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IoT Based Healthcare Applications

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ABSTRACT: Nowadays, Internet of Things (IoT) is becoming more and more popular around the world. It is the network of physical objects or things which are embedded with electronics, software, sensors that can be used to achieve greater value and service by exchanging data. There are many fields where IoT plays vital role. One of the important domains of IoT applications is healthcare. Healthcare is defined as the maintenance of health via treatment and prevention from any disease or disorder which are delivered by health professionals.

I. INTRODUCTION

The Internet of Things (IoT), refers to the billions of physical devices around the world which are connected to the internet for collecting and sharing data. Healthcare is defined as the maintenance of health via treatment and prevention from any disease or disorder which are delivered by health professionals. Before the advent of technologies, it was very difficult for the doctors and the patients to monitor patients' health continuously and make recommendations accordingly. The seminar will provide a detailed explanation, about the condition of healthcare and the problems and issues the society are facing in this field. The paper also focuses on the role of IoT in healthcare and how it helps in obtaining real time medical information about the patients. The Internet of Things is a system of interrelated devices and machines that has the ability to transfer data over a network. It consists of devices that uses embedded systems like sensors and processors to collect, send and act on the data. People can also interact with the devices like to set them up, to give instructions. It has the ability to access the information at anytime from anywhere. There are multiple branches in the industry where IoT is being implemented.

II. LITERATURE SURVEY

One of the most challenging goals of modern-day society is to improve the efficiency of healthcare infrastructure and biomedical systems. Other primary issue includes tackling with the nursing staff shortage problem and providing quality services and care to the patients reducing the healthcare cost. Procedures for patient monitoring, care management are supervised by the nursing staffs. But recent advancement in the Internet of Things technologies gives the opportunities in developing the smart systems to support and improve healthcare [1].

Some possible examples are automatic identification and tracking of people and devices in hospitals, real-time monitoring of patients. Healthcare is one of the basic needs to any human being. However, the physicians are not clear in terms of services and money with each and every patient. One of the main problem associated with the healthcare system is the lack of medical facilities and equipment to track the patient's history to provide the effective treatment. Therefore, it is necessary to improve the healthcare system to make it more efficient. To solve this problem a cloud computing based approach can also be used for integrating all the hospital records from large size to small size and thereby maintaining the patient's data under one roof. Internet of Things based health monitoring systems enable remote monitoring of patients, with applications in chronic conditions, such as obesity, hypertension, diabetes, heart failure, asthma, depression, elderly care support, preventive care etc. The IoT can play a significant role in improving the health of the people by increasing the availability of services, quality of care, reducing the treatment costs and travel. The IoT-driven healthcare system employs networked sensors to simultaneously collect multiple signals and wireless connectivity to share the data [2].

A system is designed to continuously monitor the Electrocardiogram using Raspberry Pi which is a credit card sized single board computer with microprocessor. This data is stored in a database and can be viewed in a website that can be accessed only by authorized person. The primary task of this system is to store and update the data in the database and alert the doctors in case of emergency. The designed system can have the future scope as the data gathered by monitoring the patients can be used for scientific research. The nature of disease or any disorder can be predicted and evaluated by determining the patterns observed in the parameters. Many algorithm are used to IoT based healthcare applications June 2020 Department of MCA, RVCE 5 accomplish this task. The system works in an automatic way for monitoring the ECG signals and other health parameters. Raspberry pi can be used for this application because of its

multi-tasking nature and low power consumption. Also it can be installed easily in all the hospitals where huge data obtained can be stored in the database. Raspberry Pi, with its various features can be used to serve several purposes having more scope in future. Even the results can be accessed from mobile application [3].

III. IOT BASED HEALTHCARE APPLICATIONS

According to the World Health Organization's 2000 World Health Report, the ranking of India's healthcare system is 112 out of 190 countries. In addition to this, there are wide gaps between the rural and urban populations. Approximately 70% of the population still lives in rural areas and has no or limited access to hospitals and clinics. Moreover, the rural population mostly relies on low quality medicine and government programmes in rural health clinics. The urban centres have numerous private hospitals and clinics which provide quality healthcare but due to high cost people find it difficult of having treatment there. Globally, the rate of deaths from non-communicable causes, such as heart disease, stroke, and injuries, is growing day by day. Poorly system design are unable to ensure safety and hygiene which can leads to high rates of hospital infections, along with medication errors. Healthcare system in other countries is better as there are the availability of better doctors and better medical equipment. But in India, still many places are there where there are no hospitals available and due to poorly designed system it is difficult for the people to monitor their health. People have to travel to other places for their treatments which cost more to them. So, it's important to focuses on IoT architecture for automatic monitoring and tracking of patients, personnel, and biomedical devices within hospitals and nursing institute. By determining the patterns in the parameters observed, the nature of disease can be predicted. The paper focuses on how the android application is used to send the patient's parameters to the server. It also helps the patient or their relatives to generate an alert in case of emergency. Health organization are facing several challenges related to ECG monitoring. At present ECG is monitored using wired technology with limited distance. This system can improve the ECG monitoring wirelessly as it does not require any physical connection. The application can be accessed globally through the Android Application. To solve all these problems IoT came into picture. It helps the people to monitor their health while sitting at home without wasting too much money in travelling and treatment.

IV. IMPLEMENTATION OF HEALTHCARE IN INDIA

India being a developing country which offers a lot of areas to be researched and to be worked upon as there are multiple fronts where the living of life is still in the phase full of complexity. Healthcare Sector is one of that critical zone sector where there is lot more of improvement is required with respect to patient treatment, tracking of patient after their discharge from hospital. The health care system in India is universal.

V. SOME OF THE PROBLEMS RELATED TO HEALTH SERVICES ARE

1. **Neglect of Rural Population:**

A serious issue of India's health service is the neglect of rural population. . There are large number of primary health care hospitals yet the health services are still dependent on the urban hospitals.

2. **Emphasis on Culture Method:**

The health system of India depends on western tools, technologies and facilities. It has no roots in the tradition of the people as it is mostly service based on urban hospitals. This has been at the cost of providing basic primary health care to all. It has completely neglected preventive, rehabilitative and public health measures.

3. **Inadequate Outlay for Health:**

According to the National Health Policy 2002, the Government contribution to health sector consists of only 0.9 percent of the GDP which is quite insufficient. In India, public expenditure on health is 17.3% while in China, it is 24.9% and in Sri Lanka and USA, it is 45.4 and 44.1 respectively. This is the main cause of low health standards and quality of life in the country.

4. Social Inequality: The growth of health facilities and medical equipment has been highly imbalanced and insufficient in India. Rural and remote areas of the country are under developed due to which they lack proper facility while in urban areas health facility is well developed. In some places the SC/ST and the poor people are far away from modern health service and facilities.

5. Shortage of Medical Personnel:

In India shortage of medical personnel like doctors, a nurse etc. is a basic problem in the health sector. In 1999-2000, while there were only 5.5 doctor in India, 25 in the USA and 20 in China. Similarly, the number of hospitals, clinics and dispensaries are insufficient in comparison to our huge population.

6. Medical Research:

Medical research in the country needs to be more focused on drugs and vaccines for diseases which are normally neglected by pharmaceutical companies. The National Health Policy 2002 suggests to allocate more funds and resources to improve medical research**.**

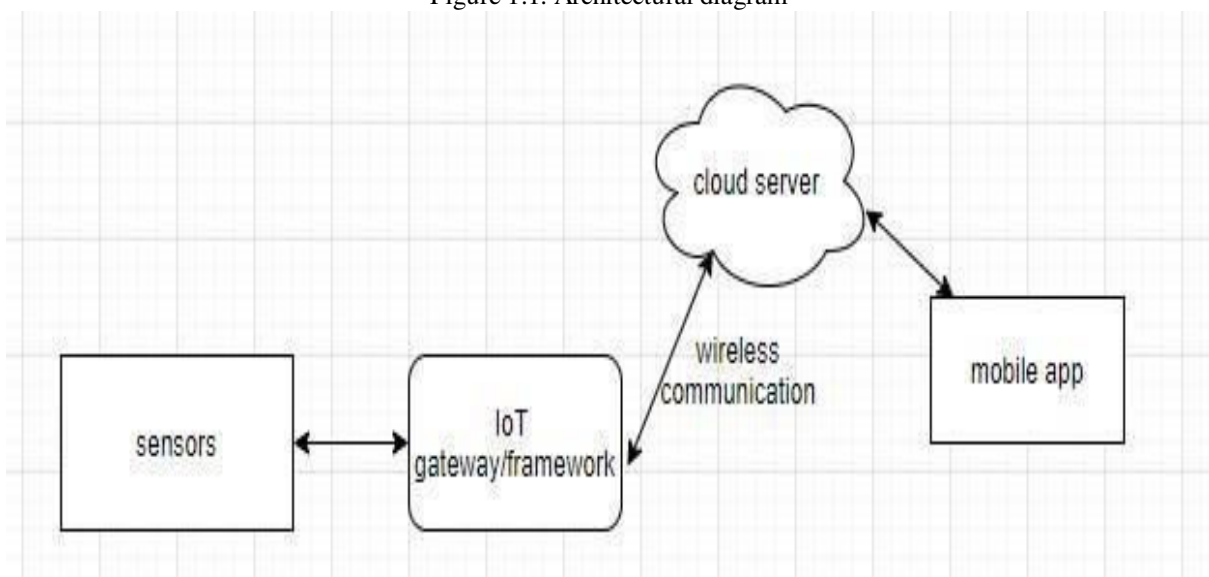## V. ARCHITECTURAL DIAGRAM:

Figure 1.1: Architectural diagram

Figure 1.1 clearly explains that, this project, involves the sensors which are used to monitor the patients' health conditions. Sensors like temperature sensor used to measure the body temperature of the patients, heartbeat sensor used to monitor the heartbeat rate of the patients, flex sensor used to measure the range of motion of the joints etc. All these sensors are connected to human body and the data gathered from these sensors are stored on the cloud. The patients or the doctors can see the status by using the mobile app.

VI. CONCLUSION

This proposed project helps the doctors to get aware about the patient's health condition anywhere and anytime. In this system IoT is used for fast communication and data transfer. This system is secure about the data transaction over the internet. Using this application data can be accessed globally and wirelessly. Implementation of devices like smart

watches or gears with the help of IoT is helping a lot in monitoring the patient's condition. There are such IoT devices which also does work like if a patient is in a serious situation the device automatically sends the location of the patient to the nearest hospital so that the patient can be treated accordingly and life can be saved. So, these interconnected devices are very much accurate in such situations of emergency too. The implementation of IoT and other techniques to improve the accuracy and response time with respect to the human activities to do a particular work. There are multiple sectors where IoT is being implemented but healthcare is something which requires accuracy but with time constraints because it deals with the life of the person. Delay in decision can lead to drastic outcomes which has proven itself as one of the important ingredients to be blended with the healthcare sector. There are multiple challenges while implementing IoT like security breach and many more, so this paper also tries to focus and put light on this area of research to tighten the security parameters so that this invention should do wonders in the area of healthcare like it is doing in other areas too. In the Healthcare arena, multiple doctors and fraternities don't even believe in blending IoT with healthcare as they believe that it can lead to drastic outcome and moreover it is unsecure. But there is also a part of people who believe in the implementation of IoT in Healthcare sector and they do believe that IoT will help the doctors to ease their work in treatment of patient.

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