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A Survey on Internet of Things (IoT) Applications and Challenges for Smart Healthcare and Farming

Rakesh Kumar Saini[1,3] Anil Kumar Dahiya[2] and Priyanka Dahiya[3]

[1,3]*Department of Computer Application, DIT University, Dehradun Uttarakhand, India*

[2]*Department of Information Technology, DIT University, Dehradun Uttarakhand, India*

ABSTRACT

Nowadays Internet of Things (IoT) succeed a great attention from investigators, after all it becomes a big automation that contract a smart body being life, by allowing a means between article, machines and everything constant with persons. The Internet of Things (IoT) is a logically connected device and system which is composed of smart machines combined and communicating with other machines. Internet of Things have wide applications in agreement to bring immense value into our life. This paper focuses on Internet of things and their applications and challenges in certain areas of life sciences like environment, health and agriculture. In this paper we have presented how smart health care, environment and agriculture fields are benefitted from Internet of Thing structures..

KEY WORDS: IOT APPLICATIONS, SMART ENVIRONMENT, HEALTHCARE AND FARMING.

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INTRODUCTION

Internet of Things is a system of computing devices that are connected from each other. These computing devices should be power-driven as well as digital machines and these computing devices can transfer data over a network deprived of demanding human-to-human or human-to-computer communication. In IoT, Statistics transmission between one computing devices to another calculating device without personal communication. Essentially Internet of Things IoT strategies consist web-enabled smart devices and these devices made by surrounded processors, sensors and hardware (Tubaishat, 2018 Magsi et al 2018). These devices can communicate with each other, including those which can transfer data in distributed environments. The IoT helps people live and work smarter as well as have far reaching improvements. Internet of Things is must for employment as it conveys productions with an immediate look into how the companies' systems actually work effectively, distributing perceptions into all from the achievement of apparatus to stock chain and coordination actions, (Simitha et al. 2019).

Internet of Things is a class of software application program for action authority, the gathering of data in real time from remote locations to control apparatus and conditions. In 2008 the Internet of Things was born and in 2011 the market research company Gartner, included "The Internet of Things" technology in their research. Internet of Things is one of the biggest technologies of normal life. Internet of Things (IoT) is very useful for our daily life for example, smart toilet balances working in tandem with treadmill, delivering food preparation ideas to laptops or smartphone to make people healthy, (Zorzi et al 2017 Magsi et al 2019). Security devices monitoring homes, turning lights on and off as one enters and exits rooms. It helps and controls streaming of videos so one can check in while he is away. Clever estimation assistants engaging ones traditional ready-to-wears, order on command, making it a breeze to get fresh nutrition transported to ones entrance (Anggorojati et al 2012).The Internet of Things has many characteristics such as-

1. Internet of Things save time and money
2. Internet of Things can display occupational process
3. By using IoT users can access data from anywhere any time
4. Provide fast communication between connected devices
5. Improve quality of business
6. IoT provide high security
7. By using IoT users can take better decision for good business

The Internet of Things (Iot) Model: The Internet of Things is a device of connected manipulative methods, motorized and virtual machines, objects, animals or people which are well-found with exact dependent on and the competence to switch facts over a network without stressful human-to-human or human-to-pc interaction, (Xiao et al., 2014 and Xiao and Wang 2014 Magsi et al 2019). IoT devices are part of the advanced concept of home automation that can consist of lights, heating and air condition media and safety structures. Enduring assistances ought to consist of enthusiasm sources by means of frequently assure streamers and microelectronics are exaggerate (Magsi et al., 2019).

Process of Internet of Things: The Internet of Things movement twitches with the system like smartphones, smartwatches, digital applications like TV, Washing Machine which assist you to transmission with the Internet of Things floor (Lee, 2014 Razzak et al., 2017). There are 4 component of Internet of Things.

Sensors/Devices: Sensors or devices are a key element that recommendation you to acquire animate Statistics from the connecting weather. All this facts may also have destructive elevation of complication. It will be a simple temperature monitoring sensor, or it may be inside the form of the video corn.

Connectivity: All the imperturbable information is dispatched to a cloud base. The sensors have to be related to the cloud the usage of innumerable channel of transportations. These connection channel embody mobile or restraint networks, Bluetooth, WI-FI, WAN, and so forth.

Data Processing: Once that information is accidental, and it converts to the cloud, the software program convey approximately relate at the amassed data. This trade may be neutral inspection the infection, analyzing on techniques

like AC or reservoirs. However, it can every now and then also be very multipart like recollect materials, using pc estimation on cinematic.

User Interface: The cloth request to be appropriate to the end-user in a few resources which may be entire by harvest seizures on their earphones or sending them statement thru e-mail or textual content message. The consumer irregularly power need a border which unaffectedly audit their IOT machine. For instance, the person has a digital camera properly-appointed in his domestic. He desires to get admission to video broadcasting and all of the barley with the assist of an internet server.

Applications of Iot: There are some popular applications of Internet of Things:

1. Smart City
2. Smart Grids
3. Industrial Internet
4. Smart Retail
5. Smart Farming
6. Pharmaceutical
7. Insurance

Smart City: The Internet of Things attack new user-friendliness for cities to use data to charge gridlock, cut pollution, make improvement use of base and keep native perfect. Cities are energetic important advance, transporting primary challenge as they seek to continue viable, active and harmless credit for people to invigorate and work, (Zorzi et al., 2017).

Smart Grids: Smart community technology has the strength to prepare these days' towns for the following day's needs. With more than half of the arena's communal fixed in municipal centers, cities will want to research new suitability, solutions and structures to hold fabric walking for its humans, industries, and administrations.

Industrial Internet: The Engineering Internet is the combination and mixing of massive statistics, effective equipment and wireless networks with physical and modern-day fixtures, or contrariwise applying meta-stage networking achievement, to allotted systems.

Smart Retail: Today, peddle stores are automatically focusing on leveraging the attained mechanizations like cloud computing, mobiles, beacons, etc., to provide connected marketing services and better spending action to customers. For example, store holders are associate sensors in the key area of retail stores and connecting them to cloud through an appearance that donation real-time data examination related to products, sales, and customers from these sensors, (Kumar et al 2014).

Smart Farming: IoT based Smart Farming improves the entire Agriculture system by monitoring the field in real-time. With the help of sensors and interconnectivity, the Internet of Things in Agriculture has not only saved the time of the farmers but has also reduced the extravagant use of resources such as Water and Electricity. It keeps various factors like humidity, temperature, soil etc. under check and gives a crystal clear real-time observation.

Pharmaceutical: The pharmaceutical business is totally situated to enjoy the benefits of industrial IoT technologies. Between the manufacturing plants, supply chains, delivery routes and, of course, the patients themselves, there are many sources of data out there and an increasingly broad selection of tools for taking advantage of them (Castrucci et al 2012 Kumar and Patel 2014). Patients, medication businesses and supply chain operatives all have a lot to gain from compliant the IoT on a larger scale.

Insurance: Internet of Things (IoT) technologies enable insurance corporations to regulate hazards more exactly. Auto insurers, for example, have traditionally relied on indirect indicators, such as the age, address, and comfort of a driver, when setting premiums. Now, data on driver behavior and the use of a vehicle, such as how fast the vehicle is driven and how often it is driven at night, are available. Applications of such technology in countries where the market is already much more mature reveal that insurers can assess risk far more accurately this way. Networked devices also allow insurers to interact with their customers more frequently and to offer new services based on the data they have collected. In the insurance sector in particular, customers often engage exclusively with agents or brokers; direct customer contact has been limited to contract extensions and the handling of insurance claims.

Internet of Things Devices: Internet of Things can connect devices implanted in numerous systems to the internet. When devices/objects can signify themselves digitally, they can be

controlled from anywhere. The connectivity then helps us capture more data from more places, ensuring more ways of increasing effectiveness and refining protection and Internet of Things safety (Vignesh 2017). Internet of Things devices are basically smart devices which have support for internet connectivity and are able to interact with the other devices over the internet and grant isolated access to a user for supervision the device as per their essential. These IoT devices are purely integrated with high definition technology which makes it possible for them to communicate or interact over the internet smoothly and can also be managed and controlled remotely when required. Approximately there are around 7.62 billion humans on our planet, but to your surprise, by the year 2021 with an increasing graph of IoT devices, there may be around 20 billion IoT smart devices up and running with an increase in the demand of 5g network.

There are several top devices in the market. Smart Mobiles, smart fridge-freezers, smart watches, smart fire alarm, smart door lock, smart motorbike, medical sensors, fitness trackers, smart security system etc., are few examples of IoT products. For example, a user reaches home and his car communicates with the garage to open the door. Once inside, the thermostat is previously familiar to his preferred infection, and the lighting is set to a lower intensity and his chosen color for relaxation, as his pacemaker data indicates it has been a stressful day (De et al. 2011 Gubbi et al 2013, Lee et al 2014 Hossain et al 2015, Xhiao and Wang 2014 Magsi et al 2918).

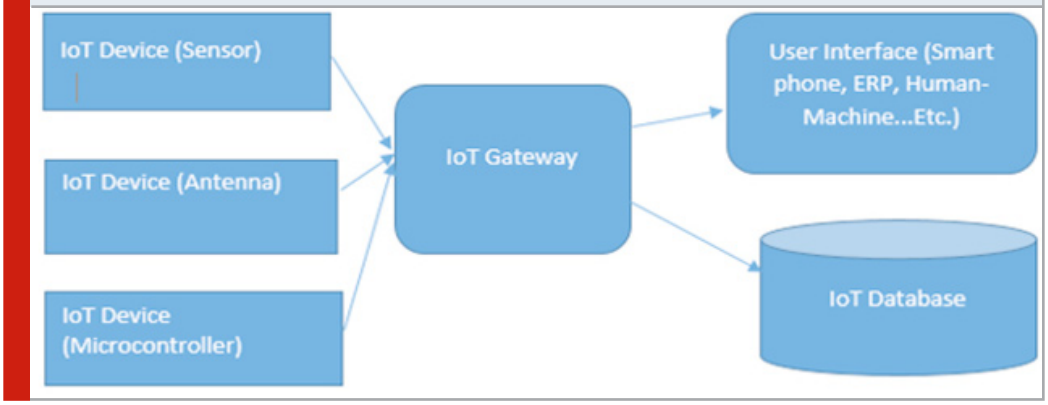
The networking, communication and connectivity protocols used with internet-enabled devices principally depend on the unambiguous IoT application deployed (Kovalchuk et al., 2019). Just as there are many different IoT applications, there are many different connectivity and transportations possibilities. Communications protocols contain CoAP, DTLS and MQTT, among others. Wireless protocols include IPv6, LPWAN, Zigbee, Bluetooth Low Energy, Z-Wave, RFID and NFC. Cellular, satellite, Wi-Fi and Ethernet can also be used. A number of challenges can hinder the successful deployment of an IoT system and its connected devices, including security, interoperability, power/processing capabilities, scalability and availability. Many of these can be addressed with IoT device management either by adopting standard protocols or using services offered by a vendor.

Internet of Things Standards:
There are some standards of Internet of Things LiteOS: LiteOS is a Unix-like operating device for Wi-Fi sensor networks. LiteOS cares smartphones, wearables, shrewd production applications, clever homes and Internet of Vehicles (IoV). The operating machine also serves as a smart device improvement platform.

6LoWPAN (IPv6 over Low-Power Wireless Personal Area Networks): 6LoWPAN is an open standard defined via the Internet Engineering Task Force (IETF) (Xhiao and Wang 2014). The 6LoWPAN general permits any low-strength radio to communicate to the internet, such as 804.15. Four, Bluetooth Low Energy and Z-Wave (for home automation).

ZigBee0: ZigBee0 is a low-strength, low information-fee Wi-Fi network used in particular

Figure 1. Internet of Things (IOT) Model



in industrial settings. ZigBee is primarily based on based totally the IEEE 802.15.Four standard (Zorzi, et al., 2017 Li et al 2018). The ZigBee Alliance created Dotdot, the commonplace language for IoT that permits smart gadgets to work securely on any network and apprehend each other.

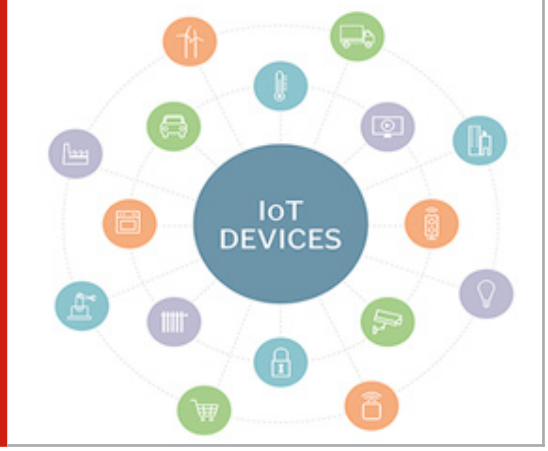
OneM2M: OneM2M is a machine-to-machine service layer that can be embedded in software and hardware to connect devices. The global standardization body, OneM2M, was created to develop reusable standards to enable IoT applications across different verticals to communicate (Kumar and Patel 2014).

DDS (Data Distribution Service): DDS (Data Distribution Service) changed into evolved via the Object Management Group (OMG) and is an IoT well known for real-time, scalable and high-performance machine-to-device verbal exchange.

AMQP (Advanced Message Queuing Protocol): AMQP is an open source posted general for asynchronous messaging by twine. AMQP permits encrypted and interoperable messaging among organizations and applications. The protocol is used in patron/server messaging and in IoT tool control, (Neisse et al.. (2014) Mohan et al 2014 Kovalchuk et al., 2019).

CoAP (Constrained Application Protocol): CoAP is a technique deliberate by the IETF that has the same opinion how low-strength calculate-uncommon approaches can stimulate within the net of things. LoRaWAN (Long Range Wide Area Network): LoRaWAN is a protocol for wide location networks, it's planned to sustenance huge networks, including smart towns, with hundreds of low-power techniques.

Figure 2. Internet of Things (IOT) Devices



Internet of Things in Agriculture: Agriculture plays an essential function in manufacturing and for livelihood. The Internet of Things has the ability to convert the ways we stay in the global. We have extra-efficient industries, greater related automobiles, and smarter towns, a lot of these as additives of an integrated Internet of Things device. Smart farming via the usage of Internet of Things technologies will help farmers to lessen generated wastes and enhance productivity. That can come from the quantity of fertilizer that has been utilized to the wide variety of journeys the farm automobiles have made. So, clever farming is basically a hello-tech device of developing food this is smooth and is sustainable for the masses (Anggorojati et al., 2012; 2014 Magsi et al 2018 Li et al., 2018).

It is the induction in addition to the utility of modern-day ICT (Information and Communication Technologies) into agriculture. The use of IT and objects like sensors, self-sufficient automobiles, automated hardware, manipulate structures, robotics, and so forth on this method are key components, (Chen et al., 2014 Kumar et al.2014, Kumar 2017). IoT applications help farmers to collect data regarding the location, well-being, and health of their cattle. This information helps them in identifying the condition of their livestock. Such as, finding animals that are sick so, that they can separate from the herd, preventing the spread of the disease to the entire cattle. The feasibility of ranchers to locate their cattle with the help of IoT based sensors helps in bringing down labor costs by a substantial amount.

CONCLUSON

Internet of things (IoT) is a new expertise which adds many utilities to connect the things and human beings through the internet. Internet of things can afford some elegant attractive applications in making healthcare, transportation, insurance and agriculture work more efficiently. However, various factors like security, privacy and data storage also need to be considered. Though Internet of Things can improve the product, but

associated security problems have also to be considered.

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