Enabling Wireless Sensor Networks For Smart Healthcare Using IoT

V. Dini Aadhithya Harshan, R. Bala Subramanian, P. Diwahar, I. Muthu Selvi

Abstract: Internet of Things in healthcare is the key player in providing better medical facilities to the patients and facilitates the doctors and hospitals as well. The proposed system here consists of various medical devices such as sensors and web based or mobile based applications which communicate via network connected devices and helps to monitor and record patients’ health data and medical information. The proposed outcome of the paper is to build a system to provide world-class medical aid to the patients even in the remotest areas with no hospitals in their areas by connecting over the internet and grabbing information through about their health status via the devices provided in the kit using an Arduino UNO microcontroller which would be able to record the patient’s heart rate and temperature. The system would be smart to intimate the patient’s family members and their doctor about the patient’s current health status and full medical information in case any medical emergency arises. The collected information can be used to analyze and predict chronic disorders or other diseases such as heart attacks in preliminary stage itself using the data mining techniques that will also provide the approach advantageous for decision making.

Index Terms: IoT, Arduino uno, monitor.

1. INTRODUCTION

The Internet of things is the inter-connection of devices, apps, sensors and network connectivity that enhances these entities to gather and exchange data. The distinguishing characteristic of Internet of Things in the healthcare system is the constant monitoring a patient through checking various parameters and infers a good result from the history of such constant monitoring. There can be cases where the doctor can’t be alerted in time when there is an emergency. Also, there might be hurdles in sharing the data and information with the specialist doctors and the concerned family members and relatives. The technology that enhances these features is already available but is not accessible and affordable by most of the people in developing countries such as India. Hence these solutions to these problems can be just a simple extension to the current devices which don’t have these facilities. This project demonstrates a Remote Health Monitoring System controlled by Arduino UNO microcontroller. The main objective of this system is to update the data online and send an alert to the doctors for any abnormality and predict if the patient is having any disease. This system has much future scope as the data collected by monitoring is so valuable and can be used for any kind of research by the medical community.

2. EXISTING SYSTEM

In existing systems, sensors networks are used to monitor patient’s health parameters like pulse, body temperature and they are limited to the hospital unit itself because the range of monitoring is very small.

So the patient can be monitored only within the hospital. In case, if a person who is carrying out his daily routine or elderly people who is alone in home are facing difficulties, these systems can no longer monitor or notify the health service providers or family members. The existing systems are useful only to the patients residing in the hospitals but not the persons who are carrying out their regular life outside hospitals with some medical issues. To eradicate this issue we need more effective systems that can provide continuous monitoring at anytime and from anywhere.

3. METHODOLOGY

A. Objective

The system aims at design and development of affordable sensor system that could be capable of monitoring multiple vital physiological parameters like Heart rate, Body temperature and the system is proficient of giving proper warning to the respective health care provider.

B. Problem Statement

There are few sensor networks are used to monitor patient’s health parameters like pulse and body temperature and they are limited to the hospital unit itself because the range of monitoring is very small. So the patient can be monitored only within the hospital. In case, if a person who is carrying out his daily routine or elderly people who is alone in home are facing difficulties, these systems can no longer monitor or notify the health service providers or family members. The existing systems are useful only to the patients residing in the hospitals but not the persons who are carrying out their regular life outside hospitals with some medical issues. To eradicate this issue we need more effective systems that can provide continuous monitoring at anytime and from anywhere.

C. Module design

The smart healthcare system will have two modules such as data collection module and data transmission module.

D. Module Description

In the data collection module, medical parameters like human body temperature and heart rate is collected from the patient. To measure temperature, a temperature sensor
is used. And also a heart rate sensor is used to sense the heart rate. The data from the sensor is received by the respective sensors and they are received by the Arduino UNO microcontroller. The signals from the sensors are processed and the actual medical values are obtained. The obtained values are sent to the wi-fi module using serial communication between Arduino UNO and the wi-fi module. The transmitted data will be received by the wi-fi module and will be ready for transmitting to the Thingspeak cloud. In the data transmission module the received data by the wi-fi module will be transmitted to the Thingspeak cloud. A dash board to display the sensor readings are created and the data will be received through a unique channel key. A single channel can receive and display 8 fields. ThingSpeak is an open source Internet of Things (IoT) application and API to store and retrieve data from things using the HTTP protocol over the Internet or via a Local Area Network. ThingSpeak enables the creation of sensor logging applications, location tracking applications, and a social network of things with status updates. Fig(1) represents the block diagram of the system.

![Block diagram](image)

### 5. RESULT AND DISCUSSION

A virtual dashboard is created in the ThingSpeak cloud. For data security a private channel key is given to send the data. ThingSpeak was originally launched by ioBridge as a service in support of IoT applications. ThingSpeak has integrated support from the numerical computing software MATLAB from Math works. Allowing ThingSpeak users to analyze and visualize uploaded data using Matlab without requiring the purchase of a Matlab license from Math works. A Channel named patient has been created in the ThingSpeak dashboard. To display the temperature and heart beat values, graphical displays are created using the respective units. Under a single ThingSpeak account we can create eight different channels. This supports multiple patients. The data collected from the patients can be exported in the desired format and can be used for further analysis for diagnosis. Fig(2) Shows the actual Channel.

![Graphical representation of the patient's heart beat and temperature values.](image)

### 4. CONCLUSION AND FUTURE ENHANCEMENTS

The main idea of this system is to provide better and efficient health services for the patients by implementing a networked information cloud so that the experts and doctors could make use of this data and provide a fast and an efficient solution. The system will be well equipped with the features where the doctor can examine his patient from anywhere and anytime. Emergency scenario to send an emergency mail or message to the doctor with patient’s current status and full medical information can also be worked on. The proposed model can also be deployed also in mobile phones so that the model becomes more mobile and easier to access anywhere across the global. We can also integrate the system with many biomedical sensors to monitor parameters like body pressure, body position, EEG (brain sensor) etc.

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REFERENCES


