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CHALLENGES AND ISSUES OF HEALTHCARE IN INTERNET OF THINGS (IOT)

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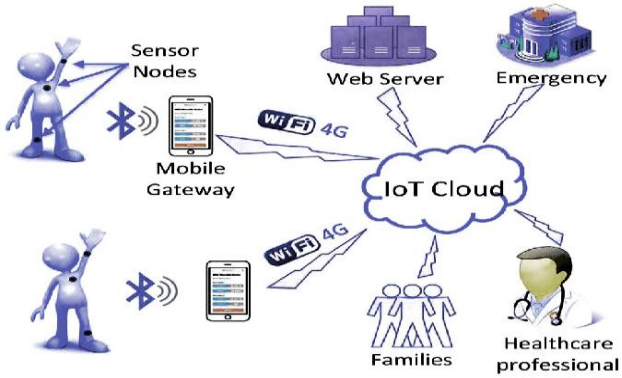
Abstract- IoT is a communication network connecting things which have naming, sensing and processing abilities. IoT connects all people to collect the information from the environment then send to the internet and transforms information from the physical world into the digital world. The IoT has a variety of application domains like health care, smart home, connected cars, Industrial Internet, Agriculture, Smart Cities, Smart Retail, Energy Engagement, Poultry and Forming ete. Moreover, there is an increasing consciousness and engagement of people with regards to their health, healthcare expenditure reduction remains a main goal, along with better quality care. IoT in healthcare is aimed at empowering people to live healthier life by wearing connected devices. This paper presents few applications of IoT in rural healthcare and ways to improve primary health needs of the developing nations and technology used in IoT.

1. INTRODUCTION

Internet of Things has played a particular role in improving the quality of life. Internet of things is an ever growing network of smart objects connected to each other through the internet. The various application of Internet of Things includes smart healthcare, smart cities, automation in industries, agriculture, transportation where decision making is tough.

The sensing devices and objects in IoT sense and collect relevant information which later on can be processed, analyzed for better decision making. Thus allows the physical devices in real-world to connect together to send with computation based performance. Hence, IoT is an establishing network of smart devices, actuators, smart phones and objects connected with processors low on memory and connected to the network to collect and exchange information to useless liked services. IoT allows various dynamic applications connecting machine-to-machine, sensor-to-device, patient-to devices [1], and patient-to-doctor and device-to-doctor communications. The healthcare IoT have many applications including remote monitoring [3], early prevention, chronic disease management, elderly care, medical treatment for institutionalized patients etc. It allows us to establish intelligent connections assuring an effective healthcare system. But we faces some critical issues such as security and privacy that are the key issues of concern for IoT applications.

Fig.1.shown the IoT platform. Using this system architecture, patients' body parameters can be measure in real time. Sensors collects patients body parameters and transfers that data to Arduino Uno which further transfer that data to cloud with the help of WiFI module. This data is stored into MySql database server which manages data and provides accessibility. User can



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view this data with the help of Android App. Which one can install in Smart phone, Tablet or PC. [4]

Figure 1. IoT healthcare

The sensing devices may be wearable, fixed or the sensors present in the nearby environment are connected to the internet from where the doctors or concern authorities can provide effective and timely medication to the patients. If data is abnormal then patient gets notification also the concern authorities will get notifications. With the help of different decision making algorithms. decisions can be made and according to this people have access to database. Patient can check their medical record so this system gives a Quality Health Care to everyone and particularly patients.

Health is fundament need. and it is human right to get quality Health Care. Nowadays India is facing many health issues because of less resource. The huge data would generated by the Internet. that are considered high business values, and data analytics and data mining algorithms can be applied to IoT to extract hidden information from data. Still we pose some challenging issues such as security and privacy that are the key issues of concern for IoT applications.

This paper presents the idea of solving health issues using latest technology [2]. The rest of the paper is organized as follows. IoT Challenges are explained in section II. In Section III described what are the technology is used in IoT. Finally concludes this paper in section IV.

2. IOT CHALLENGES

2.1 Real-Time Location System (RTLS)

In healthcare, a Real-Time Location System (RTLS) is a system used to gives a quick or real-time tracking and management of medical equipment, staff and all types of patients care environments.While the technology different from using location data captured by satellite trilateration, it can be thought of as a type of "indoor GPS" for hospitals.Now, by using the real time location services in health care user can have access to the database and can view the data. In this method the user can view the data from the data base by using Android apps which is written in JAVA language in anytime and anywhere. This app can be installed in any Android mobiles, tablet, PC and laptop. In this system if data is abnormal then notifications will goes to user mobile and also notification can be deliver to the concern authorities or health care providers.

2.2 Ubiquitous Video Cameras

Video cameras that are always on or frequently on are Increases in the Internet of Things (IoT). A 2013 survey in the U.K. estimated one surveillance camera in a public space for every 11 people [5]. By 2012, virtually every automobile in Russia had a video camera on its dashboard to record incidents for insurance purposes Body-worn cameras are increasingly common in police forces. Extrapolating from these trends, the report of the 2013 NSF Workshop on Future Directions in Wireless Networking predicts. [6] that "It will soon be possible to find a camera on every human body, in every room, on every street, and in every vehicle."

The video captured by these cameras is normally stored on local storage, close to the point of capture. It is examined only in response to some shocking event such as a vehicular accident, a burglary, an accusation of police brutality, or a terrorist attack. Without ever being examined, most data is overwritten to reclaim space after a modest retention period. Still we pose some challenging issues such as memory, redundancy, and security. The richness of high-resolution video content and deep video analytics make vision-based sensing especially attractive.

2.3 Edge-Based Video Analytics

Video analytics is generally played in the cloud today. Using Netflix's estimate of 3 GB per hour of HD video, one video stream demands nearly 6.8 Mbps .Even upgrading to a 1 Tbps MAN will only support 150,000 video cameras. If Supporting a million cameras (one per home in a large city) will require nearly 7 Tbps. import all videos to the cloud is clearly un measurable.Our solution is to process video close to the cameras, These have excellent network connectivity to associated cameras, sufficient compute power to perform video analytics, and required storage to preserve video at full fidelity for a significant retention period before being overwritten .Extended retention permits retrospective search of captured video.3 GB for an hour of HD video, a single 4 TB disk that costs about $100 today could hold over 50 days of video from one camera. Only the results of video analytics (e.g., index terms and metadata such as cloudlets id and timestamp) are shipped to a global catalog in the cloud. Based on popularity and importance, small segments of full-fidelity video could also be shipped to the cloud for long-term archiving.

So from this part B and C we can see how the world will go towards the updated technologies. from this video data collections or video cameras specialities we can easily monitoring the peoples. Especially we identified who need a medical helps like such road accidents, or attacked by physical health in lonely places.so that and also for a IoT growing the each and every peoples will be covered by one camera in future.

2.4 PACU(Post-Anaesthesia Care Unit)

Morphine used by titration in the post-anaesthesia care unit (PACU). It is regularly the first step in after the surgery pain management. This approach provides quick analgesia but shows a wide inter-individual variability in morphine requirements and may extend patient stay in the PACU. The aim of this study was to identify the patient characteristics, surgical, anaesthetic, and after the surgery factors predictive of early morphine requirements.[7].

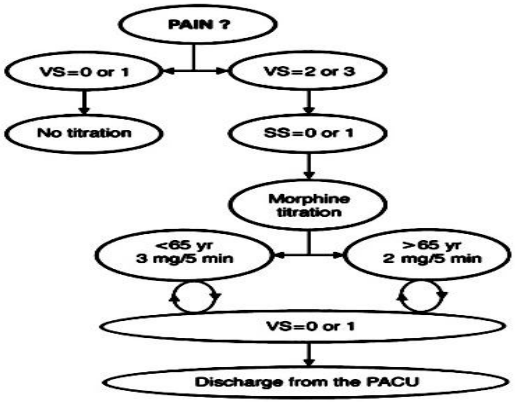


Figure 2 . PACU

3.5 Hand Hygiene Compliance

There are some hand hygiene monitoring systems that would detect the degree of cleanliness in a healthcare worker like nurses and ward boys . The centre of Disease control and Prevention in USA would said that one patient out of every 20 get a infections from lack of proper hand hygienic in hospitals. Many patients lose their lives as result of hospital acquired infections. The interactions in the hand hygiene monitoring systems are done in real time and if there is any clinician comes near to a patient's bed without washing their hands, the device would start buzzing. And also, The information about the healthcare worker, and his ID, time and location will all be fed into a database and this information would send to the concerned authorities.so use of the smart wearable devices we can set this type of system with help of internet of things.

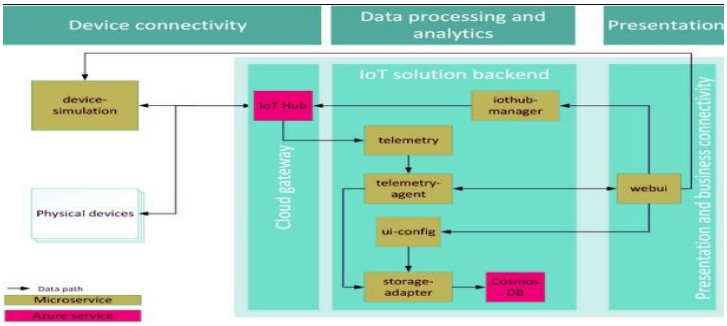
3.6 Tighten Budgets and Improve Patient Journey

The healthcare industry is must to watchful eye on the budgets because its necessary one and at the same time have updated quality of infrastructure to give better experiences to the patient. The seamless connection between devices that IoT has made possible, it is now possible for the medical staff to access patient information from the cloud. [8]

Figure 3.Tighten Budgets and Improve Patient Journey

IoT provides better patient journey by:

- ✓ Room lighting through personal control generate less electricity.



- ✓ Communicate to family and friends through email services for reduces the transport services.
- ✓ Immediate attention to patient needs.

3.7 Remote Monitorning

We can give a required health care to the peoples who are in dire need of help by use of remote monitoring. Every day, more peoples are die because they didn't get a help or medical service within the correct time. If There is any changes are found in peoples body the concerned authorities will get a notification whether he is a family doctor or nearest hospitals or his family members with the help of IoT connected wearable devices fitted with sensors. These devices would be capable of applying complex algorithms and analyzing them. Figure 4. Shown the Remote monitoring System for health providers. These monitoring devices are available in the form of "wearables" too.[9]

Figure 4.Remote Monitoring

3.8 The Internet OF m-Health Things (m-IoT)

m-health is communication technologies for healthcare services like a mobile computing, medical sensors. In theory part , m-IoT known as novel healthcare connectivity model that connects the 6LoWPAN with evolving 4G networks for future internet-based m-health services. Although m-IoT usually represents the IoT for healthcare services, it is worth mentioning that there exist some specific features nature to the global mobility of participating companies . This leads to the creation of concept of m-IoT services. Its examined the use of m-IoT based on the potential of m-IoT for the non penetrable sensing of the glucose level . The two main different challenges in m-IoT services are context awere issues and m-IoT ecosystems. A system for message-exchange based mobility is introduced, but its low network power consumption is not verified.

4. IOT HEALTHCARE TECHNOLOGIES

There are many enabling technologies for IoT-based healthcare solutions, and therefore it is difficult to prepare an explicit list. In this regard, the discussion focuses on several core technologies that have the potential to revolutionize IoT-based healthcare services.

4.1 cloud computing

The Cloud and IoT are the two important worlds and it have seen an independent evolution. Whatever its happened, several mutual advantages deriving from their integration have been identified in literature and are predicting in the future. On the one hand, IoT can benefit from the virtually unlimited capabilities and resources of Cloud to compensate its technological constraints (e.g., storage, processing, energy).[11]. The IoT-based healthcare technologies includes the integration of cloud computing must provide facilities with present everywhere access to shared resources, offering services upon on request over the network and executing operations to meet various needs.[12]

4.2 Grid Computing

The medical sensor nodes have insufficient computational capability. Then it can be addressed by introducing grid computing to the ubiquitous healthcare network.To introduced Grid computing, more accurately a same things computing, can be viewed as the important backbone of cloud computing.[12]

4.3 Big Data

The Big data can include huge amounts of essential health data generated from different medical sensors and provide tools for increasing the efficiency of relevant health diagnosis and monitoring methods and stages. we can draw this method is robust to many kinds of watermark images.

4.4 Networks

There are many networks ranging from networks for short range communications (e.g., WPANs, WBANs, WLANs, and these are 6LoWPANs, and WSNs) to long-range communications(e.g., any type of cellular network). The long range communications are part of the physical infrastructure of the IoT-based healthcare network. In addition, the employment of ultra-wideband (UWB), BLE,NFC, and RFID technologies can help design low-power medical sensor devices as well communications protocols. [10]

4.5 Ambient Intelligence

End users, clients, and customers in a healthcare network are humans beings (patients or health-conscious individuals), the application of ambient intelligence is crucial. Ambient intelligence allowed for the continuously learning and observing process of human behaviour and executes any needed action loaded by a recognized event. The integration of self control and human computer interaction (HCI) technologies into ambient intelligence can next increasing value the capability of IoT-aided healthcare services [13].

4.6 Augmented Reality

Being part of the IoT, Role of augmented reality key role in healthcare engineering For surgery and remote monitoring, Augmented reality is useful. Augmented reality is a basic visual and/or audio "overlay" on the physical world that uses contextualized digital information to augment the viewer's real-world. Augmented Reality -enabled smart glasses help warehouse workers fulfill orders with minute, airline manufacturers assemble planes, and also electrical workers make repairs [14]. Figure 5 represents the components of Augmented Reality.

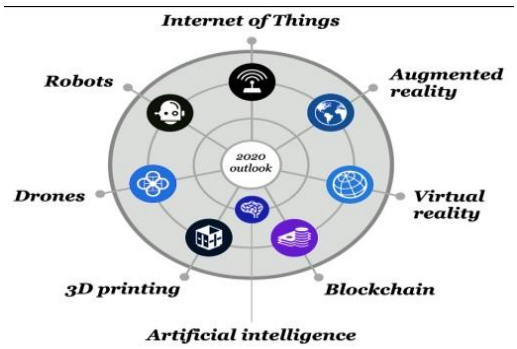


Figure 5. Augmented reality

4.7 Wearbles

In the Wearable device adoption has been on the rise within the mobile health sphere and this development has been revolutionizing remote monitoring and patient engagement across the medical care continuum. then,Chronic conditions like diabetes may be better monitored by physicians through the use of these types of wearable devices. Additionally, healthcare costs should decrease as wearable device adoption rises. For example, we're working with an HMO around a diabetes care monitoring program where their diabetes patients have Bluetooth-connected glucometers that are connected to an app that sits on a mobile device. That data is uploaded into the cloud and allows a nurse to monitor 250 diabetes patients at a time. That really points to an increase in convenience and an increase in the quality of care. [15]

5. CONCLUSION

In this paper we discussed about challenges of Internet of Things and technology used in IoT. IoT in healthcare is aimed at empowering people to live healthier life by wearing connected devices. The collected data will help in personalized analysis of an individual's health and provide tailor made strategies to combat illness. In this paper various technologies has been analyzed and this paper contains the few applications IoT in rural health care and ways to improve primary health needs of the developing nations.Healthcare IoT has the potential to greatly improve patient care but it's not without its challenges.

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