with many advanced technologies (Arpitha et al. 2017, Arun et al. 2017).

B. Common Hearing Devices

i. Cochlear Implant Device

A cochlear implant is a device that is used to hear the sounds from the environment. Deaf people can use this device for better hearing. The implant consists of two portions, one portion is placed on behind the ear another one portion is placed under the skin through surgery. The parts of the cochlear implant: microphone, speech processor, transmitter and receiver, electrode array. The microphone that receives the sound signals from the environment and then the sound signal is analyzed by the speech processor. The receiver, receives the sound signal from the speech processor and then the sound signal is converted into electrical signal by using microphone. The electrode array is placed inside the ear, the electrode array collects the electrical signal from the receiver, which is send to different parts of the auditory nerve. The signals are generated in cochlear implant portion and the generated signal is sent to the brain through the auditory nerve, the brain that receives the generated signal as sound. In which people can receives the warning signal and can understand the sound over the telephone. But cost involved is very high (Chen et al. 2014, Di Nardo et al. 2014, Foteff 2016).

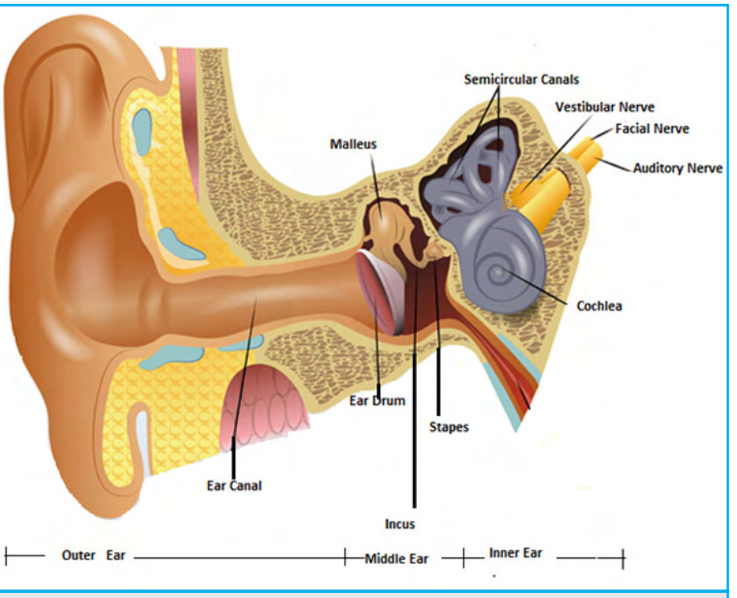

Figure 1. Parts of Ear – Outer Ear, Middle Ear and Inner Ear

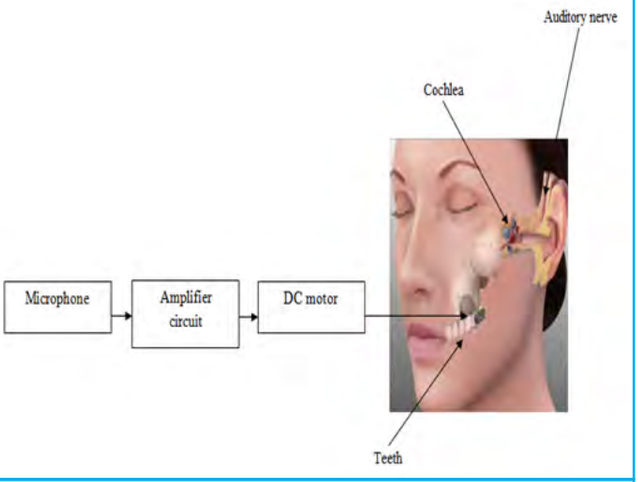

Figure 2. Block Diagram of Proposed Bone Conduction Hearing Device using Nano Direct Current Drive

ii. Bone Conduction hearing Aids

Bone conduction hearing device is a hearing device (Ricardo et al. 2012), that are used for persons who are suffered from conductive hearing loss or mixed hearing loss, problem of hearing loss occurred in the ear drum ,ear canal and part of middle ear. There are two portions of bone conduction hearing device. One portion is the sound processor which is placed externally, that detects the sound and converts the sound into vibrations. In another portion the equipment is placed in the skull behind the ear. These vibrations are transmitted through the equipment which is placed in the skull. These vibrations move from the skull to the inner ear where the vibrations are sensed as sound by the cochlea. Compared to other hearing devices the bone conduction hearing device is more comfortable. Conventional hearing aid cannot be used due to some reasons like irritation (or) ear canals that are collapsed and it does not give effective benefit, so we mostly prefer bone conduction hearing devices.Bone Conduction will bypass the eardrums. The bone conduction devices like headphones will perform the task of eardrums in bone conduction listening. These devices will decode sound waves into vibrations which is received directly by the Cochlea and thus eardrum will not involve in this process. The ear receives the vibrations of sound with help of bones (skull) and skin.

RESULT AND DISCUSSION

PROPOSED HEARING DEVICE

The aim of our project is to hear sound with teeth with the help of vibration. This device can be used by deaf people and it is a small device. The common hearing devices discussed previously are having disadvantages like surgery, cost and electrode metal inside the body etc., the proposed work is an attempt to overcome these problems.

Figure 2 shows the block diagram of the proposed hearing device. Microphone, amplifier and micro drive (Nano DC Motor) are the parts of the hearing aids. The function of the hearing aids is to receive sounds from the environment that are received by a microphone and then the sound signal is analyzed by a speech processor. The sound signal which is received is transformed into electrical signal with help of a micro phone and the signal is sent to an amplifier. The function of the amplifier is to increases the power of the electrical signal and then sends the signals to the Nano DC Motor. The motor vibrates according to the signal received. When we directly pass the vibration to the teeth by placing the motor shaft directly between the teeth, the signal is transferred from the teeth through the skull bones and into the cochlea. Thus the deaf people can hear the voice.

Micro Drive Specification:

The specification of drive used in this work (Nano DC motor) is given in the Table 1. The operating temperature range gives leniency to us to use at any circumstances.

The device is tested in the laboratory. Once the motor shaft is kept between teeth it vibrates when there is a sound waves received by microphone. This vibration reached brain as a sound wave through cochlea. This device will be helpful to the deaf people those who are having problem in their outer and middle ear. For testing the device in the laboratory the sound waves are fed to microphone with the help of mobile phone and the out-

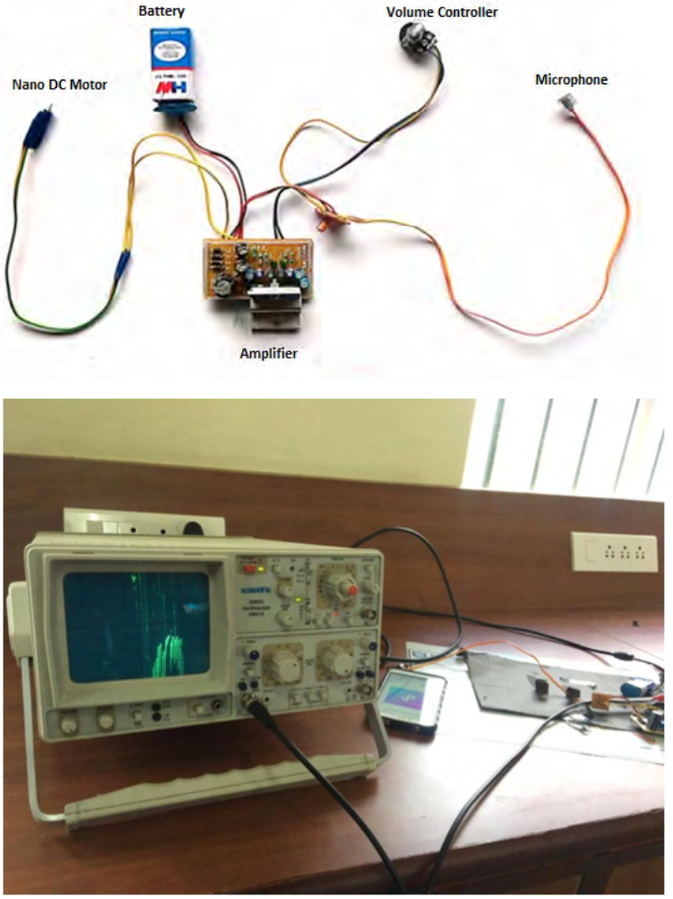

Figure 3. a) Picture of Bone Conduction hearing Device. b) Picture of Testing the device in Laboratory

put is taken across the DC motor. The output waveform obtained is shown in figure 3.

CONCLUSION

The components involved in the proposed hearing device and how it transfers sound waves to brain nerves are discussed in this paper. The cost of the device is very less and it is affordable to people below poverty line. The device proposed in this paper is an initial development. For practical applications still we need to work with less sized nano components.

Table 1. Nano DC motor Specification

Motor Specifications	
Voltage Rating	3 V (DC)
Maximum Output Power	61 Milliwatts
Rated Speed	39,000 rpm
Operating Temperature	+50oC to -10oC
Diameter	4.1 mm
Length	7.9 mm

ACKNOWLEDGEMENT:

Figure 1 https://www.hearinglink.org

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Biosci. Biotech. Res. Comm. Special Issue Vol 12 No (3) May 2019

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Advanced Navigation System for Visionless Person using Pharos Technique

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ABSTRACT

The proposal of ablind stick model is made for the visually impaired persons to guide their respective paths without any disturbances, and it will provide a better walking experiences which consists of Global Positioning System (GPS) Modules in addition with ultrasonic sensor and infrared sensor. GPS Module is used to detect the exact location of the person, that position and information will inform through short message service. Sound waves and distance to an object are measured using ultrasonic sensor, it is also used to detect the object, and Infrared sensor are used for detecting infrared radiations and it is also capable of detecting the objects. The objectiveaim of this paper is to help visionless persons to lead a safe life.

KEY WORDS: ARDUINO, GLOBAL POSITIONING SYSTEM (GPS), IR SENSOR, STICK, ULTRASONIC SENSOR

INTRODUCTION

Chaitrali K. (2016), designed a headway of modern innovation has made the life of outwardly impeded individual simpler. In the antiquated days, the visually impaired individuals are absolutely reliant on their relatives or some other pet creatures. The cutting edge innovation has given the basic answer for this issue. The visually impaired stick is equipped for distinguishing the article in front of the individual and impart that individual astutely by vibration and it causes the visionless to achieve their way. Roughly 37 million individuals over the globe are visually impaired.

Gaikwad, (2016), describes the visionless individuals are a term that regularly utilized for the general population who are totally visually impaired. The nearness of these issues in the visual framework can be brought about by various things. Some of visionless individuals are conceived in the condition of visually impaired, regular birth, mishap, ailment, and so forth. Rizzo (2009),

ARTICLE INFORMATION:

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Received 3rd Nov, 2018
Accepted after revision 22nd Dec, 2018
BBRC Print ISSN: 0974-6455
Online ISSN: 2321-4007 CODEN: USA BBRCBA
Thomson Reuters ISI ESC / Clarivate Analytics USA and Crossref Indexed Journal
NAAS Journal Score 2019: 4.31 SJIF 4.196

Online Contents Available at: http//www.bbrc.in/
DOI: 10.21786/bbrc/SI/12.3/4

describes a visionless people, more often than not utilize a mobile stick to walk or go some place as a relative to know the bearing and express the state of the passing street. Be that as it may, the elements of the traditional stick itself is as yet restricted in guiding and advising the article to a visually impaired individuals particularly when they are approaching the ideal goal. Steve (2015), describes a visual impairment is the condition of being visionless in which eyes experience the ill effects of all out loss of vision. The weakness isn't joined, even using glasses, Contact focal points or at times, surgery. A stick, the essential versatility device for the outwardly hindered.

In the 21st century, the most recent visually impaired stick is utilized to hit the market was presented by the Indian Technology Delhi's Assistive Technologies Group (Assistech). This hardware encourages the visionless individuals to explore around an article by estimating the separation through vibration recognition and sonar innovation. Dazzle individuals encounter challenges when driving to their planned goal. One of the more noteworthy deterrents is to distinguish outside items over their strolling way. A relative separation between a visually impaired individual and a hindrance is distinguished by utilizing sensor. The walking stick contains arduino, ultrasonic and IR sensors, and buzzer. The whole system is designed using arduino based upon its reliability. All sensors data are taken by the arduino through micro-controller and it produces the output. The main aim of this moduleis tohelp the blind person walk self dependently without stick as information related to distance to the obstacle.

MATERIALS AND METHODS

Figure 1 shows the different types of components used. The ultrasonic sensor provides an easy method of distance measurement. The Global Positioning System (GSM) controls the sending and reception of signals to the other components. The push button sends the message to the receiver through GSM. The prototype is designed to sense an object within 1.8m. It uses ultrasonic sensor, infrared sensor, push buttonand GSM. Ultrasonic sensors are used to detect the obstacle for user.

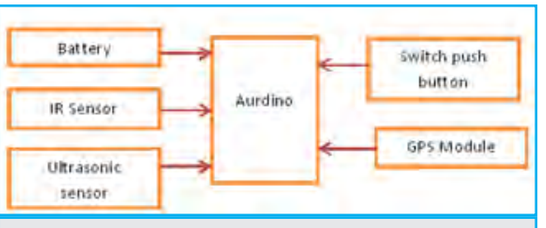

Figure 1. Block diagram of blind stick using arduino

A. ULTRASONIC SENSOR

An Ultrasonic sensor (Fig. 2) is a device that can be used for distance measurement between the object and the stick by using sound waves. Sound waves are measured by an ultrasonic sensor by sending a specified frequency. By measuring the time expanded among the sound wave that have been produced by the sound wave returning back, there is a possibility for measuring the distance for both the ultrasonic sensor Fig. 3 and the object.

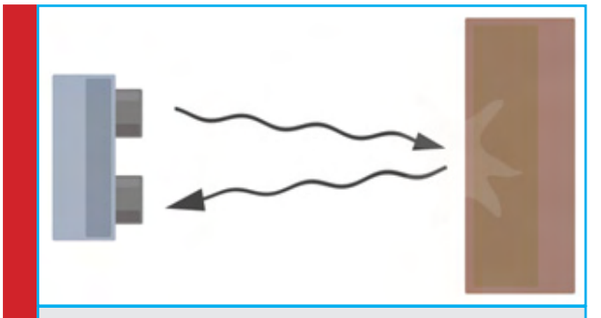

Figure 2. Basic ultrasonic sensor

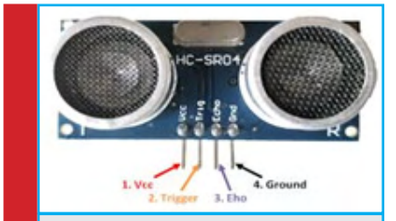

Figure 3. Ultrasonic sensor

Since the ultrasonic sensor is specific that sound waves travelling through air at about 344 m/s (1129 ft/s), as we can hand over the time for the sound wave to returns back and then repeats it by 344 meters (or 1129 feet) to measure the total turn around distance of the sound wave. Round trip is the multiply of speed of sound and time taken. Here, the distance can be calculated by half of the round trip.

B. IR SENSOR

An IR radiations falling on the gadget can be distinguished by IR sensor. The warmth of an article can be estimated by IR sensor (Fig. 4) just as it identifies the motion.IR sensor work by utilizing a particular light sensor for recognizing a predefined light wavelength by utilizing Infra-Red (IR) Spectrum. This kind of sensor can be utilized to gauge how "splendid" the item is.

For human eye the IR beam are not unmistakable. In the electromagnetic range, infrared radiation can be found among the unmistakable and microwave areas.

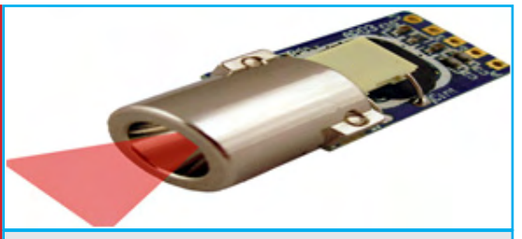

Figure 4. IR sensor

The infrared waves principally have wavelengths in the scope of 0.75 and 1000µm. Infrared innovation discovers driving positions in progressively ordinary items. TVs utilize an infrared identifier to translate the signs sent through a remote control. The fundamental advantages of infrared sensors incorporate their necessities of intensity in least, the hardware in straightforward and the highlights.

C. GPS MODULE

Worldwide Positioning System (GPS) is a system of circling satellites that send supreme data on their area in space back to earth. The produced signs are acquired by GPS recipients, for example, route gadgets are utilized to compute the correct position, speed and time at the engines or article area. GPS is outstanding for the military uses and was first created by the US.

D. BUZZER

Buzzer an electrical device (Fig. 5) that makes a buzzing sound and is used for signaling and it also attract someone's attention. It makes buzzing sound as a signal. Buzzers are used commonly in indicating devices, computers, relays and confirmation of user input such as a computers mouse click and keystroke.

E. ARDUINO

The Arduino is a microcontroller based board (Fig. 6). It consist of electronic input and output pins, a power jack,a resonator, USB connector and a reset button. The microcontroller needs each and everything to be supported by arduino and connected to a computer through USB cable.

Figure 5. Buzzer

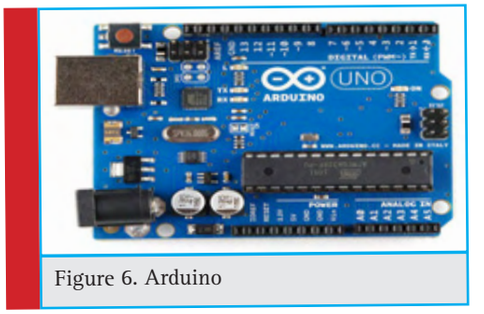

Figure 6. Arduino

RESULTS AND DISCUSSION

The project starts an organization to questionnairethe visionless persons about which type of module that would be showed on the stick. As the inventionof this project, they need an any other module for finding the disturbances and fast moving objects .This module has to help the blind persons.

At the time of starting when the first on/off catch is squeezed, it will enact the ultrasonic sensor. The blurring sound will dynamic if identify any hindrance, openings, hitch around the visually impaired position from the separation 150cm until 3 cm, the speed of the sound signal will be quicker when the visually impaired individuals walk drawing nearer to the hitch or gap. Then if the client needs to discover the position, squeezed the second on/off catch to enact the infrared and the framework will give the data about their situation through the GPS

Arduino, sensors, GPS Module,GSM Module Push get switch and the battery all are connected together and shown in Figure 7. When the object is detected by the sensors, it gives the intimation to the visionless person through noise or vibration .If that person needs any help, he presses the push button automatically the message will sent to their relatives or friends through GSM along with their position where they are located through GPS.

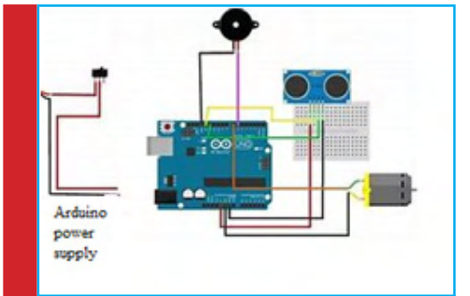

Figure 7. Design of the system

Type of		*Sensor outputs*	
Obstacle	*IR*	*Ultrasonic-1*	*Ultrasonic- 2*
	Sensor		
Down	Off	Not accounted	Not accounted
Stair			
Up Stair	On	D<15cm	D>136cm
			& D<160cm
Wall	On	D<15cm	D>106 cm & D <
			120cm
Vehicle	On	D> 300cm	D>300cm &D
			<450cm
Small	On	D< 15cm	D>300cm
stone			

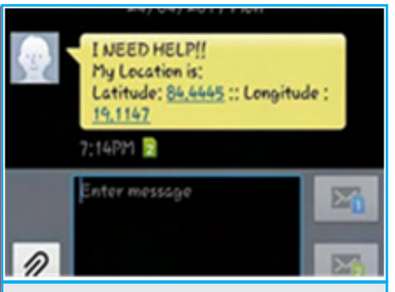

Figure 8. SMS output

The below Fig. 8 shows the SMS that have been received at the relative number, when the blind man miss the way he presses the push button for asking help by informing through GPS location to hiscolleagues and friends.

CONCLUSION

The investigation has effectively built up a shrewd stick for alarming the visually impaired client of the looming deterrents. These were acknowledged through usage of ultrasonic sensor which is fit for estimating separation to the article. The recurrence of blaring increments as the client strolls nearer to the hindrance. The situation and introduction of the sensor on the stick was additionally effectively broke down regarding exactness and point. The upper situated sensor with edge of 90° has been found to the most down to earth setup. When all is said in done, a shrewd stick with range notice include has effectively been produced and its particulars checked.

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Biosci. Biotech. Res. Comm. Special Issue Vol 12 No (3) May 2019

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Internet of Things Based Patient Health Care Monitoring System

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ABSTRACT

Technology production senergetic part in Media, Medical Health care Organizations, Communications, etc., Internet of Things is the proposed development recycled in health care observing organization. Health care organization is one of the greatest encouraging applications of Information Machinery. Health monitoring system using mobile phone is recycled to monitor the different parameters of patient's health in simultaneously. In this system the doctor can monitor different parameters of patients sitting in his room and even when he is away from the patient. This paper gives as the improvement of Arduino based system for wireless monitoring using IOT module. If we could construct a lesser cost manageable health detecting device, involving of several sensors, accomplished of measuring the energetic qualities of a human body and has the ability to communicate with the hospital data base, we could deliver with superiority medical guidance.

KEY WORDS: ARDUINO, SENSOR, INTERNET OF THINGS, BLOOD PRESSURE SENSOR

INTRODUCTION

Health is one of the worldwide challenges for humanity. The development ofworld, health care monitoring system is used field such as hospital, homecare unit and sports (Chengathir Selvi M et al 2017), The patient's heart beat rate and temperature data are monitored. The wireless observing schemeis the one of the effectively monitor and also health conditions of the patients which includes constraints suchas blood pressure, temperature, heart rate. There are basically two components for measuring system one is Wireless health care monitoring system and other is measuring base station. The server has a possibility for transferring the record of the patients with their subtle elements and their therapeutic antiquity (Kumar R, Pallikonda Rajasekaran M 2016). The

ARTICLE INFORMATION:

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Received 12th Dec, 2018
Accepted after revision 20th Feb, 2019
BBRC Print ISSN: 0974-6455
Online ISSN: 2321-4007 CODEN: USA BBRCBA
Thomson Reuters ISI ESC / Clarivate Analytics USA and Crossref Indexed Journal
NAAS Journal Score 2019: 4.31 SJIF 4.196

Online Contents Available at: http//www.bbrc.in/
DOI: 10.21786/bbrc/SI/12.3/5

information server can be gotten to whenever by the specialist and the specialist can likewise observe the current live sustain of the patient's medicinal circumstance. A track of patient's well being best ever is additionally kept up for future reference on the web-based interface. In order to improve the above condition we can make use of technology in smarter way. In the Internet of Things, gadgets accumulate and measure data straightforwardly with each other and the cloud, making it conceivable to gather record and examine new information streams speedier and all the more precisely. Sensors that gather persistent information. Micro controllers that procedure breakdown and remotely impart the information Microprocessors that empower graphical. Social insurance particular doors through which sensor information is additionally investigated and sentto the monitor.

In this development we require temperature, blood pressure and heart beat readings which are supervised using IOT. In sensors restrained patients body temperature, blood pressure, and heart rate and it canbe observed and monitoring using IOT as well as over any place in the world consuming internet source (Amna Abdullah et al. 2015).

MATERIALS AND METHODS

Social insurance particular doors through which sensor information is additionally investigated and sentto the monitor. The power supply block is powered by a 12V transformer which is the whole source of power. Each and every connected devices will get power from this block. The arduino controls and coordinates all the devices and sensors. The heartbeat device dealings the heartbeat of the patient continuously. The measured signal is an analog signal and this is fed to the analog to digital converter of the arduino. Here in the adc the analog to digital conversion takes place. The converted signal is then fed to the arduino which takes the necessary action as per the given structure.

Likewise the temperature device measures continuously, the temperature of the patient. The measured signal is an analog signal and this is fed to the analog to digital converter of the arduino. Blood pressure sensor also connected to the arduino and as the same as heartbeat sensor and temperature the measured signal is an analog signal and this is fed to the analog to digital converter of the arduino. Here in the ADC the analog to digital conversion takes place. The converted signal is then fed to the arduino which takes the necessary action as per the given structure. The readings are continuously transmitted over IOT for remote monitoring. If there is any abnormality, it will be indicated on the remote host. Using mobile and computer we monitor patients health parameter is Illustrated in Figure 1.

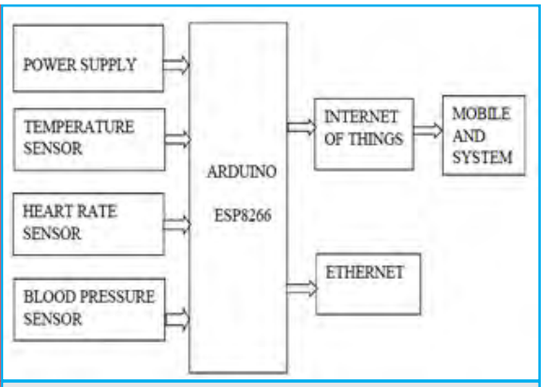

Figure 1. Blockdiagram for health monitoring system

RESULT AND DISCUSSION

The power supply unit is powered by a 12v transformer which is the whole source of power is illustrated in Figure 2. Each and every connected devices will get power from this block. The arduino controls and coordinates all the devices and sensors. The heartbeat device measures the heartbeat of the patient continuously. The measured signal is an analog signal and this is fed to the adc of the arduino. Here in the adc the analog to digital conversion takes place. The converted signal is then fed to the arduino which takes the necessary action as per the given structure. Likewise the temperature sensor and blood pressure sensor also has been connected to the arduino. And as the same as heartbeat sensor, the measured signal is an analog signal and this is fed to the adc of the arduino. Here in the adc the analog to digital conversion takes place. The converted signal is then fed to the arduino which takes the necessary action as per the given structure. The readings are continuously transmitted over IOT for remote monitoring. If there is any abnormality, it will be indicated on the remote host.

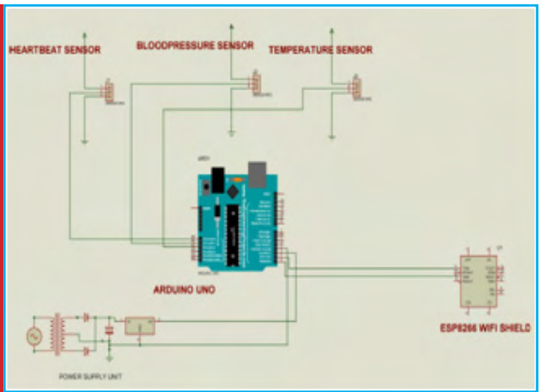

Figure 2. Software Implementation

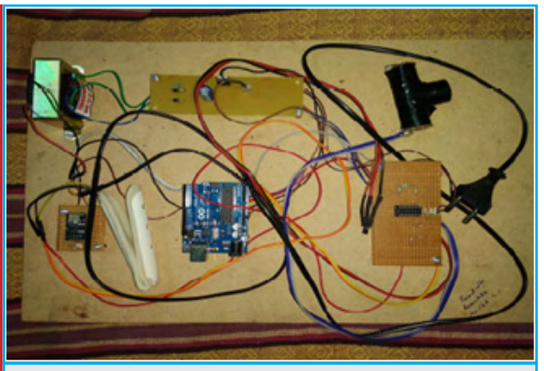

Figure 3. Hardware Implementation

Using mobile and computer we monitor patients health parameter.

In this paper we use three sensor like temperature, blood pressure and heart beat sensor for measuring human parameter. These three sensor are connect to arduinouno for measuring and monitoring patient health. Arduino transfer the value to ESP8266 is shown in Figure 3.

Measured value are transfer to ESP8266 and values are changes to more than mentioned value it indicates "ABNORMAL" or it show "NORMAL". All parameter values are show in display. Values are updated in every one second. Measured values are monitor by Patient and Hospital. In abnormal condition system indicate Abnormal in display so, we can easily understand current situation. Measured value are transfer to ESP8266 and values are changes tomore than mentioned value it indicates "ABNORMAL" or it show "NORMAL".

Table 1. Normal & Abnormal Values for Different Parameter.

SENSOR	NORMAL	ABNORMAL
TEMPERATURE	0-36	38 & above
HEART BEAT	60-80	80 & above
BLOOD PRESSURE	80-120	120 & above

CONCLUSION

The product part integrates an Arduino IDE which is expected to program our Intel Galileo Board which was utilized to transfer our last code of keeping up a record. Every one of the information associated with the sensors is sent to a Xampp established information base server to log the patient auspicious best ever or detected information, which will support the specialist for better counseling and solution to tolerant. More finished these data sets put away in database are utilized to design diagram for every one of the sensors are appeared. In conclusion, the dependability and authority of our arrangement have been confirmed through field tests. The field tests display that our arrangement can harvest medical data that are associated to individuals manufactured by the surviving medical apparatus.

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Biosci. Biotech. Res. Comm. Special Issue Vol 12 No (3) May 2019

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Medical Computing for Identification of Lung Nodules by Application of Effective Dual Power

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ABSTRACT

The Chest radiography is to identify nodules that superimpose through ribs and collarbone and to moderate the numerous artificial positives cause by ribs. Recognition of nodules by a CADE design is quite significant, since radiologist be probable to live such faint nodules. Our idea during this reading was to build up a CADE design by enhanced understanding and specificity in make use of "Effective dual power" (EDP) someplace ribs and clavicles be covered up with substantial-training simulated neural networks (s-TANNs). The EDP technology hidden the rib and clavicle cloudiness within Chest radiography whereas preserve soft-tissue cloudiness in utilize of the s-TANN method to facilitate have be instructed through authentic dual-power image. The design detected nodule contestant on EDP image with the implement of a morphologic filter performance. Sixty morphologic and gray level base portions were extracting as of all nominee starting together novel and EDP Chest radiography. A non linear maintain vector classifier used for tagging of the nodules contestant. The communal offered documentation which enclosed the group of nodules in respected chest radiography and some Chest radio graph regularly used for testing our CADE design. The entire nodules be authenticated through computed tomography examination, with the universal dimension of the nodules was 15.8 mm. The unique design with no EDP skill accomplished a sensitivity of 75.4%. The compassion and specificity of our CADE design designed for recognition of nodules, particularly faint nodules, in radiograph was enhanced very much.

KEY WORDS: COMPUTERIZED RECOGNITION, LUNG NODULES, EFFECTIVE DUAL POWER (EDP)

ARTICLE INFORMATION:

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Received 19th Dec, 2018
Accepted after revision 29th Jan, 2019
BBRC Print ISSN: 0974-6455
Online ISSN: 2321-4007 CODEN: USA BBRCBA
Thomson Reuters ISI ESC / Clarivate Analytics USA and Crossref Indexed Journal
NAAS Journal Score 2019: 4.31 SJIF 4.196

Online Contents Available at: http//www.bbrc.in/
DOI: 10.21786/bbrc/SI/12.3/6

INTRODUCTION

In the early hour's recognition and behavior of lung cancers were move forward the endurance charge by 40% state the cancer is identify near the beginning at period 1, which is a private also bounded lung nodule (Colin et al. 2015). Even though a large compact of effort has been done by examiners to develop the presentation of CADE design, CADE design at a standstill generate moderately huge number of false positives. This would divert radiologists in their discovery and shrink radiologists' effectiveness (Weikang et al. 2017). There are several existing method noted here, a dual power estimation method be a procedure for unscrambling spongy tissue beginning skeleton in Chest radiographs' by utilize of 2 X-ray revelations at 2 dissimilar force points. During grand compensation, some partial hospitals make use of a dual power radiography method, because a dedicated equipment is necessary, and the emission dosage can be dual to attend the topic of the plainness of dual force methods (Kaarthik et al. 2018) we developed an image-processing procedure called effective dual power (EDP) (Yuvarani et al. 2018) radiography for suppressing ribs and clavicles in Chest by means of a multi resolution s-TANN method. The real dual-power images were used as the instruction images for guidance of the multi resolution s-TANN method. The skilled TANN method concealed the ribs and clavicles in normal Chest significantly, while the visibility of protuberances and lung vessels was preserved.

MATERIAL AND METHODS

A. Resources and Technique Directory of Chest Radiographs

To educate our CADE design, we composed 300 belongings with nodules and 100 normal belongings from six medicinal. The lump volume was range starting 4 near 30 mm. To assist assessment of our EDP base CADE design by means of our novel design and expectations comparison through extra processes, the method was *Japanese Society of Radiological Technology (*JSRT) database, which is communally obtainable.

To assist assessment of our EDP base CADE design by means of our novel design and expectations comparison through extra processes, the method was *Japanese Society of Radiological Technology (*JSRT) database, which is communally obtainable. The metaphors be digitized to give up 10bit Chest radiographs with a declaration of *1056 × 1056 pixels*. As a result, 160 nodule cases and 113 normal cases were selected and fitted the database for our experimentation.

B. Innovative Computerized Design for Nodule Detection

CADE design for recognition of lung lumps in Chest Radiography consists of four steps:

- *Segmentation of lung field supported on our multi section dynamic figure representation (M-DFR). Two-phase nodule improvement and nodule nominee recognition.*
- *Segmentation of nodule nominee by use of crowd together Watershed algorithm.*
- *Feature investigation and categorization of the nodule nominee into nodules by use of a nonlinear sustain vector mechanism (SVM) classifier.*

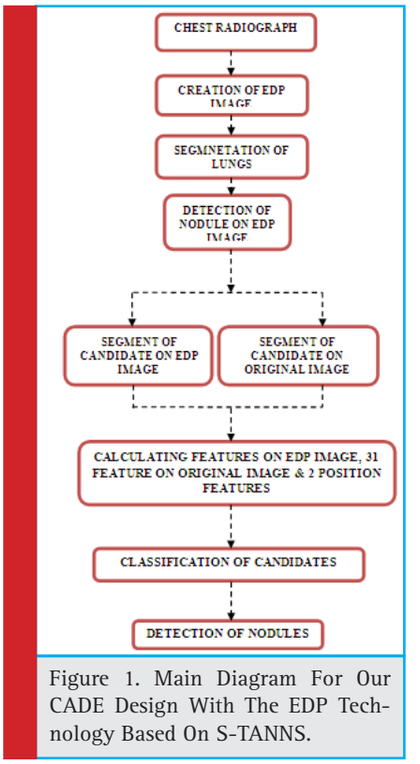

Figure 1. Main Diagram For Our CADE Design With The EDP Technology Based On S-TANNS.

The node specified DFR was build via a permanent position of similarly spaced attribute nodes for both margin segments. Later than the lung was sliced, an environment tendency rectification method based on the subsequent second order bivariate polynomial utility was functional to the segmented lung field:

$$F(m,n) = pm^2 + qn^2 + (r * m * n) + (s * m) + (t * y) + u$$

Where p, q, r, s, t, u are coefficients.

The phase of the method improved nodules by use of two dissimilar kinds of depressing level morphologic opening operator one better nodules the additional covered up with ribs. Another phase of our lump development transformed the nodule improved representation interested in a nodule possibility plan through apply of a bearing incline importance filter. At last, 21 shape, gray-

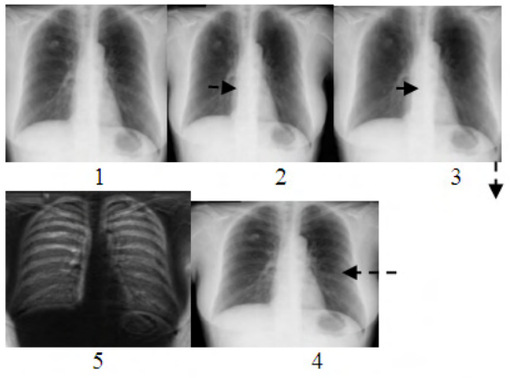

Figure 2. (1) Original image. (2) EDP soft-tissue image with 20% rib contrast (3) 70% rib contrast (4) 90% rib contrast (5) EDP bone image

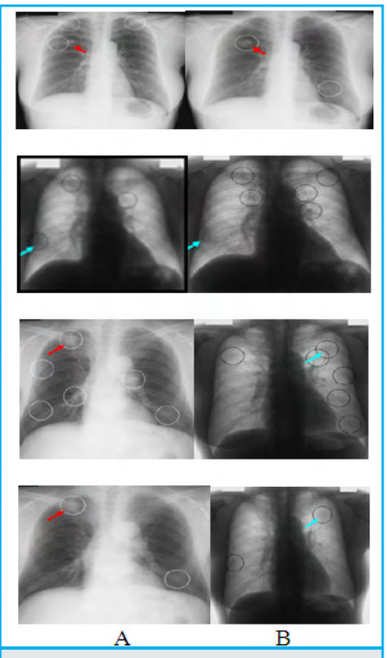

Figure 3. Image of the development in nodule finding with our EDP Technology.

level, quality, and specific FP features were removed from nodule contestant.

C. Establishment of EDP Images

Fig. 3 shows pattern of EDP images in which ribs and clavicles were suppressed by use of the s-TANN method. S-TANN is an extremely nonlinear filter that can be skilled by use of effort Radiographs and the equivalent *"training"* mages.

$$\{ \overrightarrow{I}_{a,b}\, T(a,b) \mid a,b \in R_T \}$$

$$gL_{(a,b)} = \tfrac{1}{4}\textstyle\sum_{ij \in R_{22}} gH\,(2a-i, 2b-j)$$

$$g_U^L(a,b) = gL\,(a/2, b/2)$$

$$dH(a,b) = gH_{(a,b)} - g_U^L(a,b)$$

These events are carrying out frequently, construct additional subordinate motion image.

$$gH_{(a,b)} = g_U^L(a,b) + dH(a,b)$$

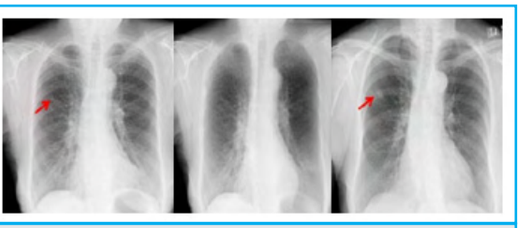

Figure 4. Examples of EDP images

For repression of ribs and clavicles in an original radiograph $g\,(a,b)$ an EDP bone image $f_b = (a,b)$

$$f_s(a,b) = g(a,b) - w_c \times f_b(a,b) \times m(a,b)$$

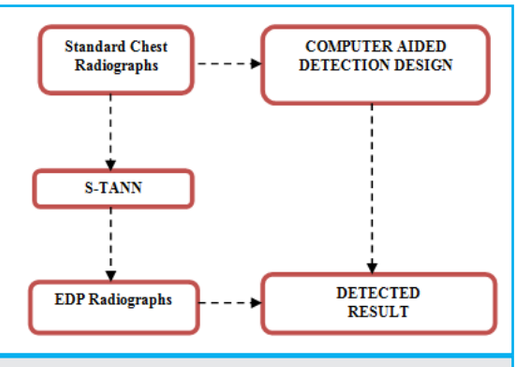

Figure 5. Design used for finding of lung nodules

D. CADE Design United With EDP Technique

Most important challenge designed for our novel design was to identify the nodules overlap through ribs, rib crossings, and clavicles, and shrink the FPs caused by these structures. A number of nodules had similar to characteristics to those of bones in terms of the shape, the size, the disparity, and the direction.

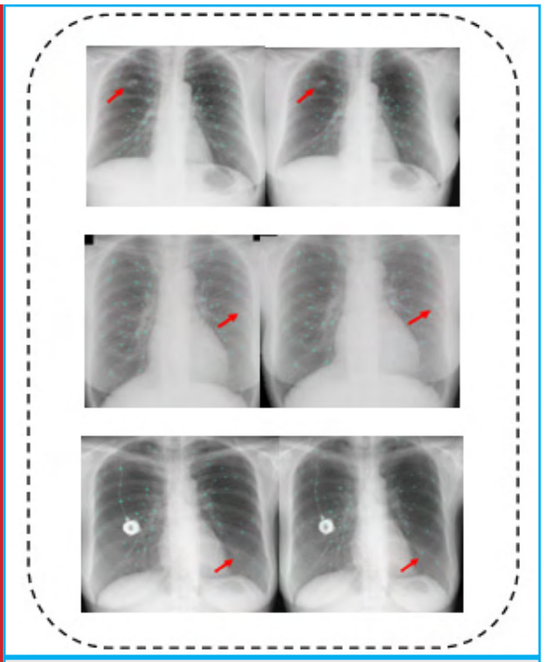

Figure 6. Precision in finding of nodule candidates by use of our EDP Technology

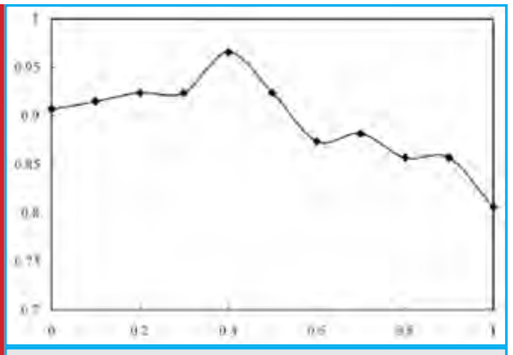

Figure 7. Graphical Representation of Sensitivity Vs Rib Contrast

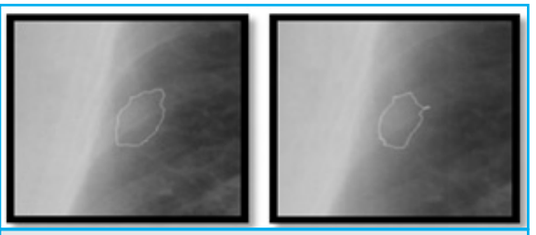

Figure 8. Illustration of the nodules detected in the nodule candidate detection.

RESULTS AND DISCUSSION

In this part, we present a few investigational outcomes to express the presentation of the EDP -based CADE design (Colin et al. 2015), which included the EDP system.

CONCLUSION

We developed a complex automated design for recognition of lung nodules (Weikang et al. 2017) through integrates with EDP picture with in ribs and clavicle was censored by S-TANN method. The presentation of the CADE design (82% sensitivity) was providing a significant upgrading along with the novel CADE design.

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Biosci. Biotech. Res. Comm. Special Issue Vol 12 No (3) May 2019

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Bioscience Biotechnology
Research Communications

Automatic Reduction in Emission of Bagasse into the Environment in Paper Industry

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ABSTRACT

Pulp is a cellular fibre which is made from wood / Bagasse. The bacteria in sugar cane may lead to degrade the quality of paper. The Paper is being made with different kinds of Pulp. Bagasse is the main raw soft wood, Hardwood, Chemical, Mechanical and Imported Pulp are mixed with some proportionate ratio to produce different varieties of papers for making Paper in paper industry. These pulps are mixed in various proportions to produce seventeen different qualities of paper. Due to the requirement of paper production, the pulp requirement has raised, as a result lot of money is spent on purchasing of hardwood and imported pulp for the paper production. In order to cater for the need of increased pulp demand certain amount of de-ink pulp is mixed along with the other raw materials for the pulp production. The de-ink pulp is produced in the de-ink production plant is allowed to store in a tank and the parameters like consistency, flow rate, level, agitation, lubrication of drives in the de-inking pulp mixing process are controlled with the help of PLC. Then the de-ink pulp is pumped to the mixing tank with required consistency and flow. Finally the mixed pulps are sent to the machine chest and they are drawn as paper. The paper which is produced from the mixing of de-ink pulp which may be treated with chemicals to reduce bacteria are categorized as a medium grade and are used in notebooks. Due to this de-ink pulp preparation the annual production has been raised and the demand for the pulp is also achieved. And the emission of bagasse in the environment may lead to damage the environmental conditions. To avoid that the de-inking pulp can be used to avoid those environmental damages.

KEY WORDS: PROGRAMMABLE LOGIC CONTROLLER, RATIO CONTROLLER, ENVIRONMENTAL CONDITION

ARTICLE INFORMATION:

*Corresponding Author: gowthami.ei@gmail.com
Received 24th Jan, 2019
Accepted after revision 26th March, 2019
BBRC Print ISSN: 0974-6455
Online ISSN: 2321-4007 CODEN: USA BBRCBA
Thomson Reuters ISI ESC / Clarivate Analytics USA and Crossref Indexed Journal
NAAS Journal Score 2019: 4.31 SJIF 4.196

Online Contents Available at: http//www.bbrc.in/
DOI: 10.21786/bbrc/SI/12.3/7

INTRODUCTION

The paper industry consists of two main raw materials for manufacturing paper such as wood and recovered paper. Kaolin, starch and other products are used as supplementary materials in the paper production process. Pulpwoods used for paper making are made from whole mature trees. The Papermaker usually uses parts of the tree that are left after wood, (Priyanka et al. 2015) has been used for other commercial purposes. In paper industry they will use sugar cane as pulp for production of paper. During cultivation if any disease affects the crop it may lead to some bacterial growth in the sugar cane. If we use the same for production of paper in paper industry it may reduce the quality of paper and also affect the entire plant production. The raw products which come as outlet is bagasse (Sagar et al. 2014). The bagasse will lead to damage the environmental surroundings. Thus de-inking pulp chest have been introduced in paper industries to avoid those emission of bagasse in the environment. The paper manufacturing process is outlined below:

1. *Wood preparation:* The bark is removed from the in-coming logs and it will be converted into chipped.
2. *Cooking:* The cooking process is done by heating the wood chips in a solution of NaOH and Na_2S in a pressure cooker, during this process a lot of the lignin the reinforcing substance that make tree cells wood hard and 'woody' rather than soft similar to those of other plants is removed which is removed from the wood, (Kavitha et al. 2012). The pressure is then released suddenly, causing the chips to fly apart into the fibres.
3. *Pulp washing:* The pulp is made to wash with water the purpose of washing the pulp is to remove the cooking chemicals and lignin from the fibre due to this type of washing it will not interfere with forth coming process steps.
4. *Pulp screening:* A sieve which is a pulp screening technique which is used to remove knots and also clumped-together with uncooked fibers from the pulp.
5. *Bleaching:* Bleaching is done in two steps. In the first stage the pulp is treated with NaOH in the presence of O_2. The NaOH is used for removing the hydrogen ions from the lignin and then the O_2 breaks down the polymer. In the next stage the pulp is treated with ClO_2 then a mixture of NaOH, O_2 and peroxide and again it is treated with ClO_2 in order to remove the remaining lignin.
6. *Paper making:* In the paper making process the fibers are mechanically treated in order to make them bond together and also used for strengthening the paper. The chemicals added to provide special properties such as color and act as the water resistance, and then the water is squeezed out and the pulp is rolled smoothly and dried. Various additional processes result in the recovery of CaO, NaOH and Na_2S, the major chemicals used in the process. Several utilities and techniques are used to ensure that such conditions as sufficient reaction times and adequate mixing criteria are met. On site processing removes the lignin from the liquid wastes and also made to remove solid wastes and the solid wastes are taken to a landfill.

MATERIALS AND METHODS

A. Existing Method of Pulp Production

In paper industry the main raw material is the BAGASSE-the sugarcane residue. Here the bagasse which is used as sugarcane. if the sugarcane is affected by any bacteria during cultivation it may lead to degrade the good conditioned pulp. It also uses certain proportion of hardwood pulp, chemical pulp & imported pulp for the production of paper pulp. As the sugar cane is the raw product used for production of paper that lead to emit the excess bagasse into the environment. To avoid that the de-inking pulp can be used. Currently the paper industry is producing seventeen different qualities of paper. Initially only two paper machines was used for paper production. Now it has erected the third paper machine to increase the production. Due to the implementation of the third paper machine the consumption of pulp has increased .As a result lot of money is spent for hardwood & importing pulp.

B. Proposed Method of Pulp Production

In order to cater for the need of increased pulp demand due to the erection of third paper machine certain amount of de-ink pulp is used along with the other raw materials for the pulp production. De-ink pulp is produced by treating the used paper with certain chemicals for removing the color (Avvaru Ravi et al, 2013) and if it is affected by any bacteria it may be identified and intimation will be given to the production department by testing department. In production department they will treat the pulp with suitable pharmaceutical medicines. And then finally mixed with water in recycler plant. By this method both the demand for pulp and conservation of trees are achieved

C. Process Block Diagram

The overall block diagram for the DIP process (Priyanka Patel et al,2015) is shown in the fig. 1.

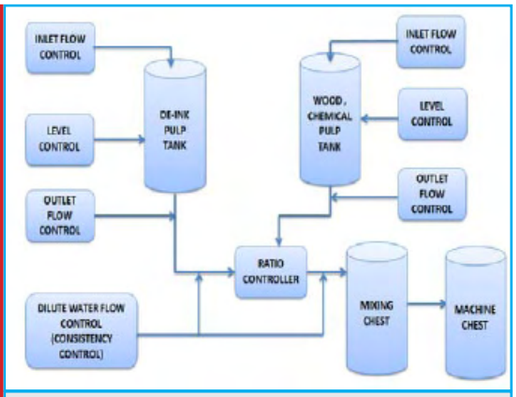

Figure 1. Process Block Diagram

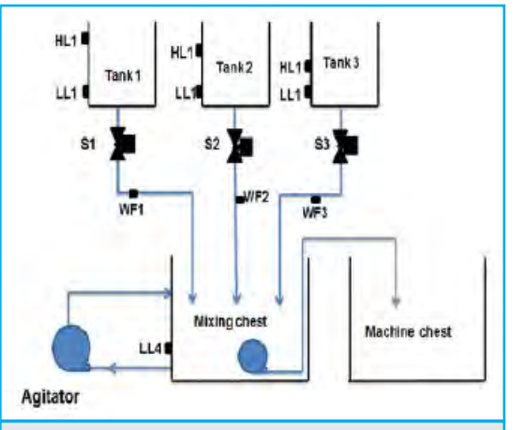

Figure 2. prototype model

D. Process Description:

The De-Inking Pulp which is being pumped from De-Inking Pulp Tower comes to De-Inking Pulp Receiving Chest. The distance between De-Inking Pulp Tower and De-Inking Pulp Receiving Chest is around 1.3 Km. The pulp from the De-Inking Pulp is again pumped to the Mixing Chest. The Level of the Receiving chest is also maintained to avoid overflow of the tank. The Pulp consistency is around 3% to 5%.

All the pulps get mixed up in the Mixing chest as per their ratio set with the Stock Proportioning system such as Ratio Control. The Ratio set point and the Level of the Mixing chest determine the flow set point for each pulp. The Level of the Mixing chest is variable as the Paper Machine speed is variable. The pulp flow set point is variable according to the demand from the Paper Machine section. The consistent quality of the product can be obtained only if the mixing rate of the pulp is uniform.

Finally the de-ink pulp is mixed with the other pulp in mixing chest and then the mixed pulp is pumped into the machine chest where the paper machines get pulp for paper production. The Receiving chest has the following controls in order to achieve the proportionate mix and to have the consistent quality of the product. It also used to maintain the PH range for that they have to maintain the bacterial content in the minimal value.

The following controls are required at Dip Receiving chest in order to achieve the desired quality of the product. Receiving chest Level Control, Pulp Consistency Control, 3. Pulp Flow Control.

E. Prototype Model:

The prototype model is shown in the fig. 2

The three different tanks are initially taken by having level switch at different level in order to mix the three different liquid in different proportions. The operation is controlled by programmable logical controller. In this model the flow is based on the level of the liquids in the tank. The liquids are manually poured and once the high level is reached the solenoid valve get triggered through a relay assembly(Sanamdikar S T,2013). All the liquids are collected in the mixing tank where the agitator assembly is kept for continuous mixing of liquids and not allowing them to settle and finally they are pumped into the machine chest. The flow of liquids are indicated by means of LEDs.

F. Plc Operation

The SELEC Programmable Logic Controller operating at 230 V is used in this prototype model. When the PLC is turned ON, first it scans for the status of input, i.e. whether the sensor connected to the input pins of PLC is ON or OFF. Then the PLC starts to execute the loaded program. Based on the programming with respective of the inputs the output are turned ON or OFF.

G. Prototype Interfacing

The PLC used is MM1015, it consists of 10 inputs and 6 output ports and operates on 230 V ac .The seven magnetic level switches are connected from the port 0 to port 6. The port 7 is unused and the port 8 and port 9 are used as start and reset inputs for which two button switches are used. A 24V supply is taken from the com port of PLC and the supply is given as the input supply to the sensors and the negative is grounded to PLC (Sagar P Jain et al, 2014). In the output port side the first three ports are used connected to a 6 amps NO relay and these relay are used to trigger the solenoid valve. The port 4 is connected to an agitator pump through a relay. A transformer of 4 Amps is used for operating the pump. Finally the port 5 is connected to an ac submersible pump through a relay contact.

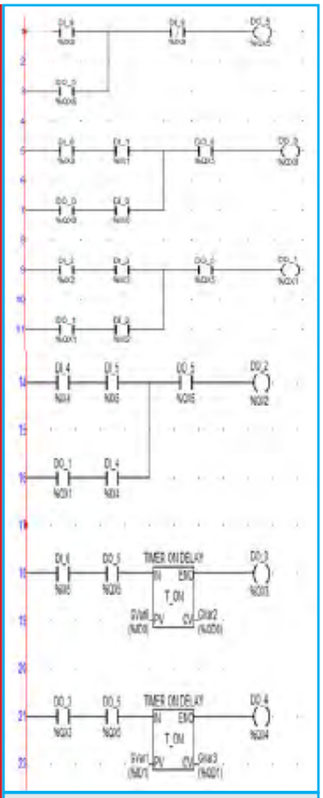

Figure 3. PLC Ladder logic

H. Plc Program:

The Selected PLC is used for the controlling of the process (Gowthami. R,2018). The ladder logic used is shown in the figure (3)

RESULT AND DISCUSSION

The first rung is used for the start and reset operation. Here the button type switches used so the ceiling concept is used. I8 used as start input and I9 for reset input. The second, third, & fourth rung are used to control the opening of solenoid valve. Initially the solenoid valve is closed, when both the level switches are on the valve opens until the water goes below the lower level. If the level switch in the mixing tank I6 is ON, then the agitator pump starts after 25 seconds using the timer T1. After T1 is turned ON, the pump get turned ON after 20 seconds using the timer T2.

CONCLUSION

Thus the implementation of De-Inking Pulp (DIP) project has raised the annual pulp production to four lakhs tons per annum and also the increased pulp demand has been compensated without destroying the forest resources. The pulp which is produced using DIP results in 88 % to 91% of whiteness and can be used for the production of medium quality paper. Further improvements can be done in the consistency control of de-ink pulp and in the production of de-ink pulp in order to increase quality of whiteness so that the quality of the paper can be raised. Thus the affected pulp is treated using suitable pharmaceutical treatment. Thus, from using this kind of method, now there is a reduction in the emission of bagasse into the environment.

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Biosci. Biotech. Res. Comm. Special Issue Vol 12 No (3) May 2019

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Nutrient Film Technique Hydroponics Vertical Farming of Lettuce Plants using Dissolved Nutrient solution

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ABSTRACT

Automation has intervened in all our day to day activities and we humans, nowadays, have become so used to it that we expect everything in our day to day life to be automated. Yet there are some fields that still require developments in various levels and one such field is Agriculture. Agriculture is an essential field which is in dire need for advancements. With the ever growing population and racing industrialization it is high time that we concentrate on smart farming techniques like hydroponics, aquaponics, etc. These techniques can be adopted so that it is easy to manage and regulate the vegetation under a more controlled environment with the proper application of concentrated nutrient solution to the plants. This paper describes about the automatic control system with latest electronic technology using microcontroller. The plants are well grown in the automated environment in the absence of soil with all the essential nutrients supplied artificially to the plants. The monitoring parameters are temperature, light, humidity, and soil moisture.

KEY WORDS: VERTICAL FARMING, RO WATER, HORTICULTURE

INTRODUCTION

Agriculture is one of the essential occupations of man since early civic establishments and even today manual intercessions in cultivating are inescapable. It is the foremost and indispensable component, (Rajeswari et al. 2018) of any nation. Computerizing a nursery incorporates checking and controlling of the climatic parameters which straightforward or by implication administer the plant development. With the utilization of nurseries, horticulture should be possible on all the places of the earth. To farm the plants in a hydroponic framework it is critical to keep up the conditions required for the plants needed for its growth.

Hydroponics implies the development of plants utilizing a supplement advanced water source without the

ARTICLE INFORMATION:

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Received 22nd Dec, 2018
Accepted after revision 28th March, 2019
BBRC Print ISSN: 0974-6455
Online ISSN: 2321-4007 CODEN: USA BBRCBA
Thomson Reuters ISI ESC / Clarivate Analytics USA and Crossref Indexed Journal
NAAS Journal Score 2019: 4.31 SJIF 4.196

Online Contents Available at: http//www.bbrc.in/
DOI: 10.21786/bbrc/SI/12.3/8

utilization of soil. Water is more important for growing plants because it gets its nutrients, (Luechai et al. 2018) from water and not from soil. Plants are developed regularly, however they have their foundations submerged in water, (Castelo et al. 2010). Soil gives structure, not simply the genuine sustenance, for plant roots, (Balraj et al. 2018). The sustenance originates from different materials blended in the dirt, for example, compost, separated plant waste or manures. These mediums don't supply any supplements to the plants however much like soil they supply the plants with a place to grapple. While giving the supplement advanced water, pH levels are essential in hydroponic frameworks.

A supplement advanced water source is basically water doped with mineral supplements called micronutrients or follows components. The portability of the supplements is dictated by the pH in the arrangement. At the point when these micronutrients turn out to be more portable, consumed by the plants quickly and in overabundance what the plant completely needs.

The overabundance of the nutrients to the plant results in toxic condition for the plant. At the point when the micronutrients are less versatile the plant experiences difficulty retaining the supplements, which at that point prompts the lack in the plant growth. Thus adjusting the pH in hydroponics framework is amazingly imperative to the wellbeing and essentialness of yield of the plants, (Qiang Wang et al. 2010).

The mechanized pH checking framework is utilized as a part of this system; undertaking will precisely decide the pH levels of the supplement enhanced arrangement and keep up these levels inside a range for ideal plant growth. Likewise the temperature of a supplement arrangement in a repository is a standout amongst the most vital elements influencing the broke up oxygen substance of the arrangement. Actually, water's capacity to hold oxygen is straightforwardly identified with its temperature. On the off chance that the temperature gets excessively icy, a radical new arrangement of issues is made. Temperatures that are excessively frosty will make the plant's development moderate and inevitably stop out. For this purpose the temperature detecting framework has been received.

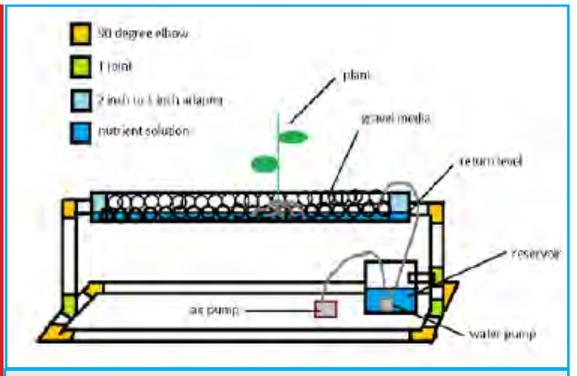

Figure 1. Nutrient Film Technology

MATERIALS AND METHODS

In this project the set up is implemented with a smart sensors and controllers, (Kulkarni et al. 2017) which are used to sense and control the physical parameters like temperature, humidity, moisture and water level and also monitor the major factors that affect the crop yield. We have implemented a vertical farm module based on hydroponics technology that is soilless farming method, (Kiruthika et al. 2018).

Figure 2. Hydroponics in vertical farming

Inside this casing, three layers of PVC channels were stacked evenly to frame vertical layers. Gaps between settled widths were penetrated at equidistant places focuses on each pipe push where the lettuce plant seeds are made to be planted. The funnels were associated utilizing submersible pump to direct the water stream between the channels. Over the casing, a focal water tank was set and a gap was made at its base to enable spill out of tank to the underneath PVC pipe layer. Two separate tanks of little limit contrasted with the principle tank were put on either side of the primary tank that stores basic and acidic solutions.LED pieces of blue and red light were stuck on the side dividers of the edge to where a pink light glows represents the intake of photo-

synthesis by the lettuce plant. On top surface two gaps were penetrated to put a fumes fan and a globule individually.

MEDIUM USED

The supplements to the lettuce plants required are given by the supplement arrangement, and the developing media for the plant sapling is watered and saturated. Probably the most broadly utilized developing media is incorporated with Rockwool, Coconut coir, growing slab and Perlite or Vermiculite. A great developing medium guarantees that plant attaches have a place to stay and holds dampness in the meantime. A few sorts of develop medium, for example, preparing blends and soil, come pre-accused of supplements and alterations as a rule. The medium provides the nutrients and minerals to the plants by which they can go grow well.The growth of the plant is monitored every day.

Figure 3. Germinating using rock wool

Figure 4. (a) Coconut coir. (b) Net Pot

TEMPERATURE SENSOR

In this venture we utilize LM 35 as temperature sensor. LM35 is exceptionally exact and great sensor to demonstrate the temperature in Celsius. LM35 is a direct temperature sensor. To change over this yield for the contribution of the ADC we utilize operation amp current intensifier to change over the flag into 0-5volt dc. LM 35 is associated with the stick no 3 of the operation amp through 2.2kohm resistor, (Sarkar et al. 2015). Stick no 2 which is – ve contribution of the operation amp is set to the reference voltage by 1 kilo ohm variable resistor. Focus purpose of 1 k ohm resistor is associated with the stick no 2 by means of 10 k ohm resistor. Positive voltage is additionally connected to the one shaft of the preset by means of 3.3kilo ohm resistor. 4.7kilo ohm resistor is additionally grounded from the 1 kilo ohm variable resistor. Stick no 7 of the IC is associated with the positive 5 volt. Stick no 4 is associated with the shared belief point. One criticism resistor is associated from yield stick to the stick no 2 which is 50 k ohm resistor. So by along these lines we set the pick-up of 5 by this operation amp. We set the base reference voltage by preset (variable resistor) and when temperature rises at that point yield is likewise increments with the pick-up of 5 and associated with the IN0 contribution of the ADC.

MOISTURE SENSOR (HIH4000)

Water vapour is measured by the estimation of dampness estimation. Water vapor introduced in a gas is blend, for example, air, or unadulterated gas. Dampness sensors depending on this guideline comprise of a hygroscopic dielectric material sandwiched between a couples of anodes framing a little capacitor. Most capacitive sensors utilize a plastic or polymer as the dielectric material, with a run of the mill dielectric consistent going from 2 to 15, (Tanaka et al. 2009). Without dampness, the dielectric consistent of the hygroscopic dielectric material and the sensor geometry decide the estimation of capacitance.

pH SENSOR

One of the essential prerequisite of this automated hydroponics framework is to quantify and change the pH of the hydroponics store. It is imperative that the pH esteem remains adjusted for a given plant that is developing in the plant supply. The plant will continually influence the pH, so the framework should have the capacity to change the pH of the supply utilizing a compound pH adjusting arrangement. The ideal pH extend for hydroponics is inside the scope of 5.5-6.8. Keeping in mind the end goal the pH synthetic should be added to the hydroponics store, a sensor senses the pH ceaselessly, (Jegadeesh et al. 2014). The most straightforward condition of a pH sensor comprises of a glass terminal test that is delicate to the hydrogen particle fixation, which gives a voltage perusing that relates directly with pH. At 25°C, anode affectability is 59.16mV/pH and the

yield of the cathode will swing from 7pH x -59.16 mV/pH = +414.12 mV (pH 0 strong acid) to +7 pH x -59.16 mV/pH = -414.12 mV (pH 14 strong base).

PLANNING OF THE NUTRIENT SOLUTION

It is critical to utilize RO water or water with Total Dissolved Solids under 250ppm to guarantee that there are no undesirable impacts on plants having the capacity to inject supplements, (Kalantari et al. 2017). An eggplant was developed with 250ppm the capacity to inject supplement arrangement made with hard water with 650ppm of Total Dissolved Solids.

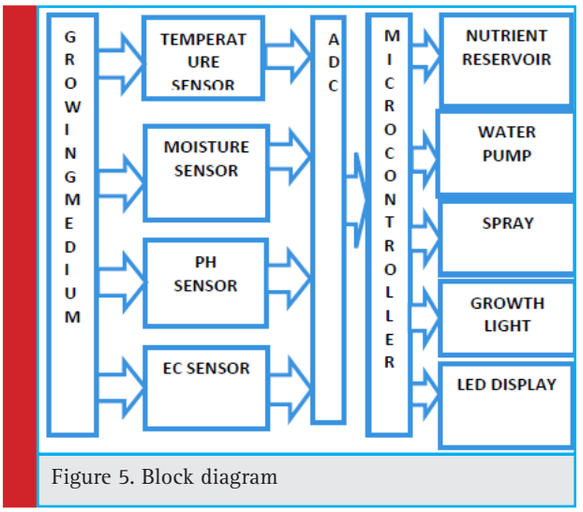

Figure 5. Block diagram

This had prompted decolorization of plant leaves and roots and the pH began floating quickly. At that point when the eggplant was developed with Reverse Osmosis water, the decolorization of plant leaves would not have happened. Similarly it is required to distinguish the ideal level of supplement focus needed for the plant of that size and for the atmosphere. Settlements of 15 lettuce plants were developed with 2500ppm of Total Dissolved Solids Nutrient course of action which was well finished the required levels. It was recognized that the Total Dissolved Solids levels started climbing as the plants started taking in water and the pH level started drifting, (Safikhani et al. 2014). Exactly when a common customized structure which draws destructive into the supplement game plan when the pH goes more than 6.3 was used, over the top destructive (H3PO4) was incorporated into the system. This changed the union of the structure and made the plants to dry changed out in water within two days.

E.LIGHT SOURCE

Plants require radiation with wavelength of the UV range, noticeable light range and infrared range. The plant responds diversely to various shades of light. Driven lights are utilized for the actualized framework.

ATMEGA328

Atmega328 utilizes a 16MHz precious stone oscillator. The water level sensors LS1-LS5 and the transfer pins S1S6, temperature sensor, ultrasonic separation sensor are associated with the computerized pins of the microcontroller, (Aswathand et al. 2016). The EC meter and pH meter are associated with the ADC of the microcontroller. The equipment serial ports tx and rx are associated with the serial ports of the ESP8266, (Anirudh et al. 2014).

The pH and electrical conductivity of the arrangement is estimated once at regular intervals of time. In this event the pH is over 6.3 pH down arrangement or weakened phosphoric corrosive is added to the supplement arrangement. If the electrical conductivity is less, then the supplements are added in the framework to a required extent. At whatever point the ultrasonic separation sensor identifies that the water level has dropped, water is drawn into the framework. Simultaneously when the supply of pH down arrangement and supplement arrangement is exhausted an alarm message is given, (Specht et al. 2015). An alarm message is additionally given to a man when unusual practices are recognized and when the temperature of the arrangement ascends to a point where broken up oxygen is denied. The plant develops with the pH meter and electrical conductivity meter serving to keeping up ideal parameters for the plant development. The framework distinguishes if the adjustment in pH esteem is too quick and alarms the client to change the supplement arrangement. It can also be controlled by the programmable logic controllers, (Gruda et al. 2015) and the molasses can be used as a germinating medium instead of coconut coir.

RESULTS AND DISCUSSION

The automated hydroponic system with pH sensor, EC sensor and temperature sensor shows good result. The growing light is used to fulfill the process of photosynthesis. So turn ON the light at least 17 hours/day. In order to avoid climatic barriers and fast production we used LED. Our growing test shows that the plant (lettuce) grows well within one week. Currently pH needs 10 minutes to stabilize data sensor reading. Automated system in recirculation of water, the hydroponic shows the growth rate of about 40-50% faster than the soil. The outcomes got from the gadget have shown that the execution is well, particularly in gathering, logging and dissecting the sporadic information from the sensors that is exchanged to focal hub for agriculturists' utilize. Additionally work is required on shield packaging of hubs

under extreme climate conditions. Power supply from inexhaustible sources or a battery or some other continuous source requires examination, (Rosa et al. 2014).

CONCLUSION

In summary, the soilless farming system guaranteed the development of agriculture. The plants grown in the hydroponics system is developing at a faster rate as the plants grow fast in water than the soil. Continuous monitoring of plants should be implemented for this system; otherwise the outcome won't be satisfactory. This system finds a gateway to the cultivation of plants in areas like deserts, sterile lands and building as all the nutrients like oxygen, nitrogen, phosphorus, etc are supplied manually to the plants.

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Biosci. Biotech. Res. Comm. Special Issue Vol 12 No (3) May 2019

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Detection and Monitoring of Air Pollution in Paper Industry

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ABSTRACT

Air pollution is one among the different types of pollutions that causes damage to the environment. The main sources for the air pollution are industries, vehicles etc. As the industries are growing in a higher rate here a pollution monitoring system is developed using Graphical User Interface (GUI) for continuous monitoring of pollutants emitted from the paper industries. Initially the system is trained with different range of pollutant data's using Adaptive Neuro Fuzzy Inference System (ANFIS) and a GUI panel is created with a space for entering different parameters and to showcase various conditions such as ecofriendly, moderate and over pollution conditions. By using this method the range of different pollutants can be controlled which in turn controls the overall pollutions emitted directly to the environment from the industries.

KEY WORDS: GRAPHICAL USER INTERFACE, POLLUTANTS, MONITORING, ADAPTIVE NEURO FUZZY INTERFACE

INTRODUCTION

In the present senario the industries are growing at a faster rate.From all these industries different kinds of pollutants are emitted day to day in air, water, soil etc. This project mainly aims to monitor (Vijnatha Raju 2013) and control the air pollution. Due to the different kind of air pollutants like carbon monoxide, carbon dioxide, sulphur dioxide, hydro carbons, oxidants, dust and smoke emitted in the environment it causes different kinds of diseases to the human beings such as respiratory problem, carcinogenic effect, lachrymatory effect, allergic problem, irritation of eyes, appetite and visual diffculties.It also causes certain problem to the atmosphere such as acid rain , corrosion of metal,green house effect and also spoils the buildings (Deepak Shankar

ARTICLE INFORMATION:

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Received 25th Dec, 2018
Accepted after revision 26th March, 2019
BBRC Print ISSN: 0974-6455
Online ISSN: 2321-4007 CODEN: USA BBRCBA
Thomson Reuters ISI ESC / Clarivate Analytics USA and Crossref Indexed Journal
NAAS Journal Score 2019: 4.31 SJIF 4.196

Online Contents Available at: http//www.bbrc.in/
DOI: 10.21786/bbrc/SI/12.3/9

2013). So to have a control of pollutants not to being emitted in the environment a continous monitoring system is developed. Here from a paper industry the pollutant data's are collected. For that a lower and a higher range is specified for each pollutants inorder to monitor them continously. This data base is uploaded for creating a Adaptive Neuro Fuzzy Inference based pollution monitoring system. A ANFIS based systemis given with three output conditions such as eco-friendly, moderately polluted and over polluted (Monisa et al. 2015). By monitoring continously the range of values for the pollutants can be maintained within eco-friendly condition.

MATERIALS AND METHODS

A. MONITORING SYSTEM FOR POLLUTANTS IN PAPER INDUSTRY

At present in the paper industry they are using a pollution monitoring system with the sensor and interface card which is shown in the Figure 1.

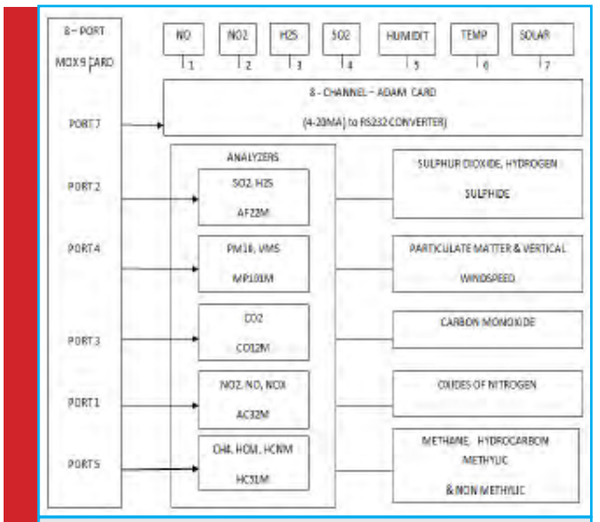

Figure 1. Pollution monitoring system in paper industry

In the paper industry the main 7 parameters such as NO, NO_2, H_2S, SO_2, humidity, temperature and solar which are to be monitored are connected to an 8 channel ADAM CARD. Initially these parameters are measured with the sensors and as they are connected to the ADAM CARD the sensed signals are converted to electrical signals with a range between 4-20 mA.

And an 8 port MOX CARD is connected with the analyzers. This MOX CARD acts as an interface between the input sensor and the analyzer. The analyzer is the one which calculates the range for each and every input parameter and gives the output values in the form of different constraints such as particulate material, methane, hydrocarbon etc. This analysis of pollution is done only 8 hours once in the paper industry. Thus the corrective action is also done after 8 hours only. So the major defect identified here is immediate monitoring and control of pollutants cannot be done which leads to the cause of huge damage in the atmosphere. So here a solution for that problem is identified. For the continuous monitoring of pollutants ANFIS is used where the individual data's collected from the industry are given with a range and trained.

Then a GUI panel is connected with the ANFIS for a continuous monitoring so that we can identify correctly the over polluted condition then and there and the control of pollution can be established by changing the input parameters range.

B. PARAMETERS TO BE MONITORED

In the paper industry which is chosen here, that discharges different kind of pollutants to the atmosphere which in turn causes major change in the atmosphere as well as to the humans. So to control them within a range some parameters are chosen here such as oxides of nitrogen, hydrogen sulphide, sulphur dioxide, solar, temperature and humidity. These parameters are monitored continuously and there higher range values are clustered within over polluted output condition (Navreetinder Kaur 2016). The lower ranges of values are given within eco-friendly output condition and finally the moderate values are mentioned with moderately polluted output condition. The cause and the effect of each of these parameters are listed one by one.

I. OXIDES OF NITROGEN (NOX)

The main source for the oxides of nitrogen is from the combustion of wood, automobiles, fertilizers and industries. This pollutant causes respiratory problem and green house effect.

II. NITROGEN OXIDE (NO)

Nitrogen oxide is produced by the combination of nitrogen and oxygen during the combustion process. It causes severe respiratory problems such as asthma when a human is exposed to a short team. And chronic disease, when a human is exposed in a long term.

III. NITROGEN DIOXIDE (NO_2)

Nitrogen dioxide is one kind of primary pollutants emitted from the paper industry. This primary pollutant will be directly emitted and they remain for a long time in the chemical form in which they are emitted.

IV. HYDROGEN SULPHIDE (H_2S)

The hydrogen sulphide is a colorless gas and it causes rotten egg smell. The main source of it is industries. And

this can cause dizziness, severe headache and irritation to the humans.

V. SULPHUR DIOXIDE (SO_2)

Sulphur dioxide is also a type of primary pollutants which is emitted directly from the industry. This causes several defects to the humans and environment such as respiratory irritation, irritation of throat and eyes and it leads to acid rain.

VI. SOLAR

Solar is a one with which the majority of the equipments will be powered in the industry. So for measuring the pollutants the power given to the input sensor, ADAM CARD etc. So the value of solar is needed to be measured.

VII. TEMPERATURE

Temperature is a one parameter with which the pollutants content will also vary. Because the degree of hotness or coldness will be a cause for spreading the pollutants into the environment. So the temperature has to be measured.

VIII. HUMIDITY

Humidity gives the range of moisture content present in the atmosphere. This is indirectly proportional to the temperature. So the value of humidity is important while measuring the pollutants.

C. REAL TIME DATA'S FROM INDUSTRY

For making efficient pollution monitoring the real time data's were obtained from the paper industry which is shown in the Table 1. The minimum and maximum ranges of all the input values are highlighted separately and by which the moderate values are found. So these ranges of values are given to the ANFIS and the system is trained to give three output conditions namely eco-friendly, moderately polluted and over polluted.

Table 1. Real time pollutant datas

NO	No_2	H_2S	SO_2	HUMIDITY	TEMP	SOLAR
1.2	2.1	0.7	0.5	33.1	15.4	19.2
2.1	3.4	2.6	1.9	46	20.8	38.4
3.6	4	5	5.2	47.8	22.9	41.8
5.9	9.1	9.7	9.6	73.4	34.8	78.2
....	....	....	....	....	....	....
....	....	....	....	....	....	....
8.1	11.8	13.5	12.5	90.7	45.9	95.6

D. ANFIS MODEL FOR POLLUTION MONITORING

Adaptive Neuro Fuzzy Inference system (Arushi Singh 2017) is a one type of artificial intelligent technique. In this once the data are feed and the system is trained it gets a capacity to take the decision by itself for any other inputs given but within the trained specific range. Here such a system is created for pollution monitoring in the paper industry (Monisa et al. 2018). The block diagram of that pollution monitoring system is shown in the Figure 2. The basic idea here is all the parameters which are to be monitored are connected to a pollution monitoring system which has an link with the ANFIS were the training and testing of input data is done. Then it is also connected with GUI which displays the out conditions by fetching the values from the ANFIS. Based on this the output values are displayed within three conditions namely eco-friendly, moderate condition and highly polluted.

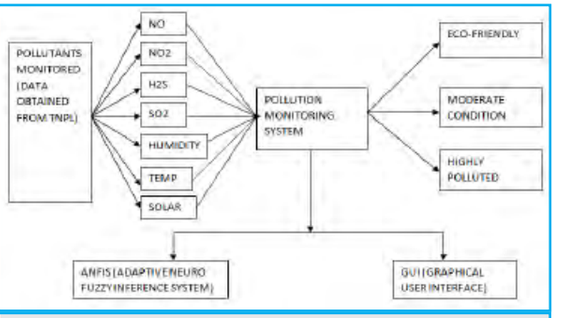

Figure 2. ANFIS based pollution monitoring system

The ANFIS system consists of two major classifications such as Sugeno model and mamdani model. In mamdani model for creating the membership function the starting and the ending range of values has to be specified. But in the Sugeno model it automatically determines the starting and the ending range of the values by itself by using the input conditions given to the systems. So by using this Sugeno model a pollution monitoring system is created (Anjaiah Guthi 2003). And this is shown in the Figure 3. For every single input a

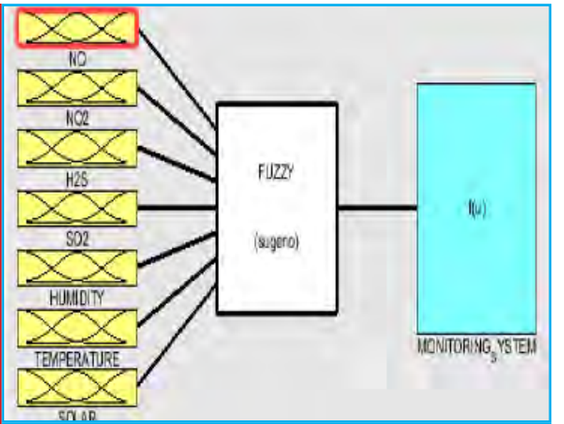

Figure 3. ANFIS model for pollution monitoring

membership function is created. The membership function is derived from a real unit interval. And the range of values will be specified between 0and 1. So for all the inputs the starting and the ending values of the input membership data's are specified by the Sugeno model as by itself. In the GUI panel when the input data's are entered it compares with all the membership values and gives the output.

Figure 4 shows the membership function for input Nitrogen oxide.

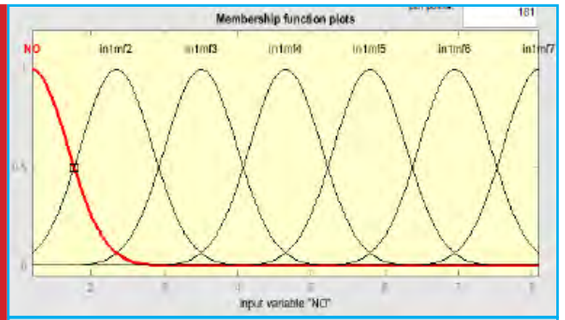

Figure 4. Membership of Nitrogen oxide

Figure 5 shows the membership function for input Nitrogen dioxide.

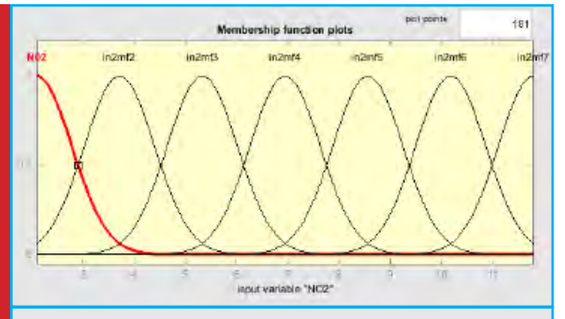

Figure 5. Membership of Nitrogen dioxide

Figure 6 shows the membership function for input hydrogen sulphate.

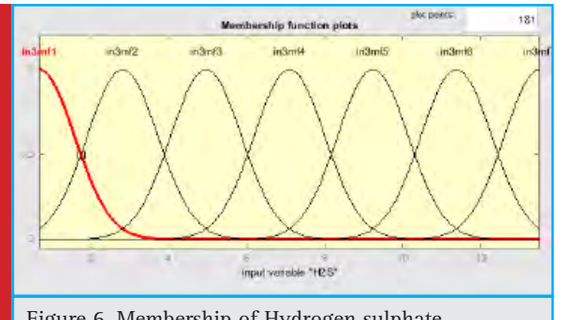

Figure 6. Membership of Hydrogen sulphate

Figure 7 shows the membership function for input sulphure dioxide.

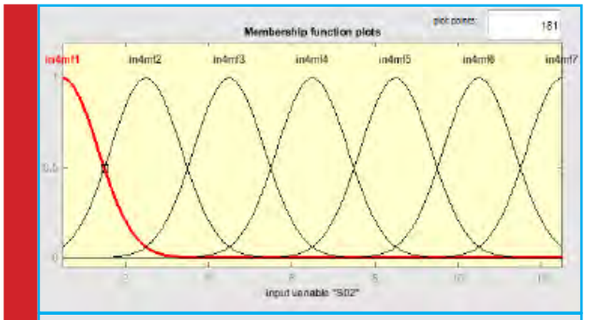

Figure 7. Membership of Sulphur dioxide

Figure 8 shows the membership function for input Humidity

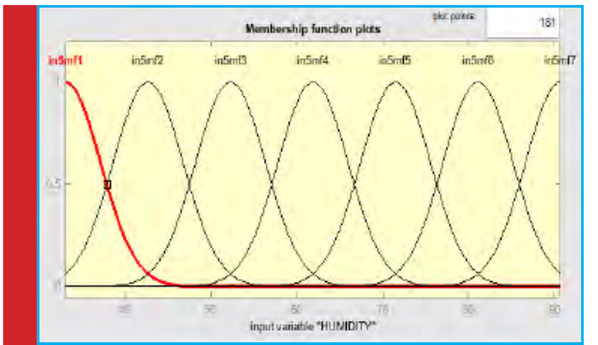

Figure 8. Membership of Humidity

Figure 9 shows the membership function for input Temperature.

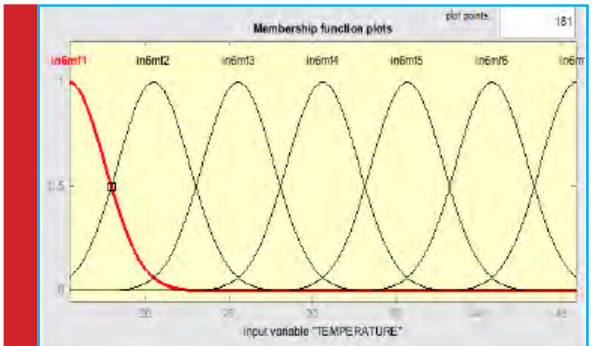

Figure 9. Membership of Temperature

Figure 10 shows the membership function for input Solar.

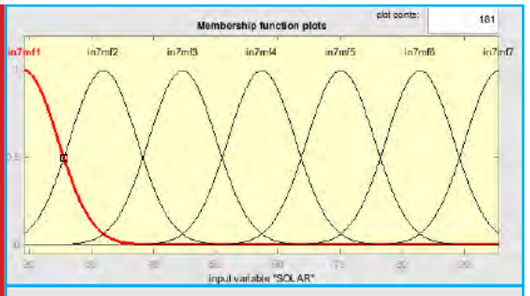

Figure 10. Membership of Solar

E. GUI MODEL FOR POLLUTION MONITORING

Graphical User Interface act as an interface with the human and the machine. GUI acts as a visual language platform for the operating system and software applications. It is a user friendly panel in which the user can see the input values and the output conditions simultaneously at the same time. And more than that the input values can be changed at anytime by the user. In this the output and the input can be viewed in the form of numeric values, text or graph. The added advantage to the GUI panel is that here the interface of any system can be done like fuzzy system, neural system etc. So in those systems the training of input data is done and the display of it is showcased in the GUI panel.

RESULT AND DISCUSSION

A GUI panel is like a user friendly display [10]. This panel is created for pollution monitoring which is shown in the Figure 11.

In this panel 7 spaces were created in the left for entering the input parameters and in the right side three spaces were created for displaying the output conditions.

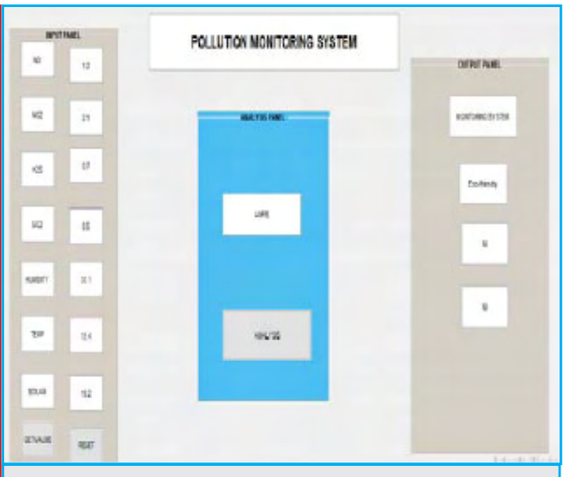

Figure 11. GUI panel for pollution monitoring

And in the middle the ANFIS is interfaced with the GUI. Once the input data's are entered in the GUI panel using get value button the analysis button is pressed which compares the input value with the trained data's in the ANFIS and it displays the output conditions accordingly. With the help of that control of pollutants a can be accomplished.

CONCLUSION AND FUTURE SCOPE

From the paper industry different parameters to be monitored for controlling the air pollution are trained using Adaptive Neuro Fuzzy Inference system. And a GUI panel was created with the space for entering the input data's and to display output conditions. This GUI panel was interfaced with the ANFIS. And with the help of this GUI panel continuous monitoring is established successfully.

In future this work can be extended by separating the different pollutant data's accurately using Support Vector Machine.

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Biosci. Biotech. Res. Comm. Special Issue Vol 12 No (3) May 2019

BBRC
Bioscience Biotechnology
Research Communications

An Automated Sensor System for Livestock Detection, Identification and Warning System based on the Ground Vibration in Cultivation Fields

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ABSTRACT

In the last years, the monitoring of the vast cultivation land is done by the manual process and it is the serious issue for the farmers to monitor the cultivation field, to overcome this problem an automated monitoring system is needed to monitor the intruder in the cultivation field. The movement of intruder, livestock or person over the ground will produce vibrations induced to soil in the form of seismic waves which are measured by geophones. Seismic detection and tracking of personnel and animals is of major importance in intruder detection applications. Considering the importance, under the present research we are proposing a sensor node that uses a LabView based livestock detection and identification system based on ground vibration.

KEY WORDS: LIVESTOCK DETECTION, GEOPHONE, AMPLIFIER, ANALOG CIRCUIT, DATA ACQUISITION

INTRODUCTION

In the world, the economy of many countries is dependent upon agriculture. In spite of economic development agriculture is the backbone of the economy. But because of animal interference in agricultural lands, there will be huge loss of crops. Crop will be totally getting destroyed. There will be large amount of loss of farmer. To avoid these financial losses, it is very important to protect agricultural field or farms from Livestock animals and other intruders. (Abhinav Deshpande et al., 2016). In the last years, the entry of a unauthorized personnel or any livestock animals in a restricted area or in the cultivation fields is a serious threat to the security of crops in cultivation land and restricted areas. (Hui Hong et al., 2011). In these regard, during last few decades various technologies have

ARTICLE INFORMATION:

Corresponding Author: aravindagurui.eie@mkce.ac.in
Received 19th Dec, 2018
Accepted after revision 2nd March, 2019
BBRC Print ISSN: 0974-6455
Online ISSN: 2321-4007 CODEN: USA BBRCBA
Thomson Reuters ISI ESC / Clarivate Analytics USA and Crossref Indexed Journal
NAAS Journal Score 2019: 4.31 SJIF 4.196

Online Contents Available at: http//www.bbrc.in/
DOI: 10.21786/bbrc/SI/12.3/10

been developed and implemented to detect the unauthorized personnel e.g.; Camera/Image based approach, Thermal imagers approach, Tomographic sensors approach, Sensor-Fusion approach Uninstrumented/Single-Modality approach, Doppler-shift sensor approach, Contact sensors approach, Pressure sensors approach, (Mosad Alkhathami et.al., 2015), Electric-Field sensors, Radio / Ultrasound/Laser approach, PIR and Ultrasonic Sensor approach. (Srinivasa Reddy Gudibandi et.al.,Amarnath M et al., 2015). But none of them is fully accurate and reliable not only that many of them suffers from complexity at hardware implementation level, high cost and poor field performance and those drawbacks have kept the hunt on for better and advanced system. (Gökhan Koç et al. and Korkut Yegin et al., 2013)

Keeping all these scenarios in mind, the proposed research has been framed to engage in developing the algorithm and hardware of a ground vibration sensor system for livestock and human detection (GVSSLD) system for various applications e.g.; Intruder warning system, Livestock warning system, Elephant warning system etc.

Considering the importance, under the present research a livestock detection system based on ground vibration has been designed. Present system uses geophones as inputsensor which is followed by a pre-amplifier and filter section and a Data Acquisition and a data storage Laptop. Acquisition unit for interfacing the system with laptop. The incoming data from the sensor is saved and displayed with LabView software for further data analysis. Present Ground Vibration Sensor System for Livestock Detection (GVSSLD) has successfully detected livestock walking with a detection circle of radius 3 meters.(Ramkumar et al., Sanjoydeb et al., 2016)

MATERIAL & METHODS

A. Seismic Sensor to Detect Livestock and Human

The movement of livestock or person over the ground will produce vibrations induced to soil in the form of seismic waves, which are measured by geophones. Seismic detection and tracking of personnel and animals is of major importance in intruder detection.The GVSSLD is composed of mainly three hardware units and one data storage and display unit as shown in the following figure

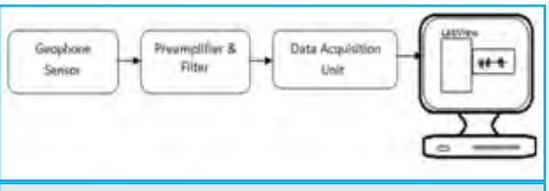

Figure 1. Architectural block diagram of GVSSLD system.

B. Sensor Unit:

A range of sensors available in marketfor detecting ground vibration at various frequency ranges with different level of accuracy. Since, purpose of the present system is to detect low frequency and low amplitude ground vibration, the geophone is the ideal choice. A geophone comprises a magneticmass surrounded with wire coil and mounted on the spring to detect the ground vibrations and convert it into an electrical signal. For presentapplication we have selected is HG-24HS (High sensitivity) from IoNInternational Company, UK which is a vertical geophone with natural frequency of 10Hz.

C. Amplifier and Filter Circuit:

The captured seismic signal with geophone is in the range of micro volts, so that it must be pre-amplified and filtered in order to get desired output to be processed. But designing an efficient pre-amplifier circuit for such low frequency and low amplitude signal is a crucial part of present hardware design.

D. Data Acquisition Unit:

The preamplifier output is connected to computer system by a multifunction Data-acquisition (DAQ: NI USB-6000 OEM). This NI my DAQ consists of 2 Analog inputs, 10 kS/s; 12-bit resolution, current limiter and DC to Dc converter, system timing controller, Digital to Analog converter and Analog to Digital converter, 4 Digital I/O lines; 1 32-bit counter etc. which are highly desirable for present research.

RESULTS AND DISCUSSION

When a person is walking on the ground, the number of impulses will be produced, when the foot hits the ground, which propagates through soil as “seismic” waves.A human’s walk may be modeled as a series of vertical impacts induced to soil by the foot of the walker. These impacts are of short duration and occur on intervals greater than the time needed for them to attenuate. They result on the excitation of the ground at its natural frequencies and travel away from the source on the elastic half-space of the ground.

Most of the energy of such signal is distributed in the band of 30 to 100 Hz and 200 to 250Hz.

After the detailed research it has been found that 1.The human and cow both are creating vibration of frequency within the range of 30Hz to 100Hz and 150Hz to 250Hz.

2. Most of the time, the frequency lies within the range, high frequency vibrations picks are more for cow compared to human. Using these two points an algorithm has been developed for the identification of cow through ground vibration.

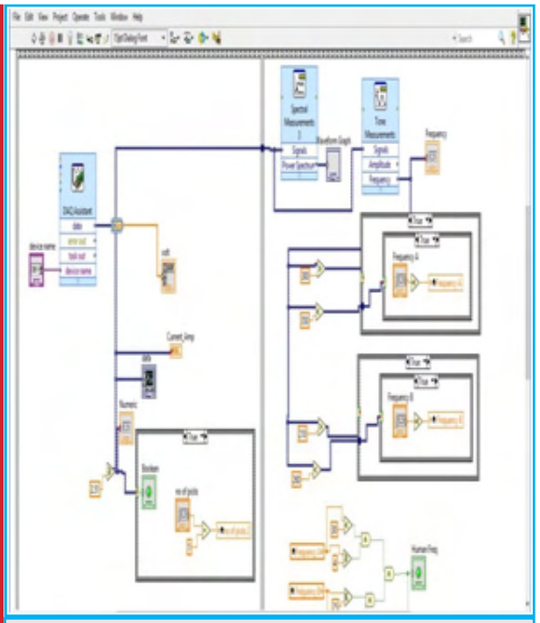

Figure 2. LabView program of Livestock and Human Detection, Identification based on the Ground Vibration

Here, the vertical geophone sensor sm-24 is used, thus the sensor is placed at proper position to get acceptable output voltage level and with present case it has been placed 30 cm under the ground to enhance its range. It has been found that the system is successfully detecting human walking activity in circular range of 3 meters radius. When GVSSLHD has been placed at the Centre of circle (radius of 1.5 meters) and a person is walking along the edge of a circle, the system has been detected individual footstep vibrations for almost 80% cases. Remaining 20% of unsuccessful detection is caused due to ground conditions, background noise, observation & testing fault.

The graph represents the frequency response of human walk around the radius of 3m circle and most of the time, frequency of the seismic vibration lies within the range of 30Hz to 100Hz and 150Hz to 250Hz.The Frequency A represents the frequency band of 30Hz to 100Hz and the Frequency B represents the frequency band of 150Hz to 250Hz. The following figure represents the frequency band 30Hz to 100Hz range response for the human walk around the sensor of 3m radius circle.

The following Figure represents the frequency band 30Hz to 100Hz range response for the human walk around the sensor of 3m radius circle. the band A represents the frequency range from 30Hz to 100Hz

The Graphical representation of the frequency band 150Hz to 250Hz range response for the human walk around the sensor of 3m radius circle is shown in the above figure.

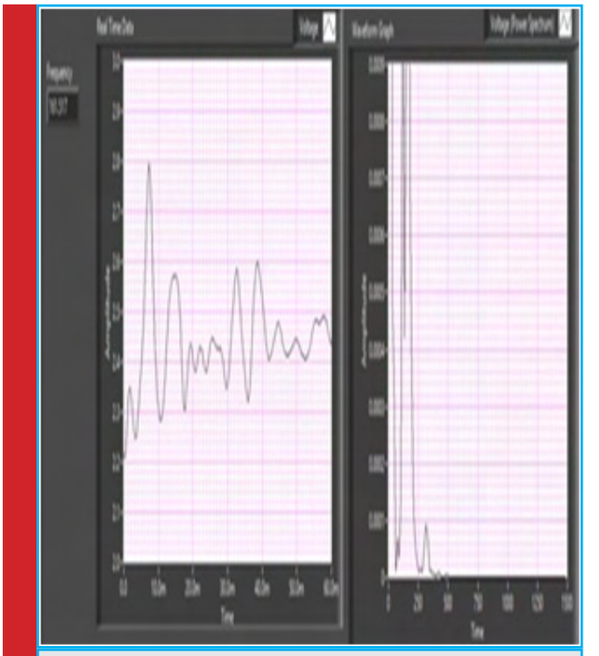

Figure 3. Graphical Representation of the Frequency and Amplitude response of the Livestock walking around the radius of 3meter

The Algorithm describes that the human detection is based on the two parameters, first parameter is the number of picks and the second parameter is frequency. Figure 6, describes that when the frequency count satisfies the condition the human frequency Led will glow

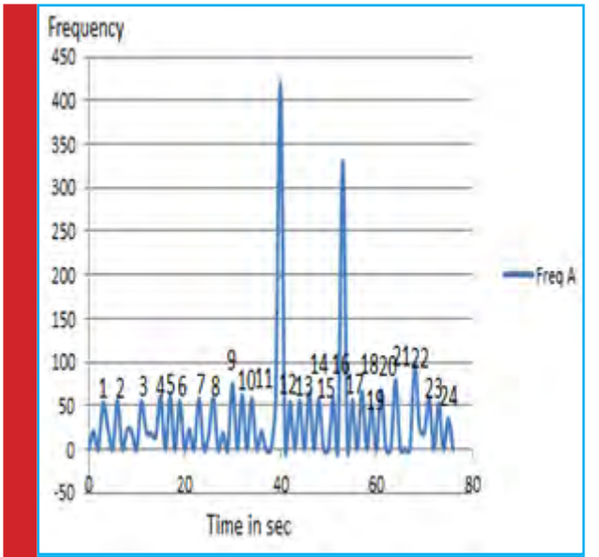

Figure 4. Graphical Representation of Human Frequency Band 'A'Detection based on Ground Vibration

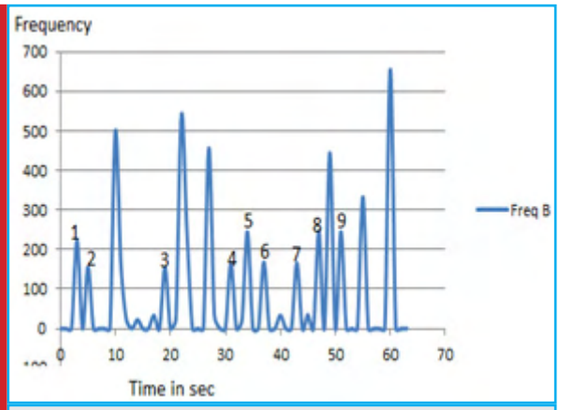

Figure 5. Graphical Representation of Human Frequency Band 'B'Detection based on Ground Vibration

Figure 6. Representation of HumanDetection based on Ground Vibration

and when the number of the picks satisfies the condition the human pick Led will glow. If both the Human pick condition and Human frequency is satisfied, the Human detected Led will be glowing, which represents the Human Detection.

The Ground Vibration Sensor System for Livestock and Human Detection system is tested in the field with cow and after the various testing and research the algorithm has been implemented.

The livestock will keep more number of steps than the human.Every animal or human will have a signature seismic vibration pattern and for the livestock is recorded here and represented as a graph.

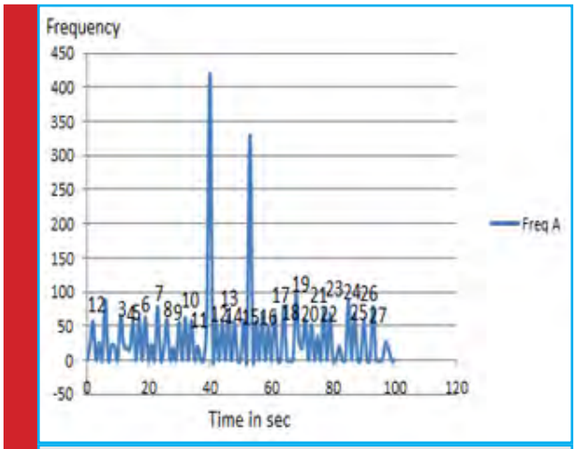

Figure 7. Graphical Representation of Cow Frequency-ADetection based on Ground Vibration

The following figure represents the frequency band from 30Hz to 100Hz range response for the cow walk around the sensor of 3m radius circle.

The Ground Vibration Sensor System for Livestock and Human Detection system is tested in the field with cow and after thevarious testing and research the algorithm has been implemented.

The Graphical representation of the Frequency Band 150Hz to 250Hz, response for the Cow walk around the sensor of 3m radius circle is shown in the above figure.

After the numerous testing we have observed the frequency count for cow and human. In the observation of the test taken the number of footsteps covered by a human in the period of time and at the region is comparatively lower than the cow footsteps. When the frequency count satisfies the condition the Cow frequency Led will be glowing and when the number of

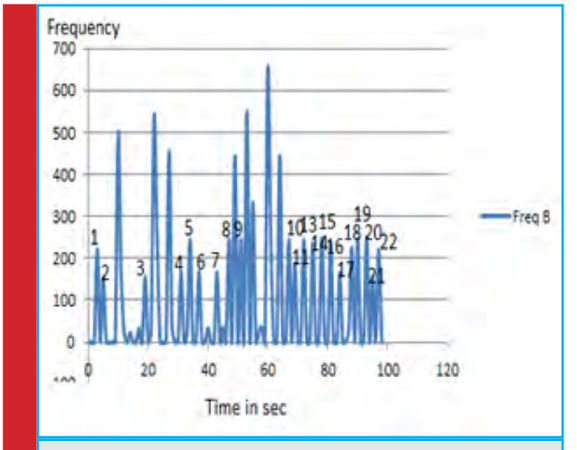

Figure 8. Graphical Representation of Cow Frequency Band-B Detection based on Ground Vibration

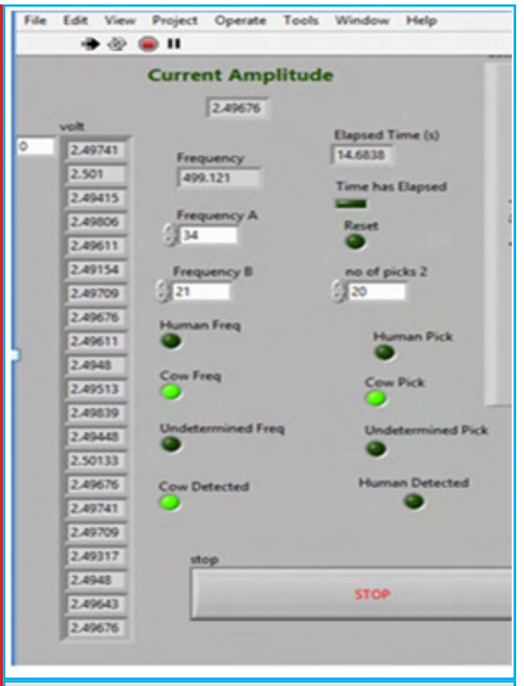

Figure 9. Representation of Cow Frequency Detection based on Ground Vibration

the picks satisfies the condition the Cow pick Led will glow. If both the no of pick of cow condition and cow frequency level is satisfied, the Cow detected Led will be glowing, which represents the Cow Detection.Since, with present system it is very much possible to identify each footstep separately by using parameters amplitude, Frequency and time axis which can be utilized to design a human and livestock identification algorithm. The system has shown 80% accuracy in detecting human footsteps throughout the testing phase. Accurate human and livestock identification algorithm are tricky job, it has been developed with our appropriate analysis of GVSSLHD outcomes.

Since, with present system it is very much possible to identify each footstep separately by using parameters amplitude, Frequency and time axis which can be utilized to design a human and livestock identification algorithm. Considering present day safety and security scenario, design implementation and further advancement of present GVSSLHD system will meet ever growing demand of accurate Human and Livestock detection system.

CONCLUSION

Present research has successfully designed a Lab View based ground vibration sensor system for livestock and human detection with geophone sensor. The design approach of our research has been elaborately discussed with architectural block diagram and technical details about individual blocks. Present system has successfully detected human and cow walking with in a detection circle of radius two to three meters. The maximum output recorded with the system is representing the two frequency band for human and cow in the detection region.

The system has shown 80% accuracy in detecting human footsteps throughout the testing phase. Although finding an accurate human and livestock identification algorithm is tricky job, it has been developed with our appropriate analysis of GVSSLHD outcomes. Since, with present system it is very much possible to identify each footstepseparately by using parameters amplitude, Frequency and time axis which can be utilized to design a human and livestock identification algorithm.

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3D Mapping of Human Body Temperature Using Optical Fiberbragg Grating Sensor

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ABSTRACT

Body temperature plays a vital role in analyzing the humanoid conditions and provides a numerous observation about health. The base model of temperature mapping on humanoid body is provided by finite method. Because of some complication it is difficult to retain very accurate model for human body temperature. The main aim of this paper to predicate 3D mapping of temperature by fiber optics and Genetic algorithm-Back propagation neural network. In the proposed information driven technique by analyzing the minor points on the body we can able to determine whole body temperature for mapping. A numerous attempts where done to examine the human body temperature in various environmental conditions. In each distinct setting the information estimated and the information yield were analyzed. The mean absolute error (MAE) is a amount of difference between two continuous variables in this way all the examination is 0.10°C which is very close to medical accuracy. The final approach shows that the result is faultless and consistent, so that it provides the gateway for analyzing mapping of temperature can be use in therapeutic and home care.

KEY WORDS: BODY TEMPERATURE; 3D MAPPING; ACCELERATED GENETIC ALGORITHM; GENETIC ALGORITHM-BACK PROPAGATION NEURAL NETWORK

INTRODUCTION

In general the human body temperature changes for age, exertion, infection ,and the time of day, the place in the body at which the measurement is made, and the subject's state of consciousness. Temperature control (thermoregulation) is part of a homeostatic mechanism that keeps the body parts at optimum temperature, as the temperature affects the rate of chemicalreactions. Temperature also changes with the difference in seasons during each year. Humans living in various climates may have different seasonal patterns. Increased physi-

ARTICLE INFORMATION:

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Received 28th Dec, 2018
Accepted after revision 22nd March, 2019
BBRC Print ISSN: 0974-6455
Online ISSN: 2321-4007 CODEN: USA BBRCBA
Thomson Reuters ISI ESC / Clarivate Analytics USA and Crossref Indexed Journal
NAAS Journal Score 2019: 4.31 SJIF 4.196

Online Contents Available at: http//www.bbrc.in/
DOI: 10.21786/bbrc/SI/12.3/11

cal fitness will enlarges the daily change in temperature (Rajan 2015e).

An assortment of flow clinical examinations have delineated the possibilities of utilizing skin temperature to analyze a significant number ailments and screen ailment advance because of the actualities between stand-out skin temperature parameters and positive infirmities, for example, diabetes, rest illnesses (Garami et al. 2014), nadequate spinal line injuries. In these investigations, human body pores and human skin temperature appropriation impassive human locales incredibly proposes remarkably high connection to confusion finding. Strikingly, it is additionally central to set up the right three-dimensional (3D) connections among's pores and skin warm measurements and human patho physiology for the determination of scatters, for example, vascular disease and bosom malignancy. The ebb and flow models for skin temperature mapping are generally developed by the constrained segment technique (Rajan et al. 2015a).

In this study, we introduced data driven technique consolidating human body temperature estimation of common skin centers using fiber Bragg granulating (FBG) sensors and advanced Genetic algorithm-Back propagation neural framework for complete human skin temperature mapping (Hasselberg et al. 2013). The data driven procedure for parameter analysis expects to use assembled estimation data to develop data driven models. This system has to figure the exhaustion period of aircraft turbine circle composites By and large, information driven desire computations consolidate the fake neural mastermind (ANN), self-dealing with control (SOM) neural sort out, back-expansion (BP) neural framework (Rajan et al. 2015d).

By using these techniques, Back propagation neural system has been used to develop the work estimate and example acknowledgment due to its great self-learning, self-adjusting, speculation capacity and vigor (Rajan et al. 2015b). It likewise has a few disadvantages, including worst rate of union, and stalling out in nearby least effortlessly. To beat these disadvantages, numerous advancement calculations have been presented, for example, molecule swarm advancement calculation and hereditary calculation (GA) . To enhance the weight Genetic algorithm can be utilized and predisposition estimations of Back propagation neural system (Rajan et al. 2015c). GA is a heuristic stochastic interest figuring as a result of its extraordinary overall looking for limit and close perfect plan without edge information of mix-up work; In this investigation, we acquaint a calculation with upgrade the typical GA's determination region to dodge intelligence issue (Kenny et al. 2016). We thusly utilize enhanced Genetic algorithm-Back propagation neural network to set up the mannequin to anticipate the human skin temperature of whole body basically in light of just a couple of run of the mill insights focuses estimated by our FBG sensor exhibit.

HUMAN BODY TEMPERATURE MEASUREMENT USING FIBER BRAGG GRATING

Fiber bragg grating are prepared through showing the main part of the one mode fiber to a constant form of extreme UV light perpetually rise the fiber core part of the refractive index, producing a permanent variation index (Lahiri et al. 2012). Thus, the replicated warm over the FBG instrument sensor crosses across the 1X 2 coupler once more and through circulator. In the wake of presence, it is validated by inspective expert, the demodulated insights is spared and deliver the information securing framework (McCallum et al. 2012). The broadband light sources have maximum capacity of data transfer in the range of 1525-1565 nm.

DRIVEN MODEL INFORMATION AND ITS PROCESS

Temperature of skin Circulation Source

Consider a glow trade feature of some various body parts, for the present human life structures data, and body can be generally apportioned into 15 territories

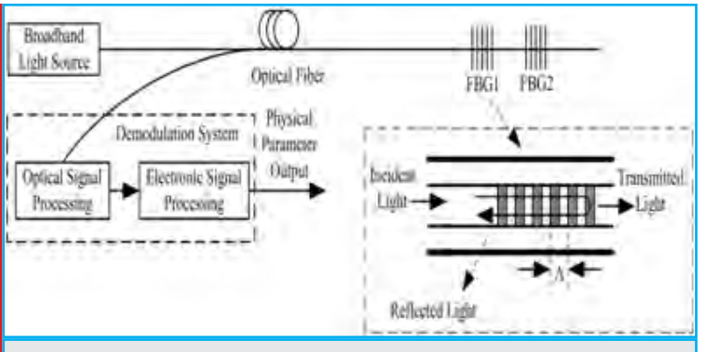

Figure 1. Schematic of fiber Bragg grating detecting framework.

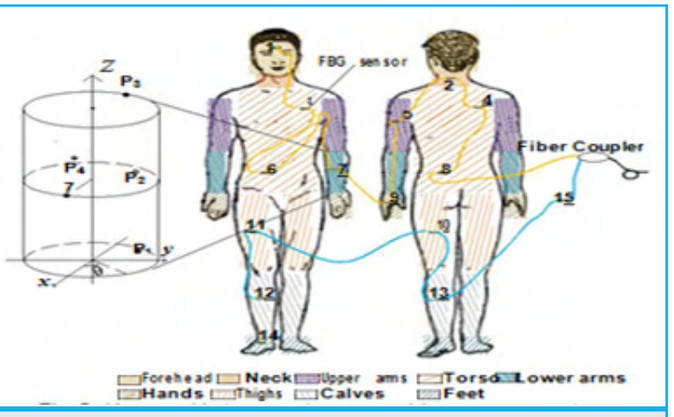

Figure 2. Wearable estimation framework and setting up for skin temperature.

(Mohanapriya et al. 2013). The external temperature surface movement of strong adult children is same, also those infection differentiate among the looking at same zones from left to right direction which should not exit more than 0.27°C. By then we develop nine information driven models which extend over the human frame. Every division consumes several dimensions; it has a tendency to be unraveled as a chamber. Thus, we use tube formed headings to develop the model of temperature transport for each division (Rajan et al. 2017). Taking the lower arm for example as showed up in the tube molded headings, the root is the point of convergence of the lower arm wrist; the center point of Z looks like lower arm in longitudinal track.

Temperature Circulation of Human using Data-driven Concepts

The recommended statistics driven mannequin is to set up the representing of skin temperature through up singular models for every portion, act as a matter of first importance, we squeeze Back the propagation process of neural networks in order to set up such discontinuous correlation of estimation focuses and subjective records focuses in the relating portion (Rajan et al. 2013). The temperature of each self-assertive factor can be foreseen with its known directions the utilization of the proposed display, and thusly mapping the temperature of that area can be precisely anticipated. To set up the information applied model for discretionary temperature forecast point, looking at records are gathered by means of tests (Rajmanova et al. 2015). Back Propagation neural framework is an efficient data driven exhibiting system in light of its self-learning limit. In our examination demonstrate, we utilize some of the components of five keys as the info information qualities for the introduced BP neural system show, counting the ones from surrounding condition and key limit of estimated skin temperature (Seungyong Han et al. 2018). In the proposed BP neural system, in light of the fact that the covered up layer influences the power of the neural system, it is essential to decide suitable the component quantities of the shrouded layer.

$$Q = \sqrt{m + n} + c \quad (1)$$

Where Q is the quantity of components in the shrouded layer; 'm' is the quantity of information components; 'n' is the quantity yield components; 'c' will be the scope of component quantities of the shrouded layer.

Enhanced Genetic algorithm-Back propagation Neural Network

The standard Back propagation neural system is anything but difficult to enter into the neighborhood ideal which can't accomplish the worldwide streamlining. It is important to streamline the underlying weights and

Table 1. Various Elements Number of Hidden Layer in Mean Absolute Error and Mean Percentage Error

Component number of the hidden layer	Mean absolute error (°C)	Mean Percentage error (°C)
1	1.24	1.73
2	1.20	1.71
3	1.20	1.70
4	1.24	1.76
5	1.18	1.70
6	1.15	1.65
7	1.18	1.75
8	1.19	1.76
9	1.17	1.76
10	1.18	1.76
11	1.19	1.73

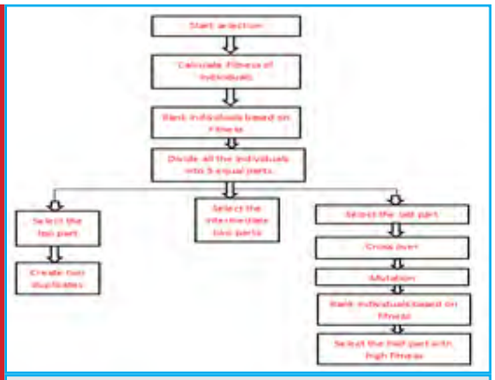

Figure 3. The best part making two copies is to enhance the people with solid match.

predisposition esteems of the Back propagation neural system Genetic algorithm has a solid large scale seek capacity and worldwide advancement execution (Y.G. Melody et al. 2015). It includes significant advances including arbitrary age of a populace, choice of people from the present populace to create the people to come, adjustment of a populace of singular arrangements by methods for hybrid and change, and assessment of wellness work . In this manner, we make strides the preparation of BP organize by beginning with GA. At that point, the BP organize begins the operation process with the better introductory weights and predisposition esteems

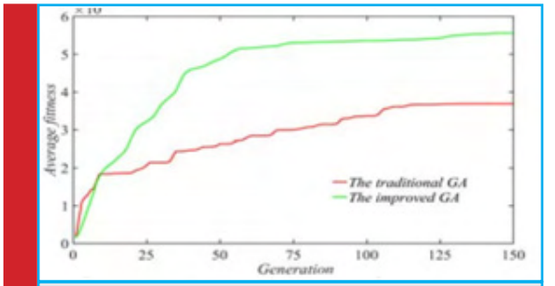

Figure 4. Improved GA and traditional GA.

gave by Genetic algorithm and methodologies the ideal arrangement (Vijayprasath et al. 2015).

The marvel of untimely combination appears in two viewpoints: 1) All the people in populace are caught at the same outrageous esteem and stop to develop; 2) the people moving toward the ideal arrangement are constantly disposed of; and the transformative procedure isn't merged.

$$f = 1 / E \tag{2}$$

We utilize the enhanced choice to supplant the conventional determination. 1) The enhanced choice builds the quantity of people with great wellness in the populace productively. 2) The people with low wellness can be chosen to the cutting edge after hybrid and change.

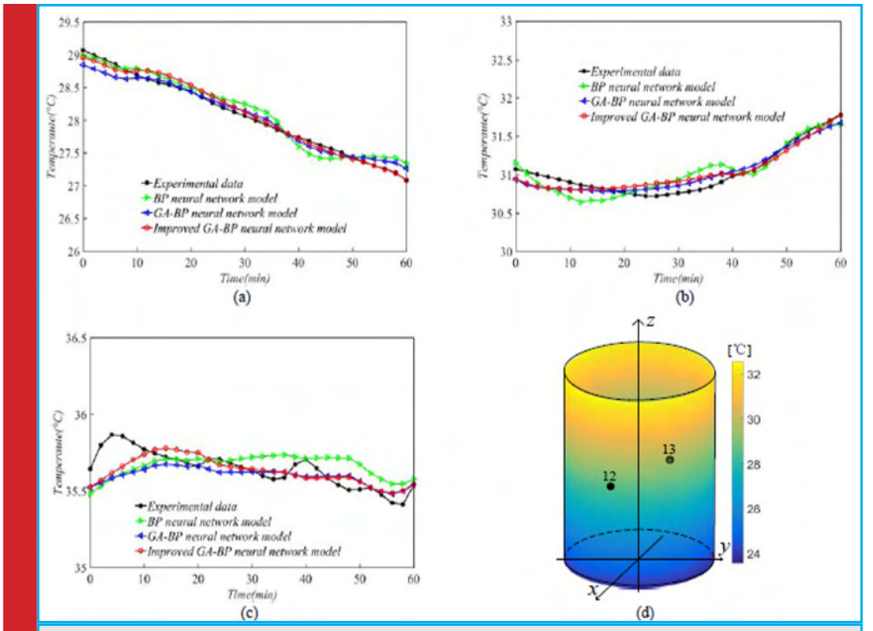

Figure 5. Results of human calf. Correlation of tentatively estimated temperature by three systems in (a) cool situation; (b) warm nonpartisan condition; (c) heat condition. (d) Temperature mapping of human calf in real-time.

Table 2. Wearable estimation framework for skin temperature and setting upmodel.

Testing enviornment	Models	Standards	
		MAE (°C)	MPE (°C)
Cold enviornment	BP NN	0.23	0.56
	GA-BP NN	0.17	0.75
	Improved GA-BP NN	0.10	0.30
Thermal neutral enviornment	BP NN	0.22	0.32
	GA-BP NN	0.11	0.31
	Improved GA-BP NN	0.05	0.20
Warm enviornment	BP NN	0.11	0.43
	GA-BP NN	0.10	0.45
	Improved GA-BP NN	0.10	0.26

TABLE II IMPROVISED ROULETTE WHEEL ALGORITHM

Calculation Improvised Roulette wheel determination

Stage 1. A category of people in plunging request as indicated by the wellness estimation of every person in the populace.

Stage 2. Partition the populace into five a balance of in the wake of arranging people.

Stage 3. Select the general population with the most vital health regards in the primary 1/5 degree and make two more duplicates, that is, the two duplicates are decided to the general population to come; Select the medium assessed 2/5 degree of the wellbeing regards to the accompanying age; After half breed and change of the general population with wellbeing regards in the line of the 2/5 extent, a category of people in new slipping solicitation and select the 1/2 degree with the wellbeing regards to the general population to come.

RESULTS AND DISCUSSION

Analysis and information collection

The temperature of the estimation centers and the self-confident foreseeing centers has a nonlinear relationship in assorted incorporating circumstances.

CONCLUSION

In this paper, set up a human skin temperature mapping organized by data driven model for coursed optical strands and upgraded Genetic algorithm-Back propagation neural framework. The proposed procedure is prepared for increasing body temperature mapping by fundamentally assessing a couple average spotlights on human skin. Remembering the ultimate objective to endorse the model, consider the lower arm and measure the temperature of a skin in normal core interests. The preliminary outcomes are utilized to favor the model in three unmistakable encompassing circumstances. Moreover, the relationship between the perceptive results gotten by model and the results by Back propagation neural framework and Genetic algorithm-Back propagation neural framework is excessively driven. The results describe the temperature is of 0.40°C and the precision of the model method is looked at a scope of circumstances.

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Bionic Eyes for the Blind

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ABSTRACT

Bionic eye is a wonderful visual mechanism which can fulfill the dream of blind people to see the beauty of nature. Among all species of life, human birth is very precious. To lead a complete life, human body plays a dominant role. Eye is a most important organ of sense in human body. About 1.3 billion people around the world are visually impaired. The major reasons for blindness and low vision are retinal diseases, macular degeneration, cataract, diabetic retinopathy, glaucoma, vitamin A deficiency and hereditary diseases of the eye. Damage to nerves with in the eye and brain also leads to blindness. As pacemaker to heart patient and hearing aid to deaf people, bionic eye gives hope to the people with inability to see. In this paper recent research and future development of bionic eye is presented which benefits a lot for society.

KEY WORDS: ARTIFICIAL EYE, RETINAL IMPLANTS, RETINITIS PIGMENTOSA, SILICON RETINA

INTRODUCTION

Eye is the most sensitive and most important part of the human beings body. Some people are born blind and some defects or partially loss their vision. The World Health Organization has estimated that Globally 1.3 billion people have some form of vision impairment. With regards to distance vision, World Health Organization (WHO) estimated that there are about 826 million people live with near vision impairment (WHO 2018). Currently, India is a home for 1/3rd of world blind population. India has largest blind population in the world which is nearly about 15 million people, which shows the need of bionic eye is very high for world, particularly India.

Due to improper treatment, people suffering from low vision are unable to get perfect vision and undergoing various surgeries that sometimes further lead to loss of vision. The various reasons for blindness are i) Glaucoma, ii) Macular degeneration, iii) Cataracts, iv) Optic neuritis, iv) Retinitis pigmentosa, v) Tumors.

ARTICLE INFORMATION:

Corresponding Author: pauljoshuak.eee@mkce.ac.in
Received 22nd Dec, 2018
Accepted after revision 23rd Feb, 2019
BBRC Print ISSN: 0974-6455
Online ISSN: 2321-4007 CODEN: USA BBRCBA
Thomson Reuters ISI ESC / Clarivate Analytics USA and Crossref Indexed Journal
NAAS Journal Score 2019: 4.31 SJIF 4.196

Online Contents Available at: http//www.bbrc.in/
DOI: 10.21786/bbrc/SI/12.3/12

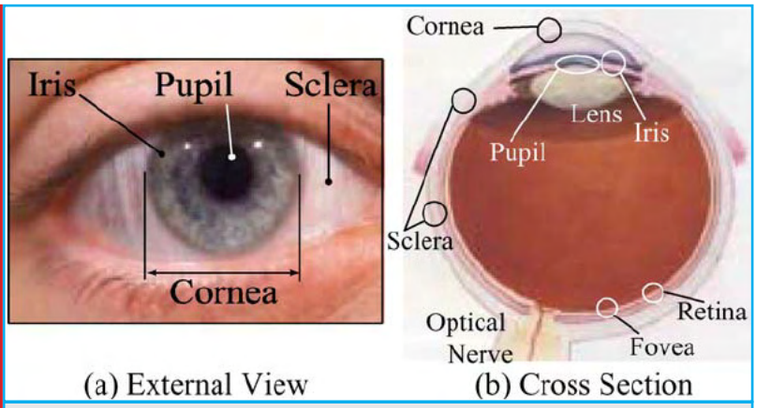

Figure 1. Structure of the Eye

Glaucoma: There is always a stable production and drainage of fluid substance in the eye which is known as aqueous humor. This keeps the eyes always wet. But when the production of fluid is high or very low, the disease called Glaucoma causes. This increases the pressure in the eye (Weinreb *et al.* 2016). Macular Degeneration: Macular degeneration is the main reason for blindness in aged people. It is due to the defect in midpoint of retina. To prevent the risk of infection at eyes, doctors usually recommend antibiotic drops. However this does not completely cures the eyes. The patient may still face vision problems (Yonekawa *et al.* 2015).

Cataracts: Cataracts are the root cause for cloudy vision. Optic Neuritis: Optic nerve inflammation leads to short-term or stable loss of eye sight. In certain case, this kind of eye defect heals on its own. Retinitis Pigmentosa: Retinitis pigmentosa is an eye defect which comes due to genetic disorders. The people affected by this kind eye defect could not see at night, as well as their side view of eye sight also affected. It mainly affects the retina and leads to blindness only in rare cases. Since it is due to genetic disorder and involves retinal cell damage, it occurs from the onset of night blindness to the gradual vision loss (Anjaneyulu *et al.* 2017).Tumors: Generally tumors affects the retina and become a reason for blindness.

The Structure of eye is shown in Figure 1to Figure 4. The structure of Human eye has three coats as outer, middle and inner. Sclera and cornea are outer coats. Sclera is the white portion of the eye. The eye ball shape is maintained by sclera. In the eye ball the outer portion is cornea and the cornea has no blood vessels. Then in the middle coat there are three important parts are there. They are Choroid, Ciliary body and Iris. The choroid is very near and adjacent to sclera and contains a large amount of blood vessels. Pigmented cells in choroid

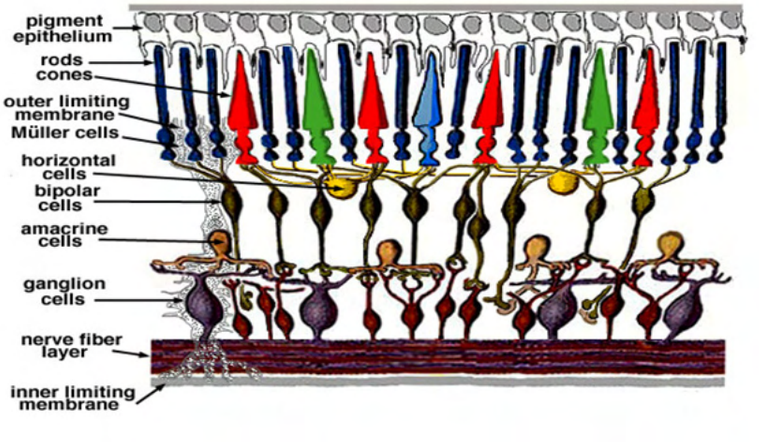

Figure 2. The Retina

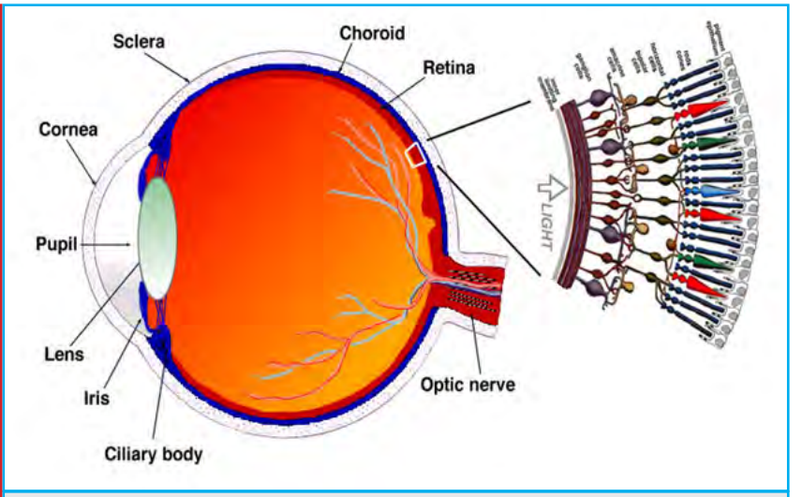

Figure 3. The Eye with Retina

absorb light. Ciliary body helps to hold the lens in place. The iris is giving colour to eye. Next the inner coat is called as retina. Retina is a nervous coat. In the eye ball, retina is a sensory layer (Dobelle 2000).

The function of eyes is, from the moment the light rays enter our eyes, the cones and rods cells perceives the images. From there, optical signals into electric impulses are sent via optic nerve to the brain. Defects in eye such as retinal pigmentosa and macular degeneration are damage these cells. Better understanding of the function human eye gives intelligence to replace the defective eye by bionic eye which is artificially designed to support visually challenged people.

A bionic eye imitates the function of the retina of human eye. It helps to restore sight for the people who were affected by serious vision loss. Here a retinal implant is joined to a video camera. This convert images into electrical impulses. Due to this the remaining retinal cells are activated which allow to carry the signal back to the brain. The brain interprets these as dark or light spots in pixelated image format.

BIONIC EYE

BIO+ELECTRONIC=BIONIC. Bionic eye indicates bio electronic eye. The electronic device normally sub-

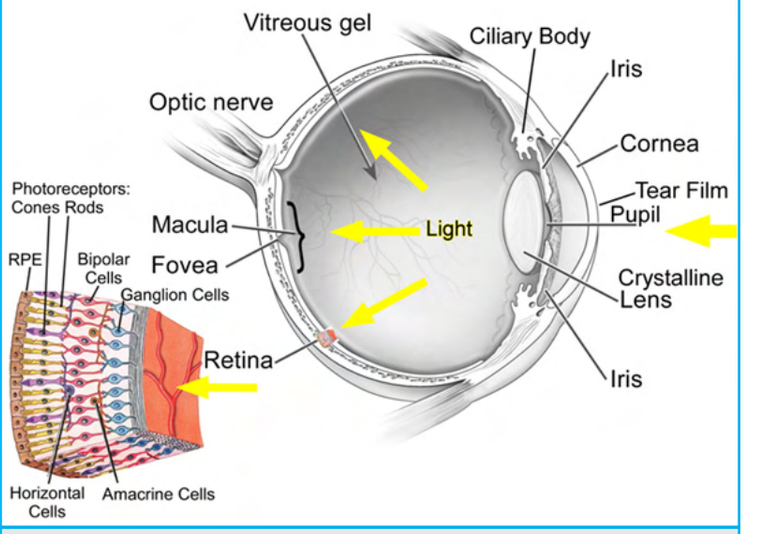

Figure 4. Structure of the Eye

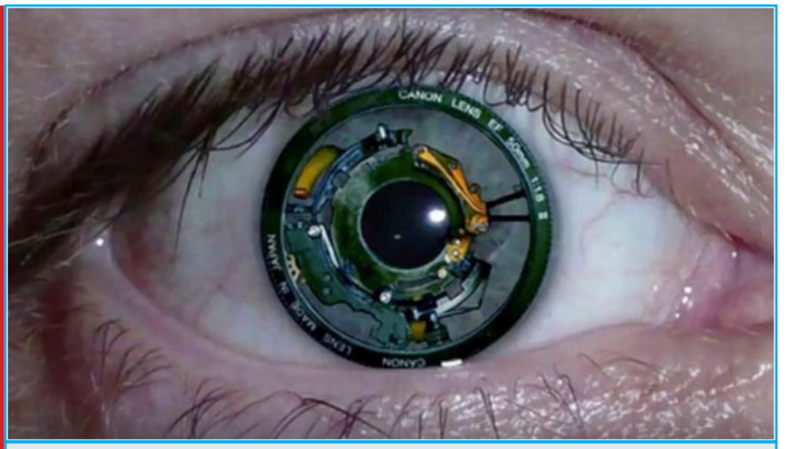

Figure 5. The Bionic Eye

stituted to perform partial or full function of the eye. The various parts of bionic eye are i) Digital Camera, ii) Video-Processing Microchip, iii) Radio Transmitter, iv) Radio Receiver, v) Retinal Implant.

Digital Camera: A digital camera is used to capture images. It is operate in real time. These images are passed to a microchip located in the retina. The Video-Processing Microchip converts these images into electrical pulses. This exactly characterizes the patterns of light and dark. These signals are pass pulses to a radio transmitter. The Radio Transmitter function is to wirelessly transmit these pulses to a receiver. The receiver is usually implanted above the ear or under the eye. Then these pulses are send to the retinal implant using very thin i.e. hair thin implanted wire (Krishnaveni *et al.* 2012). Figure 5 shows the bionic eye and Figure 6 shows the human eye with camera.

BIONIC EYE PROJECTS

Some of the major Bionic eye projects are Implantable Miniature Telescope, Artificial Silicon Retina (ASR), Harvard /MIT Retinal Implant, Dobelle eye, MARC Technology, Argus, Holographic Technology and Virtual Retinal Display (VRD). Here the very important bionic eye Artificial Silicon Retina and Argus-II are briefly discussed.

Artificial Silicon Retina

Artificial retina prosthesis is done using Artificial Silicon Retina. It is a silicon chip. The size is very tiny. It has 2 mm diameter and 1/1000 inch thickness. The ASR has about 3,500 microscopic solar cells. It transforms light into electric pulses. It mimics the function of cones and rods in the eye. ASR detects light and converts into electrical impulses.

Figure 6. The Human Eye with Camera

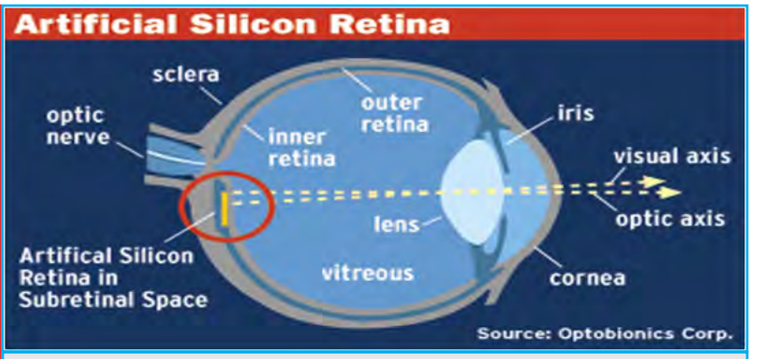

Figure 7. Structure of Artificial Silicon Retina

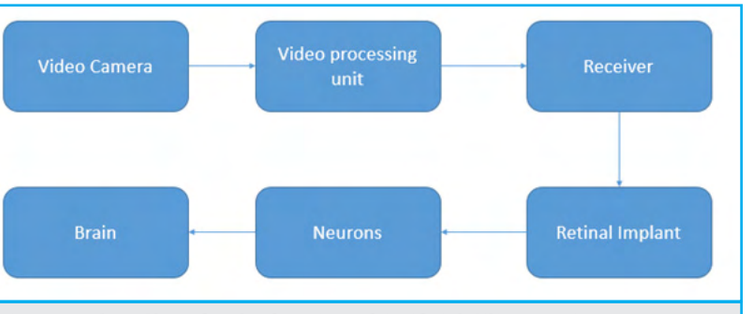

Figure 8. Flow Chart for the function of Artificial Silicon Retina

Approaches towards RETINA: There are two main approaches towards Retina. They are i) Epiretinal Approach, ii) Subretinal Approach. Epiretinal Approach involves a semiconductor based device. It is positioned on the surface of the retina. The main function is to simulate the remaining overlying cells of the retina. In subretinal approach, ASR chip is implanted behind the retina. The main function is to simulate the remaining viable cells (Chow *et al.* 2004). Thus ASR supports the blind people to receive their eye sight.

Argus-II

The Argus II is the world's first approved bionic device. It transmits image from a small eye glass. The patient wears glasses with an attached video camera. These images become an electrical signal. Argus II bionic eye i.e. Argus II Retinal Prosthesis System is dedicated for young people at age 25 (Stronks & Dagnelie 2014). The Cons and Pros of Argus-II are as follows. It has ability to perform good visual tasks and it reduced the stress upon retina. The cost of device is too high. Figure 9 shows the Argus-II bionic eye.

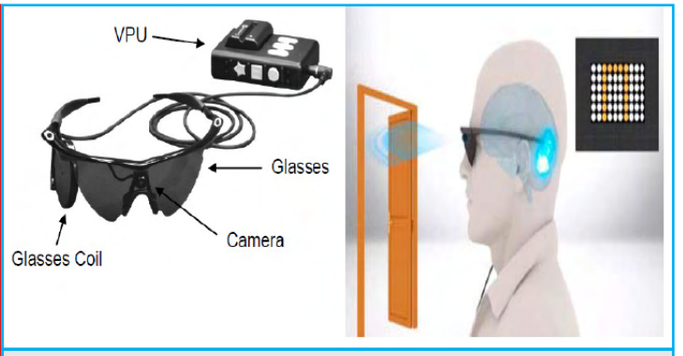

Figure 9. Argus-II Bionic eye

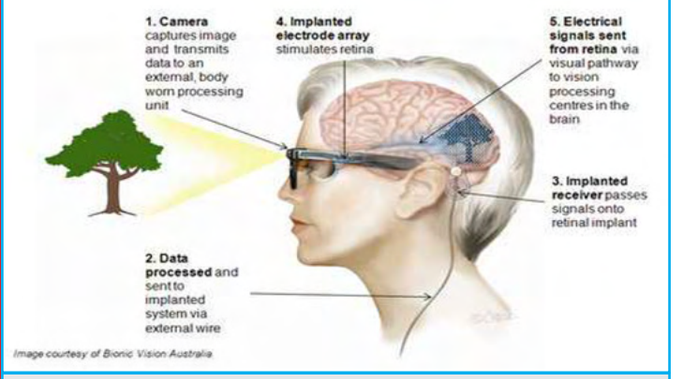

Figure 10. Bionic Eye System

Thus Bionic Eye System provides complete vision to blind people (Deeksha & Shantharam 2016). Figure 10 shows the Bionic Eye System.

CONCLUSION

Bionic Eye is a revolution in medical field and most innovative aid for the blind. It can help in restoring the vision of millions of people affected by eye blindness. Now about 1.3 Billion people suffered due to blindness around the world. If this bionic eye system is fully developed with a cutting edge technology it will transform the life of blind people who struggled all over the world.

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Dynamic Mode Brain Epileptic Seizure Detection in EEG Signals

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ABSTRACT

The objective of this paper is reliable detection of the epilepsy seizures. Epilepsy seizures are very hazardous diseases which affects million people across the world and makes them inactive to the world. The best quality automated system will really help the patients to lead their life in happy manner. Here we introduce the dynamic mode technique, as an epileptic seizure detector techniques. This mode helps in efficient detection of the seizure which enables modern medical technology need to be utilized in the right manner for the diagnosis. The proposed algorithm is checked with various types of data sets acquired from various sources and the algorithm found performing better than the other algorithms. Various parameters were considered like noise affected signals and DMD signals and it is found the proposed technique out perform the existing techniques available. The results shows improved ability in identification of epilepsy seizures in the field of medical sciences.

KEY WORDS: EPILEPTIC SEIZURES, DYNAMIC DECOMPOSITION, EEG

INTRODUCTION

Around couple of million people affected from the epileptic seizures in world. We can determine the function of brain by two types of methods first one is invasive and second is non-invasive (Sharma et al. 2017). This paper discuss about the non invasive scalp EEG. EEG is a important diagnosing test in detecting the epilepsy (Vijayprasath et al. 2012). This measure's electrical signals generated by the brain and by increasing the number of electrodes used, we can increase the percentage of detection of epilepsy (Dinesh et al. 2018b). But there will be disagreeing in recordings of these measurements between two physicians, when the test are manually

ARTICLE INFORMATION:

**Corresponding Author: nandagopalc.ece@gmail.com*
Received 7th Dec, 2018
Accepted after revision 27th March, 2019
BBRC Print ISSN: 0974-6455
Online ISSN: 2321-4007 CODEN: USA BBRCBA
Thomson Reuters ISI ESC / Clarivate Analytics USA and Crossref Indexed Journal
NAAS Journal Score 2019: 4.31 SJIF 4.196

Online Contents Available at: http//www.bbrc.in/
DOI: 10.21786/bbrc/SI/12.3/13

conducted (Sukanesh et al. 2010b). So we are going for an automated solution so that all the physician will agree with the results obtain and it will be a great help for the patient in increasing their life cycle. Here we need to know some basic waves generated by the brain and those are recorded in EEG (Sukanesh et al. 2010a). The below figure will discuss those in detail and a diagram of basic EEG setup also given here.

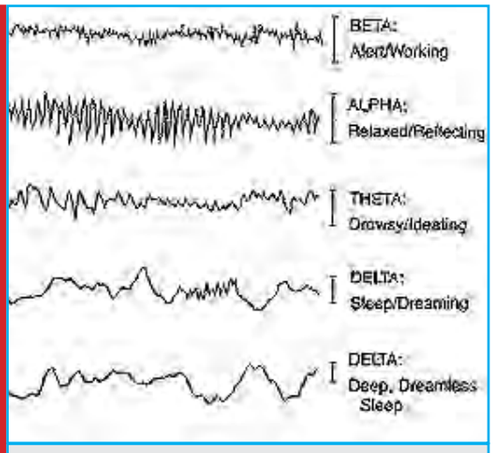

Figure 1. Brain waves.

In previous work (Sukanesh et al. 2013), there are various works are done in detecting the epileptic patient and treating. Here we are proposing a dynamic system will target on the scalp EEG, and helps the physician further in a better way to detect the seizures (Kavitha et al. 2017).

RELATED WORKS

We have various related work in determining the seizures of the brain (Davood et al. 2015). Some of the publication proposes the support vector machine by which the extraction of the electrical signal is partially automated (Ramesh et al. 2018a & b). In some of the methods proposed we have online training mechanism which helps in determining the seizures (Rajan et al. 2015b). Some other patient friendly technique proposes classification of brain areas using various built in optimization techniques (Rajan et al. 2015a). Some techniques were proposed in considering wavelet decomposition and time domain parameters (Rajan et al. 2013).

PROPOSED SYSTEM

Dynamic mode methodology in detecting seizures proposes the principle of finding low dimensional structure below the larger one. So the detected brain signals from

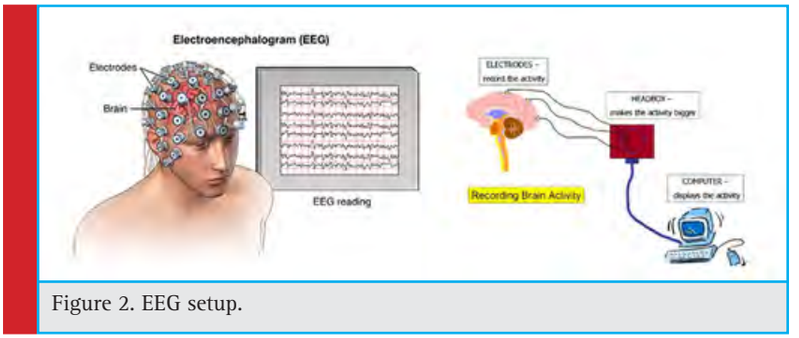

Figure 2. EEG setup.

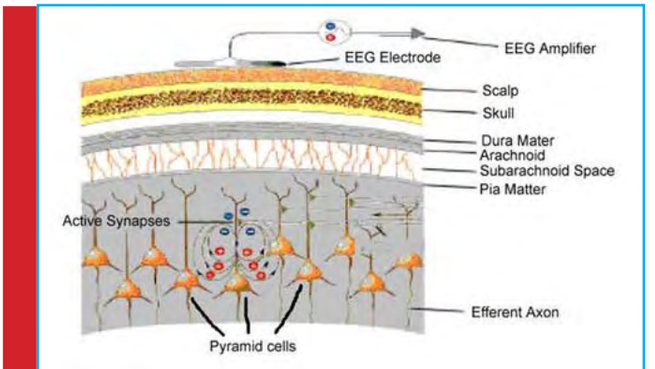

Figure 3. Layers of brain with electrodes

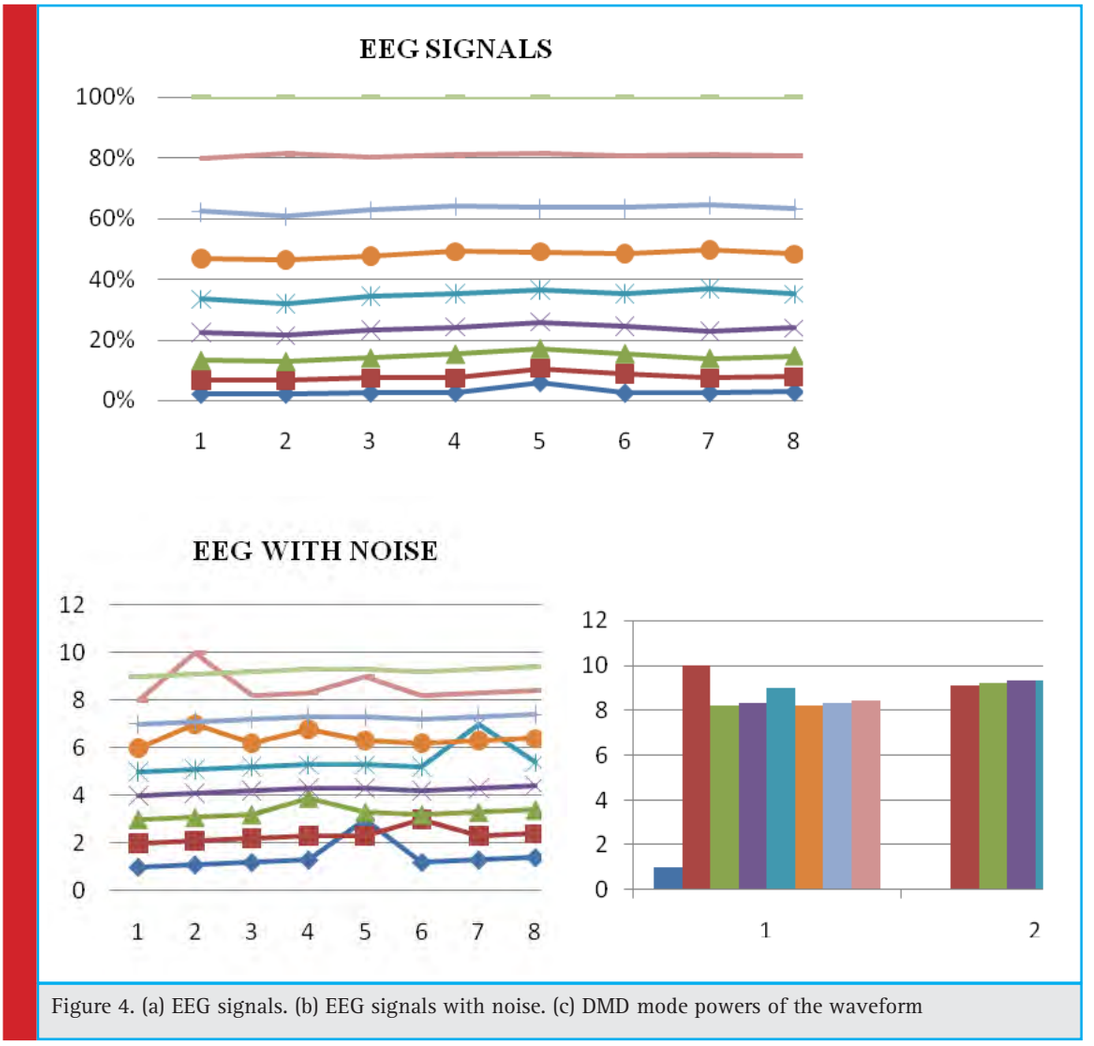

Figure 4. (a) EEG signals. (b) EEG signals with noise. (c) DMD mode powers of the waveform

the brain are vary much reliable through this technology. By using this technology we are able produce time resolved image and those images are mainly noise free. The technique not that much derivative, it is mainly detailing about the collection of the neural signals from the brain. This technology gives a snapshot in measuring the seizure which is effortless so that less consumption of time can be done. The signals from the brain are given below as fig. 4 and various analysis were done with that.

In this proposed methodology, follows the standard sequence of preprocessing, feature extraction, classifica-

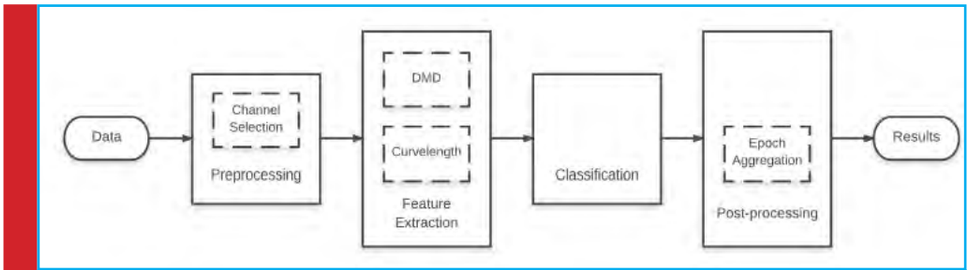

Figure 5. Block diagram of Detection model

tion, and post processing. Preprocessing does all subjects are in the exact recording conditions. And two data sets are taken for work. Feature extraction does the extraction the DMD modes power and lengths of the curves of the time-domain EEG signal. Mode power is calculated using the augmentation of the signals. The curve length give the amplitude of the EEG signals .here below we give the block diagram of the proposed system

POST-PROCESSING

The method is very important in concluding the seizure in the signals detected (Brunton, et al. 2016). To detect the data we need to take large of data samples from patients and also we need to compare the data received from the patients with the data's which we have as data sets (Rajan et al. 2014). The earlier reference data sets are received from the various medical institutions with permission of authority (Dinesh et al. 2018a). Which From this kind of post processing we are able to find the various seizures ranging from 10second to 100 seconds (Dinesh et al. 2015). we also have come filters to find the accurate output to the maximum level.

CONCLUSION

The paper discussed above gives a estimation of the epileptic seizure with the spatial and temporal characteristics picked up from the EEG signals. The Dynamic power modes and length of the curves are taken as the parameters in sensing the datas. We have utilized two sets of well known data sets .The investigation of the proposed algorithm indicated that Dynamic mode captures the EEG signals and is able to distinguish seizure and non-seizure portions of scalp EEG better than the previous methodologies.

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Biosci. Biotech. Res. Comm. Special Issue Vol 12 No (3) May 2019

BBRC
Bioscience Biotechnology
Research Communications

Supervising Physical Condition for Pernatal Ladies

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ABSTRACT

HR is the establishment of Creating and immature countries. All maternal passing (99%) happen in creating nations. Regular 830 ladies bite the dust because of pregnancy.Most piece of the pregnant women may not have the capacity to do their standard checkups at the starting time of pregnancy and this prompts higher passing rate in the event of newborn child and maternal in the provincial regions. Because of these issues, the general public is confronting an monstrous restorative issues. In the current technique ultrasound range of the pregnant women is performed also, alongside that some basic signs are assessed and it is taken care of by Bluetooth advancement. The drawback of the current system is that the ultrasound examine is exorbitant and the Bluetooth advancement. In proposed work Accelerometer sensor is made remote and it is predominantly used to gauge the development of the embryo furthermore, some indispensable parameters, for example, the temperature, pulse and circulatory strain for the ladies are estimated by utilizing diverse sensors. The deliberate parameters are exchanged through IoT and it is seen in the cell phone. The proposed work worries in building up a minimal help gadget for rustic pregnant ladies to get fundamental indications of maternal and embryo with minimal effort utilizing later sensors and web of things for customized care.

KEY WORDS: ARDUINO BOARD, BLOOD FLOW MEASURING SENSOR, GRAVITOMETER SENSOR, INTERNET OF THINGS, PULSE SENSOR, TEMPERATURE SENSOR

INTRODUCTION

Consistently around 830 ladies kick the bucket from pregnancy and labor. It was assessed generally that 303000 ladies kicked the bucket amid pregnancy and labor. All of these passings happened in low-asset settings, and most could have been anticipated. Distinctive difficulties could exist before pregnancy however they are intensified all through pregnancy, especially if not oversaw as a feature of the lady's consideration (Ashlesha et al. 2017). The significant inconveniences that record for almost 75% of every single maternal pass-

ARTICLE INFORMATION:

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Received 12th Dec, 2018
Accepted after revision 28th March, 2019
BBRC Print ISSN: 0974-6455
Online ISSN: 2321-4007 CODEN: USA BBRCBA
Thomson Reuters ISI ESC / Clarivate Analytics USA and Crossref Indexed Journal
NAAS Journal Score 2019: 4.31 SJIF 4.196

Online Contents Available at: http//www.bbrc.in/
DOI: 10.21786/bbrc/SI/12.3/14

ing are because of extreme dying, contaminations, complexities from conveyance and so on. Different elements that keep ladies from accepting or looking for care amid pregnancy and labor are Poverty, separate, absence of data, lacking administrations, social practices. Thusly essential endeavors should begin appropriate from giving auspicious and quality wellbeing help to pregnant women which will prompt the introduction of solid youngsters (Boopathi et al. 2017).

Pregnant ladies ought to perform ultrasound filter something like two times amid pregnancy period to think about the fetal development. Additionally, appropriate and opportune checkups will guarantee safe conveyance. Mindfulness and access to a social insurance focus, outfitted with current maternity offices has a huge positive effect on the wellbeing looking for conduct and pregnancy result of provincial ladies (Eleonora 2018). Absence of learning prompts high mortality among the ladies living in the provincial territories. Likewise they experience the ill effects of different medical problems, for example, iron deficiency, shortcoming and heaving. Ultrasound filtering strategy is for the most part to conform the development of the infant in mother's womb (Ridhwan 2018). By utilizing this ultrasound checking strategy we can distinguish numerous issues, for example, advancement oddities, chances for unnatural birth cycle, affirming a pregnancy, various pregnancies and so on. Subsequently, we utilize most recent sensors which won't hurt both the hatchling and the maternal (Palanivel Rajan 2014).

APPROACHES

HARDWARE ARRANGEMENTS

In the equipment setup distinctive sorts of sensors have been utilized to quantify the crucial parameters, for example, temperature, pulse, circulatory strain for the maternal and the development of the hatchling. Sensors are connected in the framework along these lines it takes perusing and it is shown (Palanivel Rajan et al 2015a). IoT is dynamically allowing to organize devices furnished for join forces with the world wide web and give data on the conditions about patients and give data interminably to experts who causes it.

GRAVITOMETER SENSOR

Gravitometersare accessible that can quantify speeding up in one, a few symmetrical pivot. The developments of the hatchling is for the most part because of the vascular condition of the placental inadequacy in the uterus (Palanivel Rajan et al 2015b). These developments is known as "kicking". From the fourth month onwards the child will begin kicking yet it won't seen by the mother. By estimating the prenatal development, the clinicians will have the capacity to anticipate the condition and advancement of the prenatal.

Prenatal development is checked by ultrasound examine yet this is costly. so accelerometer sensor is utilized. The ADXL335 is somewhat, thin and low power sensor, it have 3-rotate with hail adjusted voltage yields. It will measure the animating with a base full-scale extent of ±3 g.

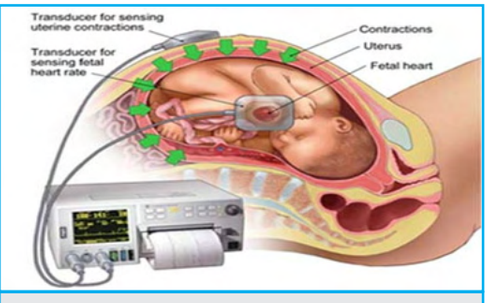

Figure 1. Sensor in the mother ventral wall

Gravitometer sensor is planned remote and the fetal development is estimated. By utilizing RF modules transmitter and collector the yield from the gravitometer sensor is transmitted to the arduino controller. The table speaks to the kick consider of the hatchling ordinary or irregular (Palanivel Rajan et al 2015c). The fetal tally begins from the fourth month, yet it isn't seen by the mother. The development of the baby will be seen by mother just in the fifth month. On the off chance that the diminished fetal development is under ten times in 12 hours it is considered as a vital indication of fetal hypoxia. So prompt measures ought to be taken with a specific end goal to keep away from these issues (Palanivel Rajan et al 2015d).

Table 1. Measurement of Fetal Movement

Duration of hours	Number of fetal movements (NORMAL)	Number of fetal movements (ABNORMAL)
1 hour	4 or more	2 or fewer
3 hour	8 or more	below 6
12 hour	Greater than 10	below 10

TEMPERATURE SENSOR

Temperature sensor are primarily used to gauge the body temperature of the maternal. Usually for a lady's body temperature to change amid pregnancy (Palanivel Rajan et al 2017). Amid pregnancy the lady's body creates extra warmth because of Increased digestion, Elevated levels of hormones, for example, progesterone, Increased outstanding task at hand on the lady's body a result of

additional weight as the pregnancy advances and additionally the preparing and fetal supplements and waste items. All the while the lady has expanded fringe flow which prompts dispersal of warmth from the body. LM35 sensor works from 4 to 30 volts. It covers the range from - 55°C to +150°C.

PULSE SENSOR

The pulse measure unit can be utilized to screen pulse of maternal. The outcome can be shown on a screen through the serial port (Ramesh et al. 2014). It is proposed to give propelled yield of pulse when a thumb is placed overit.Working voltage is +5V managed and the working current 100mA. The whole framework is a high affectability, low power utilization and convenient (Lee et al. 2009).

SENSOR FOR MEASURING BLOOD FLOW

Circulatory strain is a noteworthy worry for any individual. For a pregnant lady the circulatory strain will continue shifting somewhat all through the child-bearing periods (Sadovsky et al. 1973). This is the thing that makes them feel dazed amid the perinatal period frame. Checking Blood weight is vital as the variety in pulse can influence the infant's supply of oxygen and supplements. Hypertension amid pregnancy doesn't for the most part prompt major issues. Be that as it may, in the event that it goes untreated, hypertension can progress toward becoming hazardous for both mother and child (Sukanesh et al. 2010a).

On the off chance that hypertension proceeds following 20 weeks of pregnancy, there can be difficulties. Preeclampsia can create. This condition can cause genuine harm to your organs, including your cerebrum and kidneys. Preeclampsia is otherwise called toxemia or pregnancy-instigated hypertension. So it is especially critical to distinguish the circulatory strain for the maternal (Sukanesh et al. 2010b).

INTENET OF THINGS

The Internet of Things (IoT) is an organic framework related of physical contraptions that are open through the web. The IoT engages assets to be distinguished and constrained remotely crosswise over existing system structure, making open doors for all the more clear blend of the everyday life into PC based frameworks, and accomplishing updated proficiency, precision and cash related ideal position. This empowers the accumulation of an assortment of data from the gadgets, including information on tasks, arrangement, vitality utilization, and the power factor. The IoT empowers gadgets to settle on keen choices in light of investigative standards that fill the need of the gadgets best. The gadgets can send, get, store, and control data, sending the data exclusively to another gadget or broadcasting it to all gadgets (Sukanesh et al. 2012).

FRAMEWORK SPECIFICATION

In this system the temperature sensor, pulse sensor, accelerometer sensor and circulatory strain sensor are controlled by utilizing an Arduino controller. The information from the sensors are being broke down by this controller and the outcomes are being recreated. IoT alludes to the bury systems administration of physical gadgets. IoT will trade data over a framework without anticipating that human-should human or human-to-PC correspondence (Vijayprasath et al. 2012).

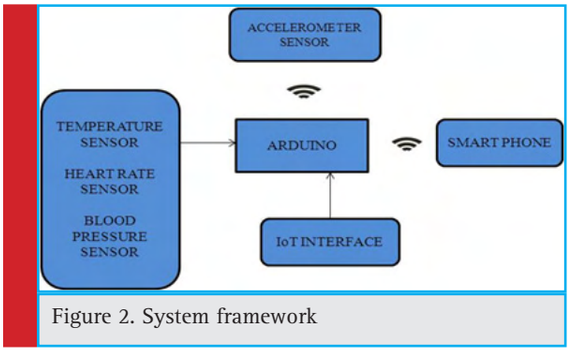

Figure 2. System framework

The Arduino has 14 propelled data/yield pins, 6 straightforward wellsprings of information, a 16 MHz valuable stone oscillator, a USB, a power jack, an ICSP header, and a reset get.Since the esteem detected from the sensor is in simple frame, it tends to be straightforwardly associated with the simple information stick. The Arduino will process the banner and the yield will be in cutting edge hail voltage outline (Vijayprasath et al. 2015).

RESULTS

Equipment setup is planned and the parameters, for example, the temperature, weight and heartbeat is estimated utilizing distinctive sensors. Notwithstanding this accelerometer sensor is put alongside the three pivot for the estimation of the kick tally of the baby. The parameters are estimated and exchanged to the cell phone through IoT and the outcomes got from the distinctive sensors are talked about in this section.

The above Fig 3: demonstrates the equipment setup of Accelerometer sensor. The three pivot X,Y,Z in the accelerometer sensor demonstrates the tilt of the hatchling when the sensor is set in the mother stomach divider.

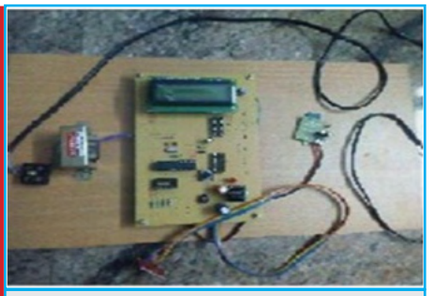

Figure 3. Setup of Accelerometer sensor

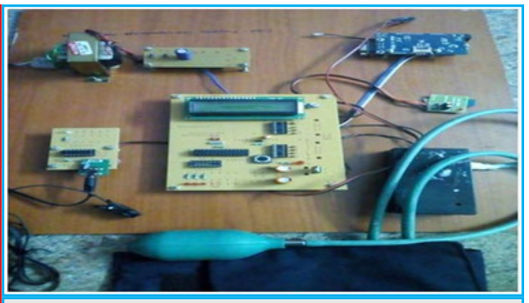

Figure 4. Setup of IoT based Health Care Monitoring System

Figure 6. Displayed Output

Figure 7. Yield

The above Fig 4: demonstrates the equipment setup of IoT based Health Care Monitoring System for Rural Pregnant Women. It is planned to give automated yield of heart beat of the maternal when a finger is put on it.The temperature of the maternal can likewise be estimated by putting a finger on it. The circulatory strain of the maternal is estimated by putting the sleeve over the arm.

Fig 5: demonstrates the showed yield of accelerometer sensor with the deliberate estimations of the three pivot. The qualities in the accelerometer sensor shift as per the development of the hatchling. Accelerometer sensor is planned remote and the fetal development is estimated. By utilizing RF modules transmitter and beneficiary the yield from the accelerometer sensor is transmitted to the arduino controller.

Fig 6 demonstrates the Displayed Output for the deliberate parameters acquired from various sensors. This equipment setup shows the yield for the parameters estimated, for example, the temperature, weight heart beat and alongside the three hub in the accelerometer sensor utilizing IoT based human services observing framework.

Fig 7: exhibits the indicated yield i.e saw through the flexible application through IoT by trading the think parameters. By using this approach the pregnant women and weaken patients in rural zones will prepared to do their general checks ups on the consistent daily schedule.

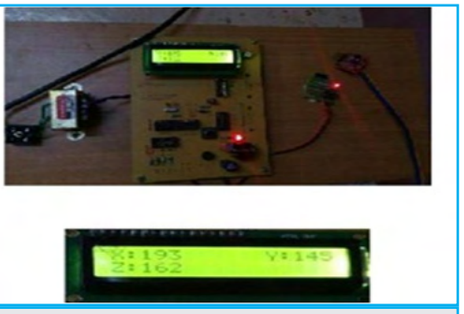

Figure 5. Estimations of the three pivot

CONCLUSION

Most examinations of maternal mortality are recovering center based. Notwithstanding, in making and energetic nations,most of the maternal passings occur at home. In order to decrease these complexities, a diminished assistive contraption is plot and the fundamental parameters, for instance, the temperature, weight for women and beat of the hatchling is assessed by using differing sensors. The device is lightweight and exceedingly tricky despite for little improvements, thusly supported as a home watching contraption. Predictable seeing of

the fundamental parameters of infant and women in the natural locales, diminishes the infant kid mortality. The think parameters is traded through the IoT. It gives quality and propitious prosperity help for both incipient organism and women. The results are found in the wireless through the IoT.

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Biosci. Biotech. Res. Comm. Special Issue Vol 12 No (3) May 2019

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Peacock Monitoring and Repellent System for Agriculture

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ABSTRACT

Deforestation and environmental changes creates a conflict between human and animals. In present situation the natural resources are severely depleted, which makes animals to enter human living area and agricultural field. This conflict between human and animals put human life in danger. So, it is necessary to monitor the agricultural field continuously inorder to prevent the entry of animals. In our proposed paper, motion of an animal is detected by using PIR sensors and drone attached with camera is triggered to take an image of the intruder. This image is used to classify the kind of intruder by image processing. The location, type of danger intruded is sent as an SMS to the field owner and also to the forest officials as an alert message using GSM technology. If the intruder is peacock, repellent techniques such as irritating noise in the range of ultrasonic frequencies and turning on the bright light are used to repel. The image of animal is not matched, alert message and repel techniques are not executed.

KEY WORDS: PIR SENSORS, GSM, PEACOCK, ULTRASONIC FREQUENCIES

INTRODUCTION

Farmers prefers electric fence as one of the option to prevent the entry of the animals into their agricultural field. Whenever animals touch the electric fences it leads to electrocution. Due to electric shock the intruder life will lost and in certain cases, life of human will also be lost.In order to avoid the death of intruder and humans due to electric fence, we have developed an idea to repel the peacock from the agricultural field without hurting the intruder. In this proposed work, we have developed a drone attached with camera to take the images of the intruder and the image is processed using image processing and suitable repellent techniques will be adopted to repel.

ARTICLE INFORMATION:

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Received 17th Dec, 2018
Accepted after revision 26th March, 2019
BBRC Print ISSN: 0974-6455
Online ISSN: 2321-4007 CODEN: USA BBRCBA
Thomson Reuters ISI ESC / Clarivate Analytics USA and Crossref Indexed Journal
NAAS Journal Score 2019: 4.31 SJIF 4.196

Online Contents Available at: http//www.bbrc.in/
DOI: 10.21786/bbrc/SI/12.3/15

MATERIALS AND METHODS

Improved real time image detection system is used to capture the images continuously in the border areas and it was transmitted through RF network to the base station, later the images are decomposed and extracted to check the obtained image to that of the database image. Here image vision algorithms are used to find the animal (Sugumar et al. 2014, Santhiya et al. 2018). A concept is proposed in paper to classify the intruder by using support vector machine (SVM). Here sensor is used in a spatial resolution capability platform to collect the data of the moving animal and software's such asblender and OpenGL software are used to generate the animal intrusion data to examine and to classify the animal (Upadrashta et al. 2015, Xiaohan Liu et al. 2015)

As we know, we normally set-up fence for agricultural field to prevent the entry of wild animal's which is prohibited. In some cases, we set-up electric fence to avoid the entry of animals which results in loss of animal lives. Beehives are placed along the border and due to this, animals fear of bee stings and sounds and leave the place when sound of bees is heard (Sheela et al. 2016, Srinivasa Reddy Gudibandi et al. 2015) In the available system, towers are constructed to place the PIR sensors to monitor the animal's movement and humans are needed to monitor it regularly.

i) Significance of the system

To avoid the conflict between the intruder and farmers in the field from accident. Safe and efficient operation is ensured. The Presence of operator in the area is not necessary. Wide range of survey is possible.

RESULT AND DISCUSSION

PROPOSED ASSISTIVE SYSTEM

In this paper, drone with camera, GPS, GSM which are interfaced with a microcontroller through phone is used. GPS is used to navigate the drone in the required path. GSM is used to transfer the image taken by the camera to server through internet for image processing. After identifying the intrusion ultrasonic sound wave of frequency 4 KHz is generated to chase-off the peacock. A microcontroller in interfaced with the mobile phone through Bluetooth link. A PIR sensor and the transducer are connected to the microcontroller. The application running in the mobile phone sends the co-ordinates to the microcontroller and captures the image with the inbuilt camera which is sent to the server through internet for image processing. The schematic diagram for the proposed system is shown in Figure 1.

Figure 2 shows the circuit diagram to operate the drone. Here PIC microcontroller is used to do the necessary control actions of the drone.

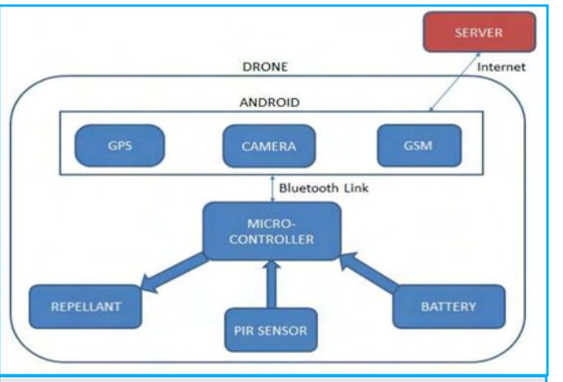

Figure 1. Schematic diagram of proposed system

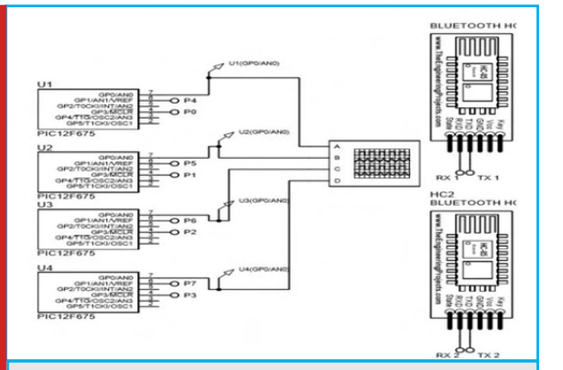

Figure 2. Drone system circuit diagram

Figure 3 represents the circuit diagram for detecting intruder and repels system. PIR sensor is used to detect the intruder and ultrasonic transducers are used to generate the ultrasonic waves to repel the intruder.

EXPERIMENTAL SETUP

The drone is in surveillance, when any intrusion (Movement) can be sensed using PIR sensor and image is captured using camera. The captured image is sent to server by use of internet. By make use of image the server identifies what kind of intruder is. After identifying the intruder ultrasound waves are generated to chase-off the intruder (Peacock). PIC Microcontroller is used to control the quadcopter by seamlessly getting the coordinates from the android mobile gyroscope with an update rate of 5ms. Then a suitable algorithm is used to keep the drone in balanced condition for surveillance by adjusting the PWM pulse given to ESC which varies the thrust of each motor accordingly. The PIR Sensor triggers the input pin of the MC when a living thing comes into its field of view. The MC sends a command to android application through Bluetooth to capture the image of the intruder from the camera. Then the application sends the image to the image processing server through internet with the help of inter-

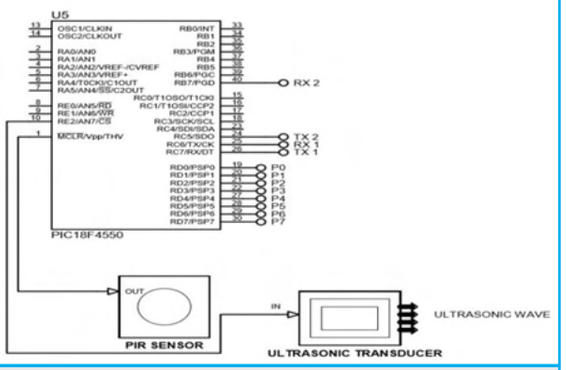

Figure 3. Circuit Diagram for intruder detection and repellent system

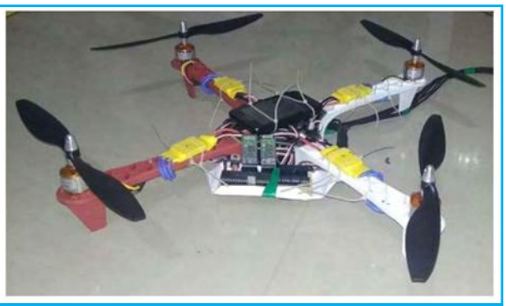

Figure 4. Drone hardware setup

nal GSM modem and waits for the response information which contains the kind of intruder. The Microcontroller generates ultrasonic sound waves using SR-04 transmitter at 4KHZ. 20 Here four PIC12F675 Microcontrollers are used as slave to generate suitable PWM signal based on the command of the master then it is given to the ESC's of the motors. The android application serves the location details to the MC through Bluetooth which is used for navigating the drone. Bluetooth is used for establishing the communication between MC and Android Mobile at a speed of 115200 Baud (bits/sec) which makes us easier to communicate. Android application was developed by Android Studio.

CONCLUSION

The proposed project peacock monitoring and repellent system was designed and implemented as prototype. Through the proposed system surveying land area can be increased and effective surveillance is achieved. Surveying time can be increased by increasing the power backup. This method does not affect the environment and bird's life. Thus, increases crop productivity.

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