REVIEW ON-IOT BASED SMART HEALTHCARE SYSTEM

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ABSTRACT
This paper focus on review of IoT based Smart Healthcare System. The main objective of this proposed system is to transmitting the patient’s health monitoring parameters through wireless communication. These input data are uploaded in cloud server and transmitted to the computer and mobile for family and doctor’s reference. Advances in information and communication technologies have lead to the emergence of Internet of Things (IoT). In the modern health care environment, the usage of IoT technologies brings convenience of physicians and patients, since they are applied to various medical areas (such as real-time monitoring, patient information management, and healthcare management). The body sensor network (BSN) technology is one of the core technologies of IoT developments in healthcare system, where a patient can be monitored using a collection of tiny powered and lightweight wireless sensor nodes. However, the development of this new technology in healthcare applications without considering security makes patient privacy vulnerable. In this paper, at first, we highlight the major security requirements in BSN-based modern healthcare system. Subsequently, we propose a secure IoT-based healthcare system using BSN, called BSN-Care, which can efficiently accomplish those requirements.

Key words: Internet of Things (IOT), Internet, Raspberry PI, Sensors, GUI.

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1. INTRODUCTION
In India, everyday many lives are affected because the patients are not timely and properly treated. Also for real time parameter values are not efficiently measured in clinic as well as in hospitals. Sometimes it becomes difficult for hospitals to frequently check patient’s conditions. Also continuous monitoring of ICU patients is not possible. To deal with these types of situations, our system is beneficial. Our system is designed to be used in hospitals for...
measuring and monitoring various parameters like temperature, ECG, heart beat etc. The results can be recorded using Raspberry Pi displayed on a LCD display. Also the results can be sent to server using GSM module. Doctors can login to a website and view those results. Health is one of the global challenges for humanity. In the last decade the healthcare has drawn considerable amount of attention. The prime goal was to develop a reliable patient monitoring system so that the healthcare professionals can monitor the patients, who are either hospitalized or executing their normal daily life activities. Recently, the patient monitoring systems is one of the major advancement because of its improved technology. Currently, there is need for a modernized approach. In the traditional approach the healthcare professionals play the major role. They need to visit the patient’s ward for necessary diagnosis and advising. There are two basic problems associated with this approach. Firstly, the healthcare professionals must be present on site of the patient all the time and secondly, the patient remains admitted in a hospital, bedside biomedical instruments, for a period of time. In order to solve these two problems, the patients are given knowledge and information about disease diagnosis and prevention. Secondly, a reliable and readily available patient monitoring system (PMS) is required. In order to improve the above condition, we can make use of technology in a smarter way. In recent years, health care sensors along with raspberry pi play a vital role. Wearable sensors are in contact with the human body and monitor his or her physiological parameters. We can buy variety of sensors in the market today such as ECG sensors, temperature sensors, pulse monitors etc. The cost of the sensors varies according to their size, flexibility and accuracy. The Raspberry Pi which is a cheap, flexible, fully customizable and programmable small computer board brings the advantages of a PC to the domain of sensor network.

2. LITERATURE SURVEY

Punit Gupta et al [1] the design and implementation of an IOT-based health monitoring system for emergency medical services which can demonstrate collection, integration, and interoperation of IoT data flexibly which can provide support to emergency medical services like Intensive Care Units(ICU), using a INTEL GALILEO 2ND generation development board. The proposed model enables users to improve health related risks and reduce healthcare costs by collecting, recording, analyzing and sharing large data streams in real time and efficiently.

Kasim M. Al-Aubidy et al [4] The main objective of this research is design and realization of real-time monitoring and alarming system for patient health, especially for patients suffering from diseases during their normal life. The proposed system has an embedded microcontroller connected to a set of medical sensors (related to the patient case) and a wireless communication module (Bluetooth). Each patient is considered as a node in a wireless sensor network and connected to a central node installed at the medical center through an internet connection. The embedded microcontroller checks if the patient health status is going well or not by analyzing the scanned medical signals. If the analysis results are abnormal, the embedded unit uses the patient's phone to transmit these signals directly to the medical center. In this case, the doctor will send medical advice to the patient to save his/her life.

Bhoomika B. K. et al [5] the PIC18F46K22 microcontroller is used as a gateway to communicate to the various sensors such as temperature sensor and pulse oximeter sensor. The microcontroller picks up the sensor data and sends it to the network through Wi-Fi. The controller is also connected with buzzer to alert the caretaker about variation in sensor output. The security issue is been addressed by transmitting the data through the password protected Wi-Fi module ESP8266 which will be encrypted by standard AES128 and the users/doctor
can access the data by logging to the html webpage. At the time of extremity situation alert message is sent to the doctor through GSM module connected to the controller.

2.1. Internet of Things
The IoT is used in healthcare domain to improve the quality of human life by assisting basic tasks that humans must perform through application. Sensors can be placed on health monitoring equipment used by patients. The information collected by these sensors is made available on the Internet to doctors, family members and other interested parties in order to improve treatment and responsiveness. Additionally, IoT devices can be used to monitor a patient’s current medicines and evaluate the risk of new medications in terms of allergic reactions and adverse interactions. With the use of sensors and the technology stated above we can track the person’s body temperature, heart beat rate, blood pressure, etc. In case of emergency, the individual and their personal doctor will be notified with all the data collected by the sensors. This system will be very useful to senior citizens and disabled people who live independently.

![Figure 1 Architecture of IOT](image)

3. PROPOSED SYSTEM
The proposed system consists using Raspberry pi microcontroller with Wireless Body Area Sensor Network. The sensors are used here Temperature sensor, Blood pressure sensor, Heart beat sensor. These sensors are placed on human body which are helps to monitor the health condition without disturbing the daily routine of the patients and these health related parameters are then communicated to physicians server using long range wireless technology.

3.1. Raspberry Pi 3
The digital signals from the PIC are received at the Raspberry pi. Raspberry pi cannot process analog signals. Raspberry pi does not have in built ADC so that analog signals from the sensors are converted into digital signal using PIC controller and then sent to the Raspberry pi. Raspberry pi send the received signals data to mobile devices through E-mail. The Raspberry Pi 3 is here to provide you with the same Pi as before but now with double the ram and a much faster processor. The credit-card sized computer is capable of many of the things that your desktop PC does, like spreadsheets, word-processing and playing high-definition video and games.
3.1.1. Why Raspberry Pi?
Raspberry Pi is a processor for use in many IoT applications. Raspberry Pi is based on Linux platform. The cost is also very low. The GPIO pins are used to connect between sensors and Raspberry Pi. Raspberry Pi and internet connection is a new innovative technology in healthcare systems. After connecting Internet to the Raspberry Pi it acts as a server. Then the server is automatically sends data to the webpage. Then these parameters (Heart rate, Body temperature, Breathing rate and Body movements) are monitored. If these parameters are goes to abnormal it will automatically sends alert message to the doctors and relatives.

3.2. WI-FI Module
Wi-Fi is defined as an abbreviation for wireless fidelity, meaning you can access or connect to a network using radio waves, without needing to use wires. An example of Wi-Fi is when you go to Starbucks and can join on their network to get on the Internet without having to connect your computer to any wires. Wi-Fi allows computers, PDAs and other devices to connect to a broadband connection in a wireless mode. The 802.11 standard defines the wireless communication operating via electromagnetic waves.

3.3. Sensors
The proposed system Sensors are described below

3.3.1. Temperature Sensor (LM35)
It is a sensor used to measure temperature. The LM35 series are precision integrated circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. It measures temperature more accurately than thermistors. It is sealed and does not undergo oxidation. It does not require output voltage to be amplified.
3.3.2. ECG Sensor

ECG electrode sticks to chest to pickup ECG signals. Then wires are connected to AD8232. This sensor is a cost-effective board used to measure the electrical activity of the heart. ECGs can be extremely noisy, the AD8232 Single Lead Heart Rate Monitor acts as an op-amp to help obtain a clear signal from the PR and QT Intervals easily.

3.3.3. Heart Rate Sensor

The sensor gives the digital output of heat beat when a finger is placed on it. When the sensor starts, the LED flashes in unison with beat. The output generated is in Beats per Minute (BPM) rate.

4. CONCLUSIONS

Internet of Things has many applications in different areas. IoT has been already designed for Wireless sensor network (WSN). It has been developed for health monitoring. This system presents the architecture of IoT and architecture of Smart health monitoring using IoT. There are some problems found in IoT and existing health monitoring. New technologies could help to minimize them by achieving the better quality as well as web based security concept. This system presents the problems and challenges that could come. New technologies and methodologies which are already used to improve applications of IoT have been discussed in this project. Raspberry Pi kit, Wi-Fi modules, temperature, blood pressure, pulse oximeter, heart beat rate sensors are currently in used for IoT.

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