

APPLICATION OF IOT IN HEALTH-CARE

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Abstract:

Healthcare is one of the most critical area which is simplified by Internet of Things (IoT) these days. The miniaturization of sensors is able to gather the data and analyze this big data. The medical devices and resources can be connected to collect the data and process using IoT sensors. Medical requirements fulfilment seems to be a major challenge. The current conditions in the countries are calling for the remote healthcare solutions. People are preferring personal activity trackers and healthcare monitoring devices or wearables. The patient or person's data is being recorded and saved for continuous monitoring purposes. The data can be monitored remotely by the healthcare professionals to guide the patients or sometimes to save them from future health problems. The paper mentions that there is need to change the healthcare scenario from reactive to proactive and preventive. Benefits of using IoT in healthcare are also highlighted. IoT and Healthcare (IoHT) architecture is discussed with the three layers, Device layer, Fog layer and the Cloud layer. Also, the challenges in IoT healthcare ecosystem are mentioned in the Seminar which are to be resolved for the remote ubiquitous and pervasive patient monitoring supported by IoT.

Keywords - IOT Internet of thinks, Adriano, WI-Fi, Signal Conditioning unit (SCU)

I. INRODUCTION

The term "Internet of Things (IOT)" has recently become popular in communication technology. It has been developed in many ways and is called as the next frontier. IOT is set to transform many aspects of our lives, it changes our world. In the coming years, the number of IOT devices is expected to grow dramatically. The reach of IOT is more than 12 billion devices that can currently connect with Internet, but by 2020 it is estimated that there will be 26 times more connected things with the Internet than the people [1]. Today, everything around us from household lights and different home appliances to vending machines and cars has the ability to get online and interact with other machines. IOT refers to devices or objects that can interact with the Internet by making use of physical devices, sensors, microcontrollers, and network connectivity that enable these objects to collect and exchange data as shown in Figure 1. In order to collect the real time data consistently, each and every device has its unique identifier (UID), which makes the communication possible in an easy way like machine to machine (M2M) communication. A massive amount of data is collected from devices all over the world which is stored in the cloud. As a result, systems will become more efficient and smarter.

IOT creates smart objects which constitute eventual building blocks in the improvement of cyber-physical smart universal frameworks. It is intended for billions of physical things or objects that will be equipped with different kinds of sensors and actuators, that are joined by the Internet through diverse access networks assisted by different technologies such as wireless sensor networks (WSN), radio frequency identification (RFID), real time and semantic web services. IOT which allows the people seamless interactions among different types of devices such as medical sensors, monitoring cameras, home appliances and so on. By keeping all these things in view, we all know several applications which have been developed for IOT, in which each and every physical object is connected through the Internet by employing sensor devices. The communication is aided through the sensors installed into the participating devices. Sensors play a vital role in detecting signals. Sensors are now found in many applications, such as smart devices (mobile devices, tablets, etc.), automotive systems,

climate monitoring, industrial control and healthcare.

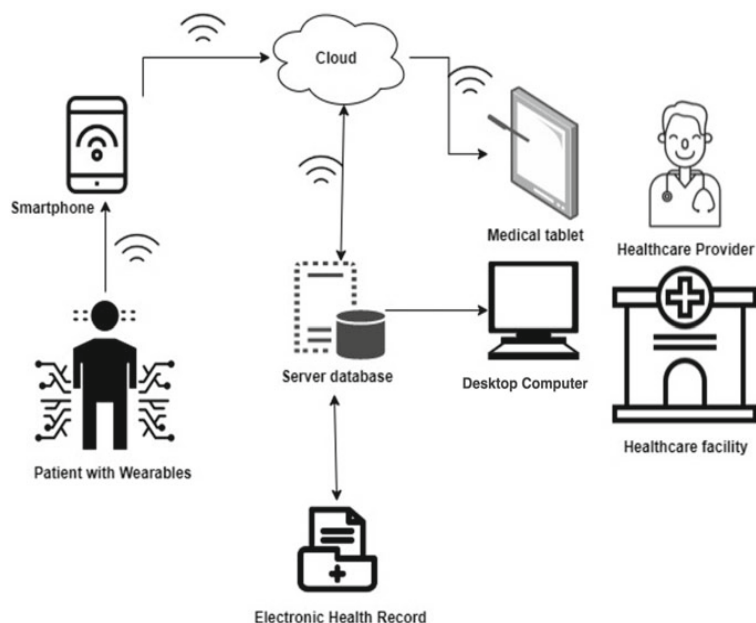
II. PROBLEM STATEMENT

Health support of each individual should be considered as very important in today's world because of a rise in many health problems. If there is an increase in the number of patients, then this leads to a decrease in the relative number of doctors. As a result, the diagnostics are delayed or some patients are ignored. This makes patients more dependent on doctors for their check-up. Keeping all these issues in mind, healthcare systems have started connecting with IOT for maintaining the digital identity of each and every patient. Due to no availability of doctors/caregivers and not being able to access the healthcare systems, many health problems are getting undetected in the healthcare system. On the other hand, these IOT based healthcare systems have helped the patients and doctors to continuously monitor and easily analyze the patient data. Infant healthcare is becoming a big problem today. The greatest fear of any parents is that they would lose their infant. Today the Sudden Infant Death Syndrome (SIDS) is a big problem. The most common reason for the sudden death of infants is that they are having trouble while they are breathing. This sudden death happens without giving any signs. It may happen when the infant is in deep sleep and also when the baby is crying or struggling with any other problem [14]. To avoid this problem, IOT has ensured the personalization of infant healthcare by maintaining the digital identity of infants each and every moment. By making use of IOT smart sensors, the infant health can be monitored, data can be collected, and realtime information of the infants each and every moment can be sent to their parents.

III. IOT AND HEALTH CARE

IOT and Healthcare Healthcare is one of the noblest areas of IOT application. Through IOT, doctors can help people through the Internet. Portable IOT-based health monitoring devices can significantly reduce the distance between the patient and the doctor. IOT allows you to approach each patient individually, analyze their health status, and calculate their individual treatment method. With portable sensors, doctors can remotely monitor patients' health and respond in real time. However, real-time metrics require an uninterrupted Internet connection. Although IOT in healthcare is developing quickly, still not in full use in some medical industries. The development of adequate Internet applications for traditional medicine still has some difficulties. With a significant increase in the number of medical research, the IOT will probably lead to attracting more of them in the coming years. Modern medical professionals are faced with the need for collecting a large amount of big data and their analysis and interpretation to make informed and personalized decisions. All that takes considerable effort and time. New technologies of the IOT can speed up and facilitate this process. In connection with the mass introduction of electronic registration of health, a growing amount of digitized medical data is seen. Fully viewing and assessment of all this information takes a lot of time. Furthermore, training the medical staff of the technology based on AI, that is very associated with the IOT, is needed as well [10]. Through coordinated actions of such digital technologies as the IOT and AI, doctors can better tailor treatment to patients' needs. With these technologies, it is possible to handle a much greater volume of information to store and analyze it in order to closely follow the progress of a particular disease or process. Skillfully combining practical personal experience with the possibilities of new methods of diagnosis, collection, and analysis will lead to positive changes in healthcare management. Introduces the concept of IOT in healthcare. Eventually, the IOT introduces network-enabled technologies, involving wearable and portable devices that can trigger, detect, synergize, and connect with other comparable media across the Internet.

The many uses of the systems and products that connect to the Internet of Things (IOT) are changing the healthcare field. Patients and providers both stand to benefit from IOT carving out a bigger presence in healthcare. Some uses of healthcare IOT are mobile medical applications or wearable devices that allow patients to capture their health data. Hospitals use IOT to keep tabs on the location of medical devices, personnel and patients. We list below some of technologies that can be applied to IOT-based healthcare systems.



IV. APPLICATION OF IOT IN HEALTH CARE

Blood Pressure Monitoring

Blood pressure (BP) is one of the most important physiological parameters of the human body. Safe and simple to use blood pressure monitors have become common. With the development in the healthcare system, the healthcare equipment/system is connected with an IOT device or sensors that make an easy communication between the patients and doctors/caregivers. An electronic blood pressure monitor is connected with the IOT sensor that collects the real-time information of the patient BP levels.

Rehabilitation System

A rehabilitation system can enhance and can restore the functional abilities and improves the quality of life for the people who are suffering with some disabilities in terms of mitigating problems that are linked with aging populations and when there is a shortage of health experts. There is a community-based smart rehabilitation system that provides an effective treatment. A convenient adequate interaction and allocation of medical resources according to patient requirements can be done by an ontology-based automating designing method connected with IOT-based smart rehabilitation system.

Oxygen Saturation Monitoring

The pulse oximeter is a device which continuously monitors the blood oxygen saturation of the patient in a noninvasive way [10]. There are many advances in the communication technology, i.e., wireless networks, and medical sensors are booming at present days because of the low power consumption and low loss. The continuous monitoring pulse oximeters are used in many medical applications to know the oxygen levels in blood and also the heart rate (HR). The IOT sensor which is connected to the patient body will monitor and sense the patient's heart rate and oxygen levels, which can limit the patient activity.

Wheelchair Management

Wheelchairs are used by the people who are suffering with a physical illness and they cannot walk or any other physical disabilities. Wireless body area networks (WBANs) can connect smart objects with the Internet, to be used as a people-centric sensing (sensor) device for wheelchair users. There will be pressure cushion (which is a resistive pressure sensor) that will detect when the human body is falling down from the wheelchair. A smart wheelchair has another accelerator sensor which detects the falling of the wheelchair. The doctor/caregiver can continuously monitor the patient's data from the hospital.

IOT in Healthcare for Babies and Infants

For parents, nothing is more important than keeping their baby happy and healthy. Babies cannot speak and tell if they are hungry or if it feels like hot, cold, and sleepy. Now, IOT wearables can make

all the difference. IOT has now been developed for babies and infants to help their parents. Parents can monitor their infant's health wirelessly (for example via Bluetooth technology), there are many IOT wearables, devices and smart sensors which can continuously monitor the baby's/infants vital signs and send that data directly to a mobile device. An infant monitor can collect data and send real-time information of the infants each and every moment.

V. CONCLUSION

The Internet of Things changed the healthcare industry, increasing efficiency, lowering costs and putting the focus back on better patient care. Meanwhile, the IOT is growing from building blocks of automation and machine-to-machine communication to the smallest sensors. We consider also how IOT can be used to increase healthcare and how IOT helps people and governments to improve daily activities in personal and public level. Although there are security issues in giving location information, we can give some permission to people in order to allow mechanisms to prevent people from abusing. Yet there are a lot of remaining works to be done in order to make the best use of this IOT technology. We need to grow these applications in the future until the desired level of health comes in society

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