SECURED IOT-BASED HEALTHCARE SYSTEM WITH MULTI SENSOR NETWORK ANALYSIS

Abhishek Kumar Dixit & Ashwin Mazumdar & Deeksha Gaubaand & V. Bhuvaneswari
Students of Computer Science and Engineering at SRM Institute of Science and Technology.
1 Assistant Professor of Computer Science and Engineering at SRM Institute of Science and Technology

Received: January 27, 2019
Accepted: March 04, 2019

ABSTRACT: The prime motive of this paper is to construct a health monitoring system which renders data real-time. The new proffered methodology is equipped with an installed controller, in connection with a bunch of multiple bio-medical sensors linked to the patients and a non-wired IOT based interaction module. The patient is considered as a node of the WSN which is in turn attached to a central node fixed at a health care center with the assistance of an interconnected network (in our case- the internet). The installed microcontroller is instrumental in monitoring the patient’s health condition on the basis of vitals rendered by the system’s sensor. A notification is triggered whenever there is a violation of the set values. The system has been tested and it is found that the values are sharply monitored, scanning is accurate, communication is stable and it is definitive in decision making, all this at a fairly cheap price bracket.

Key Words: Internet of Things(IOT), Real-Time Monitoring, Body Sensor Network(BSN)

I. INTRODUCTION
Health monitoring of humans can be achieved in many ways by using the vitals. These values speak for themselves and can be used for analysing the perfect way to lead a life on the basis of cumulative scores for the same. With the appropriate amount of data, the system would be capable predicting a heart attack, fever, or any ailment in our body prior to the first sign of any discomfort. The quick improvement in smart technology there has been a significant improvement in wireless technology as well. The focus is now on contactless-ness of technology where we can seamlessly transfer as well as receive data without the usage of wire in any format. In this paper, we have divided the whole module into 3 parts, the hardware and robust sensors, the software to render data from the sensors and the analysis module which is used by care givers and HCPs. Once we have data of the patient for 15 days we can make a prediction on the ongoing health of the patient / user. We are using a location tracking using GSM for real-time location sharing service. Incase of an emergency situation of a customer in a remote place, the location can be tracked medical help can be administered. In the hospital model, we are enabling real-time tracking through a webpage where anyone can login using the credential and two factor authorization for better patient data security. This will help the doctor to prognose the condition the patient is in and take necessary actions on that basis.

II. EXISTING SYSTEM
A. Introduction
An existing system already consists the use of BSN (body sensor networks) to develop various kind of healthcare systems. In the existing paper [1], an IOT-based health care system is introduced which makes use of the architecture proposed by the BSN. To achieve better efficiency, and improved robustness of the transmission within IOT based communication networks, they have constructed two mechanisms for to ensure confidentiality and better entity authentication among the smart objects. They have used Raspberry PI for their systems.

B. Drawbacks
One of the drawbacks that the existing system has is, it is manual monitoring system due to which there might be a time delay in data transferring and later analysing. Also the system doesn’t make use of cloud or any virtual storage hence not providing, and real time data storage and access.

III. PROPOSED SYSTEM
In this system the health condition will automatically be updated to the internet for analysis. We have tried to introduce a system which can be used to analyse data processed by the sensors as well as to alert the patient / doctors / kens in terms of a redline data.

We are providing analysis module to interpret data which will be used by HCPs as well as care givers to diagnose as well as in prognosis of any health hazards, change in routine of the
patient as well as any flaws in medication which can trigger the health condition.

We are adding a GSM Facility to the system which can be used for an ambulatory operation as well. We can see the entire architecture of the system here, the temperature sensor, heart rate sensor, vibration sensor, Arduino Uno, LCD screen, alarm and GSM slot. The bound values are set and whenever it gets violated or surpassed, it sends alarm as a precaution measure in terms of LED blip, sound and phone notification.

![Fig. 1. Simulation](image1)

**A. Architecture**

In this particular project we have used Arduino Uno microprocessor as a controlling unit. The sensor includes heart rate sensors, temperature sensors, vibration sensor, GSM module. On the software side we have used Hadoop for big data collection and retrieval of data. The data will be rendered in an excel sheet where the graph will be created and used for further process. The data will be seamlessly uploaded on the cloud and can be accessed from anyplace. This gives the patient full authority over the data handled. There is an in built alarm system which will notify any data which is out of bound or unnatural and this will help us provide care to the patient. The alarm system will be in the form of a sound as well as an SMS to the desired emergency contact.

![Fig. 2. Architecture](image2)

**C. Temperature Sensor**

Temperature sensor in this system is used to monitor the temperature of the body and check if it doesn’t cross the threshold value i.e. optimal temperature of the body, which is 98 degree Fahrenheit. It is direct contact with the patient, hence doesn’t get affected by the external factors.

**B. GSM Module**

GSM module has been used to send notification and mobile alerts to patients doctor/relative. This module has a sim card slot, in which we can insert a sim card and then send notification. This is one feature that also has been differentiated from the existing system.

![Fig. 3. GSM Module](image3)

**D. Vibration Sensor**

Vibration sensor is used to sense body motions, which are abnormal, and crosses threshold value. Whenever the motion/vibration reaches the peak value, a notification is sent.

**E. Heartrate Sensor**

Monitoring heart rate plays a vital role for patients, athletes and those suffering from serious heart conditions. Heartrate sensor is an integral part of Arduino board which is used to measure
the heart rate of the user. Pulse rate is calculated to monitor heart rate, which can be again calculated by two ways: one by manually checking the pulse of wrist and other by using a heartrate sensor. The heartbeat is often measure in beats per minute or BPM. A heartbeat sensor consists of a sensor and control circuit. The sensor part further consist of and infrared LED and one photo diode that is placed in a chip.

F. IOT Module

It is a module that consist of a small electrical module, which can be embedded in object and make it capable to communicate and send data once connected to Internet. It is then further used to view data on a web page.

G. Arduino Uno

The Arduino is a chip that is based on ATmega328 controller. It overall consists of 14 digital input and O/P Pins, out of this 6 is used as PWM, 6 analog inputs, one 16Mhz resonator, and one facilitation for connection of USB devices. All the sensor that we have used has been integrated to the Arduino board.

IV. IMPLEMENTATION

A. SMS Alert

B. Flow Chart

V. CONCLUSION

This system helps providing a better and an efficient way to notify about a patient well-being remotely. It will make it much more easier for the patients family or the doctor to know how he/she is responding to treatments without actually being there physically.

REFERENCES

[1] A Secure IT-based Healthcare System with Body Sensor Networks Kuo-Hui Yeh, Senior Member, IEEE


