IJMRT: Volume (3), Issue 1, 2021

ISSN (Print) : 2663-2381
ISSN(Online) : 2663-4007

International Journal of Multidisciplinary Research Transactions

(A Peer Reviewed Journal)

www.ijmrt.in

IoT Based Wearable Smart Health Care Monitoring System

D.Venkatesan[1*], Vasanthapriyan V[2], Mukeshkumar S[3], Ragul R[4]

[1] *Assistant Professor, Electrical and Electronics Engineering, CK College of Engineering & Technology, India.*
[2,3,4] *Student, Electrical and Electronics Engineering, CK College of Engineering & Technology, India.*

[*]Corresponding author

Abstract

An important part of our life, internet has enabled many machines and devices we use in everyday life to be monitored and controlled remotely through Internet of Things (IoT) technology. Due to the increasing usage of wireless technologies and the miniaturization of electronic sensors, progress in wearable health monitoring technologies has been improved drastically, with strong potential to alter the future of healthcare services by using Internet of Things (IoT) active health monitoring sensors for omnipresent monitoring of patients and athletes through their regular daily routines. Medical applications such as remote monitoring, biofeedback and telemedicine create an entirely new base of medical quality and cost management. The objective of this work is to develop a low-cost, high-quality multipurpose wearable smart system for healthcare monitoring of patients with heart diseases. IoT monitoring of health helps in preventing the spread of disease as well as to get a proper diagnosis of the state of health, even if the doctor is at far distance. We proposed a nonstop checking and control instrument to screen the patient condition and store the patient information's in server utilizing Wi-Fi Module based remote correspondence. A remote health monitoring system using IoT is proposed where the authorized personal can access these data stored using any IoT platform and base on these values received, the diseases are diagnosed by the doctors from a distance.

Keywords: Wireless, Health Monitoring, IoT, Wi-Fi.

1. Introduction

1.1 PREAMBLE

Health is one of the global challenges for humanity. Ccording to the constitutions of World Health Organization (WHO) the highest attainable standard of health is a fundamental right for an individual. Healthy individuals lead to secure their lifetime income and hence to increase in gross domestic product and in tax revenues. Healthy individuals also reduce pressure on the already overwhelmed hospitals, clinics, and medical professionals. To keep individuals healthy an effective and readily accessible modern healthcare system is a prerequisite.

The objective of developing monitoring systems is to reduce health care costs by reducing physician office visits, hospitalizations, and diagnostic testing procedure. If framework finds any sudden changes in understanding heart beat or body temperature, the framework consequently alarms the client about the patient's status over IoT elements of pulse and temperature of patient live in the web. In this manner IoT set up tolerant wellbeing following framework viably utilizes web to screen quiet wellbeing measurements and spare persists time.

1.2 Problem Statement

Wearable health monitoring can provide useful physiological information in the home. This monitoring is useful for elderly or chronically ill patients who would like to avoid a long hospital stay.

In this project, you are to choose appropriate sensors according to what you would like to detect and design algorithms to realize your detection. Examples are the detection of a blood pressure, temperature, oxygen monitoring cardiac signals. Using a single parameter monitoring system an approach to a wearable health monitoring system was designed that extends healthcare from the traditional clinic or hospital setting to the patient's home.

The system was to collect a heartbeat detection system data, blood pressure detection system data, temperature data and few other parameters. The data from the single parameter

monitoring systems was then availed for wearable detection. During design the following characteristics of the future medical applications adhered.

 Integration with current trends in medical practices and technology.

 Real-time, long-term, remote monitoring, miniature, wearable sensors and long battery life of a designed device.

 Assistance to the elderly and chronic patients. The device should be easy to use with minimal buttons.

2. Hardware

2.1 Proposed System

The main objective is to design a Patient Monitoring System with two-way communication i.e. not only the patient's data will be sent to the doctor through SMS and email on emergencies, but also the doctor can send required suggestions to the patient or guardians through SMS or Call or Emails. And Patient or guardian can able to track patient's location at any point in time through Google Maps which would enable to send medical services in case of an emergency for non-bed ridden patients.

Therefore, this chapter proposes architecture of an intelligent IOT healthcare system for monitoring patients' health using a wearable body sensor network. The system will use ensemble tree-based learning to disclose patterns and knowledge on patient health condition and its possible preventions. The proposed method advises and alerts medical personnel in real-time about the changing of the health condition of patients to suggest preventive measures in saving lives. The integration of the IOT-based wearable body sensors network shows improvement in patients' health conditions.

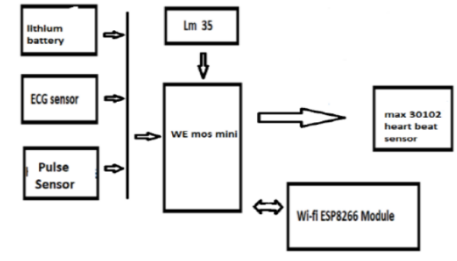

Figure. 1. Block Diagram of the Proposed System

Proposed system consists of following Hardware and modules

- Arduino Micro Controller
- GPS Module
- LM35 Temperature sensor
- We mos mini
- Max30102 heart beat sensor
- Lithium battery

3. Results and Discussions

3.1. Track Patient Location

When doctor or care taker would need to know patients, location can click on track patient location link on index page. On clicking page is redirected to Google maps page with current patient location details. In case of GPS module failure to locate current coordinates in the device, and then only last know location of the patient would be shown on this page.

In the following system, it is shown complete device setup which includes Arduino micro controller board with power supply attached to it. Micro controller is connected with all the sensors which includes from right bottom fall detection sensor (Body Movement sensor), Pressure sensor, Temperature sensor, Heartbeat sensor, accelerometer.

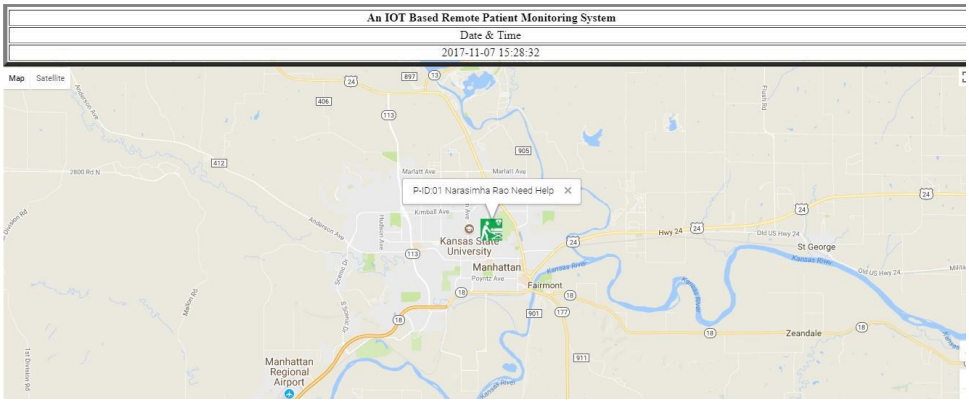

Figure. 2. Patient Location Tracking

3.2. Patient Data Analysis

Here doctor can see history of patient vitals that has been recorded is stored in server in tabular form. This data can specifically be used by doctor to perform analysis on patient health condition to predict any irregularities in health conditions, to recommend change in medication or treatments etc. and can be used to recommend patient regular visits

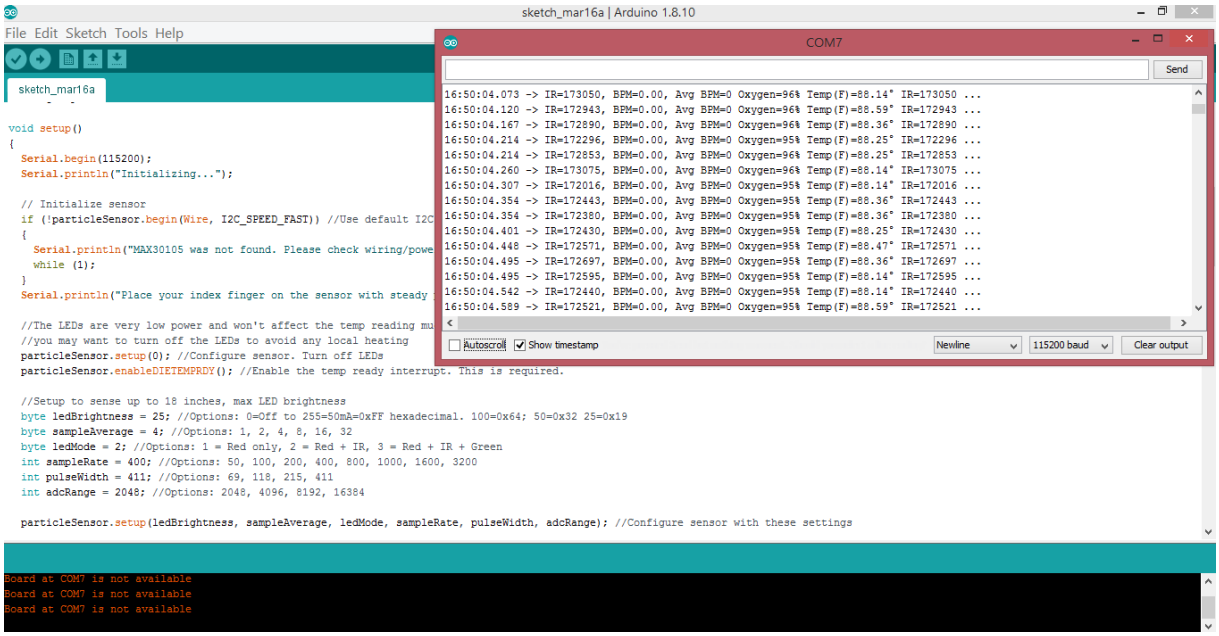

Figure.3. Patient Data Output

3.3. Hardware Setup

In the above image, it is shown complete device setup which includes Arduino micro controller board with power supply attached to it. Micro controller is connected with all the sensors which includes from right bottom fall detection sensor (Body Movement sensor), Pressure sensor, Temperature sensor, Heartbeat sensor, accelerometer. Micro controller also connected with alarm which will be used in case any of sensor data conditions are not met like temperature spikes toxic gases etc. And GSM and GPRS modules are connected which are used to send sensor data into server and fetch location coordinates of the patient respectively.

LCD is connected to micro controller which displays of information as soon as device is turned on which includes location coordinates and HTTP protocols which shows the network connect procedure. In case device unable to connect to network, we could see the command at which device currently halted and can be used to diagnose the issue. And finally, once device is connected to network, it displays all the patient information on it along with any irregularities of patient vitals.

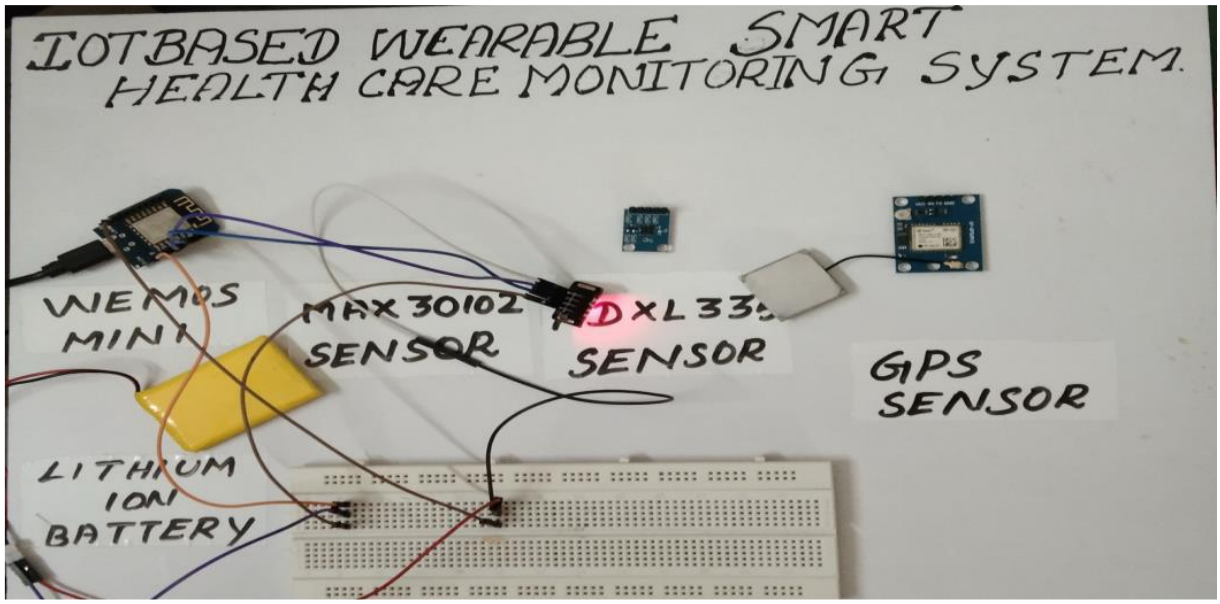

Figure. 4. Hardware Setup

3.4. Results

Email alert: Here email alert has been sent to registered email with the information about patient vitals and link to patient monitoring page. Temp=39 Deg High Body Temperature Alert htttp://rpihealth.com.IoT_patientmnr/index.php. SMS alert: Here SMS alert has been sent to registered email with the information about patient vitals and link to patient monitoring page.

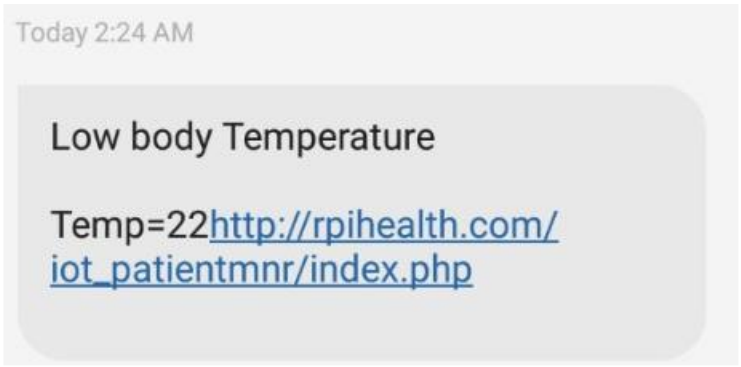

Figure. 5. SMS output

4. Conclusion

4.1. Summary

The remote patient monitoring system was researched, designed and presented the concept of the Internet of things. Personal physiological data from the patient is collected that simulates fall detection, heartbeat, temperature, humidity, toxic gas, air quality control, pressure. The

readings are collected in a simple cloud database and can be viewed remotely by a doctor or Healthcare giver. The data can also be used in research on medical issues affecting the elderly or chronically ill. On the security of the data, the database system is protected with Advanced Encryption Standard (AES). This generates the secret key which can be used to decrypt the patients' records ensuring that only authorized personnel access the data. This safeguards the patients' records from unauthorized users and hackers who may want to intercept.

The main objective of the experiment was successfully achieved. All the individual modules like Heartbeat detection module, fall detection module etc. and wearable health monitoring module gave out the intended results. The designed system modules can further be optimized and produced to a final single circuit. More important fact that came up during project design is that all the circuit components used in the remote health detection system are available easily. With the development in the integrated circuit industry, Micro Electro Mechanical Systems (MEMs) and microcontrollers have become affordable; have increased processing speeds, miniaturized and power efficient. This has led to increased development of embedded systems that the healthcare specialists are adopting. These embedded systems have also been adopted in the Smartphone technology.

REFERENCES

[1] Ashon, K, That " internet of things" thing , RFID journal, 2009 , 22(7) , 97-114.
[2] Kakria, P. , Tripathi, N.K., kitipawang , p., A real-time health monitoring system for remote cardiac patients using smartphone and wearable sensors, International journals of telemedicine and application,2015/
[3] Majumder, S., Mondal , T.,Deen, M. J., Wearable Sensor for remote health monitoring , Sensor,2017,17(1), 130.
[4] Saha, J., Saha, A. K., Chaterjee, A., Agrawal, S., Saha, A., Kar, A., Saha, H,N., Advanced IOT based combined remote health monitoring , home automation and alarm system. In computing and Communication Workshop and Conference, IEEE 8th Annual,2018,pp602-606.
[5] Patel, S., Park, H., Bonato, P., Chan, L., Rodgers, M., A review of wearable sensors and systems with application in rehabilation, journal of neuroengineering and rehabilation.
[6] Kalid, N., Zaidam, A A., Zaidan, B.B ., Salman, O. H., Hashmim, M., Muzzamil, H., Based Real Time Remote Health Monitoring Systems: A Review on patients Prioritization and Related "Big Data" Using Body Sensor information and Communication Technology, Journal of medical system, 2018,42(2),30.
[7] Rahmani, A. M., Gia, T. N., Negash, B., Anzanpour, A., Azimi, I., Jiang, M., Liljeberg, P., Exploiting Smart e- Health gateways at the edge of healthcare Internet- of Things: A fog computing approach , Furture Generation Computer System , 2018, 78,641-658.
[8] Thibaud, M., Chi, H., Zhou, W., Piramuthu, S., Internet of Things (IOT) in high-rrisk Environment , Health and Safety (EHS) industries: A comprehensive review, Decision Support System,2018, 108,79-95.