ISSN XXXX XXXX © 2018 IJESC

Research Article Volume 8 Issue No.3

Iot Based Health Monitoring and Safety Bot

C.Praveen Kumar[1], S.Sanjay[2], R.Nijanthan[3]
Assistant Professor[1], BE Students[2, 3]
Department of EIE
Valliammai Engineering College, Chennai, India

Abstract:
Now-a-days Health care Environment has become technology oriented. Humans are facing a problem of unexpected death due to the reason of heart attack which is because of lack of medical care to patient at right time. So we are developing project to avoid such sudden death rates by using Body Health Monitoring. Internet of Things (IoT) is the emerging paradigm, which contains huge amount of smart object and smart devices connected to the internet for communicating with each other. IoT devices are used in many fields which make the users' day to day life more comfortable. PHMS also notifies the patient with possible precautionary measures to be practiced by them. This system suggests the patient with medical care and next step to be followed in case of critical situation. The PHMS system is evaluated for certain parameters and the decisions made on the data obtained from the source are assumed to evaluate the system. These smart devices are used to collect temperature, blood pressure, etc., which are used to evaluate the health condition of the patient. Communicating the collected information to the doctor, making accurate decision on the data collected and notifying the patient is the challenging task in the IoT. We present a cloud-enhanced, four-wheeled, mini-robot, assembled from low-cost, off-the-shelf hardware parts, and open-source software building blocks for emerging applications mixing robotics with the Internet of Things.

Keywords: Embedded Systems, Arduino controller, Internet of Things, Patient Health Monitoring, Sensors**.**

I. INTRODUCTION

With the development of world, Health monitoring system is used every field such as hospital, home care unit, sports. This health monitoring system use for chronicle diseases patients who have daily check-up. Normally it is difficult to keep track on abnormalities in heartbeat count for patient itself manually. The average heartbeat per minute for 25-year old ranges between 140-170 bpm while for a 60-year old it is around between 115-140 bpm and body temperature is 37degree Celsius or 98.6 Fahrenheit. Patients are not well versed with manual treatment which doctors normally use for tracking the count of heartbeat. There are various instruments available in market to keep track on internal body changes. But there are many limits in maintenance part due to their heavy cost, size of instruments and mobility of patients. So, researchers design a system as portable device. Researcher designed different health monitoring system based on requirement. Different platform like Arduino controllers are used. In hospitals there are provisions for continuous monitoring of patients. Their heartbeats are continuously monitored. There is no provision to check the parameters when they return to home. And hence there is a chance that the disease may return again. Patient's data (temperature, heart rate, position) will be frequently measured and sent to server. Period of sending (say every 3 min) can be set. Monitoring person learns patient specific threshold. Say the regular body temperature of a patient is 37?c whereas one person feels feverish if his body temperature is 37.0˚c. By employing an averaging technique over a relatively long time, Observer can learn these thresholds for patients. Using IP address by doctor's smart phone, doctor can view his patient's health status. When any of the parameter goes beyond the threshold value he will get an alert notification. To design the system based on this performance. Different biomedical sensors like temperature sensor, heart rate sensor, blood pressure sensor, respiratory sensors are used for monitoring the health condition which is integrated on single system on-chip. If any varied change takes place it is notified. This notification would help to take an appropriate action at an instance of a time. This would save patients from the future health problem which would arise. This would also help patient's concern doctor to take an appropriate action at proper time.

II. PROBLEM DEFINITION

In today's social insurance framework for patients who stays in home during post operational days checking is done either via overseer/ medical caretaker.

III. RELATED WORK

The area of health in recent years has been rapidly integrating technology in the monitoring, diagnosis and treatment of patients remotely and in situ. Thus achieving to improve the quality of life of patients and greater traceability of information from them. Most studies reviewed point to a chronic disease monitoring in particular as in which are responsible for the first remote monitoring of vital signs and the second of a telemedical ECG system of a patient. All these systems although quite complete is your scenario, include individual problems with regard to the treatment of some diseases that affect human being in the economic and social. Is a very important way to develop a comprehensive solution where no matter what kind of disease, the type of check, the different units to be handled this can become a possible solution for sequential monitoring of these patients.

(a) At the first System developed, researcher designed health monitoring system using ATmega8 microcontroller with Wireless Body Area Sensor Network (WBASN). In this work, the sensors which are used here are 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 schedule of the patient and these

health related parameters are then forwarded to physician's server using long range wireless technology GSM. Health monitoring system consists of sensors, microcontroller, LCD display and GSM modem to transmit or receive health related data to or from the doctor. Similarly, at hospital same GSM modem is used. Hence, GSM modem helps in the establishment of network between patient's server and doctor's server. LCD (Liquid Crystal Display) display is providing to show the instant result to the patient. Here researcher used LM34 as temperature sensor, IR LED and red LED is used for heart rate monitoring and Pressure transducer or the sensor based on piezo-electrical material is used to measure the systolic BP and diastolic BP. Microcontroller reads data as given by the temperature sensor, blood pressure sensor and heart rate sensor and processing it gives the output in the form of digital and it gets directly display on LCD or it gets transmitted to the doctor's server through GSM modem. This system gives exact and instant result with high accuracy which gets directly display on LCD. It takes max 4-5 sec to monitor the doctor's server using GSM wireless technology .This system takes small amount of time to know the health condition of patient and then delivers the report to the doctor.

(b) In the second system developed, health parameters are sended by using RFID reader, Bluetooth, GSM and UMTS. This system gives facility to monitor the blood pressure of patient. The health parameter directly sends to the doctor using GSM and UTMS. Here, video guide is used. This video guide feature serves the patients age and his blood pressure correctly. This system consists of three parts: Touchpad, remote server and reading of the Tag ID and BPM. For reading the Tag ID and BPM, use a microcontroller unit (MCU) as a kernel. The client touchpad receive the blood pressure measurement (BPM) data a RFID through Bluetooth. Client touchpad send the data to the the health parameter. Also, these health parameters are directly send to remote data center and remote data center to the doctor using GSM and UMTS wireless technology. Data gets transmitted in the form of the packets. This system helps to store previous data. Similarly, it takes less time to monitor the blood pressure of the patient.

(c) Third System shows the blood pressure monitoring system using microcontroller. This system includes motor control unit, Microcontroller ATmega328, LCD display. The pressure sensor is directly connected to the cuff, which is inflated or deflated via a motor and valve. ON and OFF switches of motor are controlled by the microcontroller at correct time. Due to changes in the ON and OFF switches of the motor, the wrist cuff gets inflated and deflated; this pressure is measured by the pressure sensor. Pressure sensor generates the health parameter in the analog sensor. The processing of analog sensor is done with the help of the microcontroller and gives digital output which is displayed on the LCD or on the Personal computer using RS232. Magneto resistive RAM (MRAM) stores the value of systolic and diastolic blood pressure and is directly connected to the microcontroller. Similarly, here no need of pump the cuff by hand, all the system is controlled by the microcontroller. It is not required to calculate or observe blood pressure manually. Time consumption is very less compared to old system.

IV. SYSTEM ARCHITECTURE

The Block diagram of the proposed system is shown in figure. The system initially consist of two arduino controllers in which one is used as line follower robot and another one is used for processing unit. The sensors Temperature, ECG and Heartbeat are connected to the Arduino board (processing unit). The values from the Arduino controller are given to the Web Server using ESP 8266 Wi-Fi Connectivity. The parameter values can be viewed by the doctors and patient's smart phone.

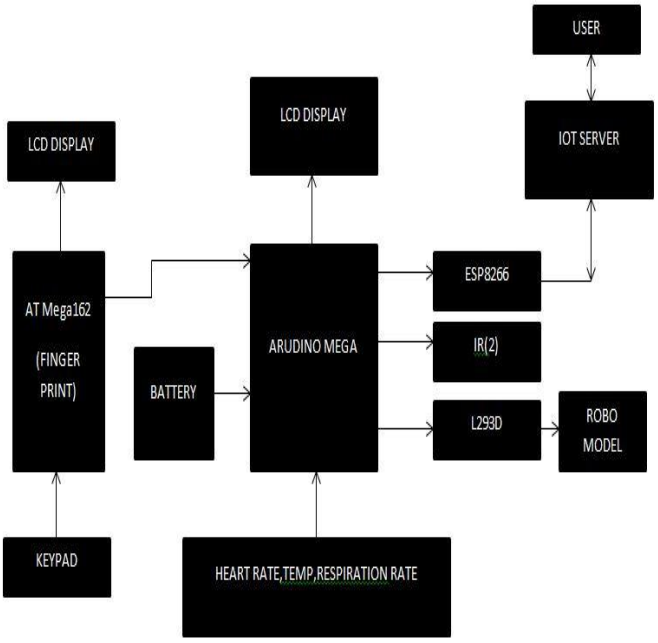

Figure.1. Block diagram of the system

A. PROCESSING UNIT:

In our system Arduino Uno Board is used. The microcontroller is connected with all other hardware units in the module. This module takes analog parameters from the sensors attached to patient, Process it and convert them in digital output. This module also contains Wifi connectivity device which sends the sensors converted data to the android smart phone.

B. HEART RATE SENSOR:

Heart beat sensor is designed to give digital output of heat beat when a finger is placed inside it. This digital output can be connected to Arduino directly to measure the Beats per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger each pulse. IC LM358 is used for this sensor. Its dual low power operational amplifier consists of a super bright red LED and light detector. One will act as amplifiers and another will be used as comparator. LED needs to be super bright as the light must pass through finger and detected at other end. When heart pumps a pulse of blood through blood vessels, finger becomes slightly more opaque so less light reach at the detector. With each heart pulse, the detector signal varies which is converted to electrical pulse.

C. TEMPERATURE SENSOR:

This series consist of precision integrated circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 does not require any external calibration or trimming to provide accuracies of (+-)1/4 degree Celsius at room temperature and (+-)3/4 degree Celsius over a full -55 to +150-degree Celsius temperature range. Less to operates from 4 to 30 volt. Less than 60uA current drain.

D. WIFI MODULE:

Wi-Fi Module - ESP8266 offers a self-standing Wi-Fi networking with TCP/IP protocol stack which provides Wi-Fi

connection to any microcontroller. ESP8266 when connected on-board it has storage and processing capabilities hence can be easily connected to the sensors based on the application. The main reason to use ESP8266 as Wireless Module is due to its compact size and high performance.

E. LCD DISPLAY:

It is called Liquid Crystal Display. There is a use of 16x2 characters LCD. This will be connected to microcontroller. The function of LCD will be to display all the system generated messages coming from the controller. LCD will provide interactive user interface.

F. BLOOD PRESSURE SENSOR:

Pressure range: 0 mm Hg to 258 mm Hg; Maximum pressure without permanent damage: 1550 mm Hg; Typical accuracy: ±1 mm Hg; Temperature compensated: -20°C to 85°C

G. IOT SERVER:

It is nothing but a web server used to store the information about the patient through ESP8266 wi-fi module.

H. USER INTERFACE:

It is an interface tool used by the Doctor or Patient to access the detailed information from the IoT server.

V. SOFTWARE IMPLEMENTATION

The simulation process is done with the help of PROTEUS software and simulink features is used in that software. This circuit includes heart rate measurement, blood pressure measurement, respiratory measurement, 5V DC voltage source, LCD display. A DC voltage source of 5V is given as an input to the circuit. The sensors are assigned with certain programs and controller also fed with the programs.LCD module is used for displaying the output of the controller.

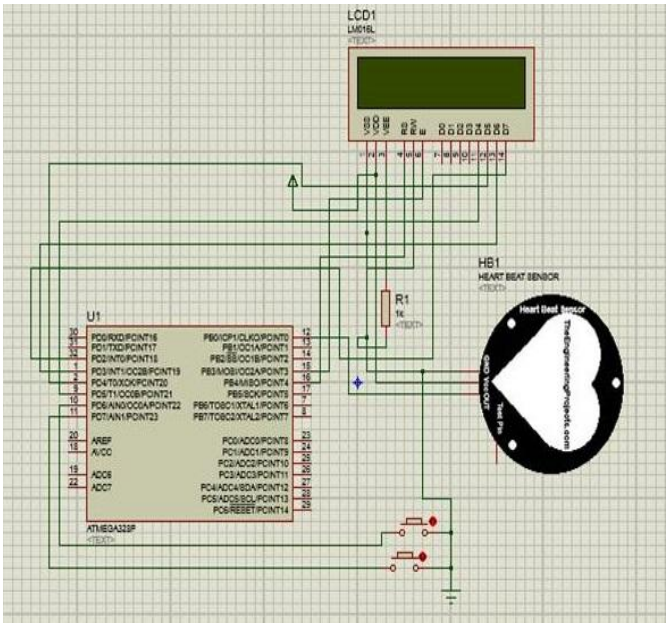

Figure.2. Simulated block diagram of heart beat sensor

After setting the parameters, the simulation is executed to get the concerned output of the circuit. By replacing heart rate sensor into other sensors we can get the output of the circuit.

OUTPUT:

The simulation result when circuit is on is shown in the fig.5.2

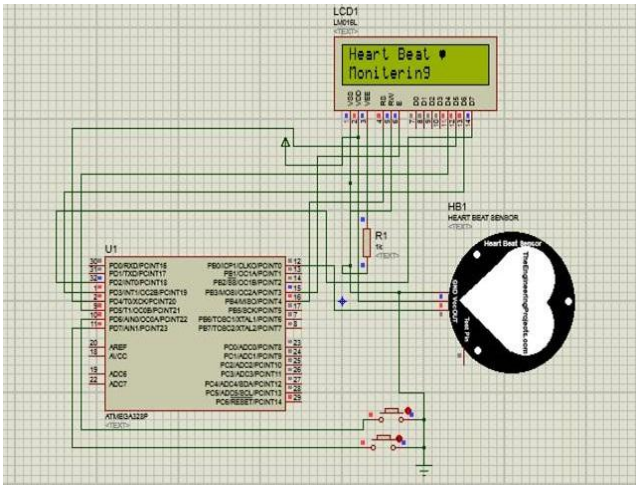

Figure. 3. Simulation result of heart beat sensor

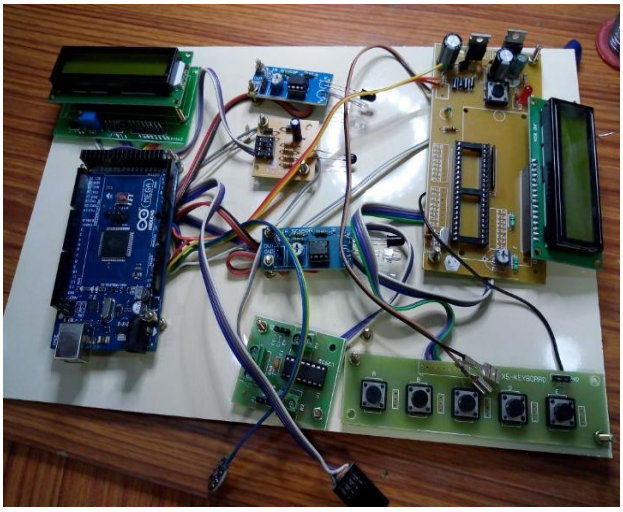

Figure. 4. Real time hardware kit for monitoring system

The real time implementation of hardware kit used for the monitoring of patient health is shown in the figure.5.3.

VI. CONCLUSION

As per paper work, health monitoring system design is based on researcher idea that meets to the patients need. As per consideration of conventional system, this system still in use from their manufacturing but it is very bulky to handle individually and size and cost are also more compared to the advance system and also it take more than 1minute for getting the exact result. As per consideration of advance system, each system has its own advantage. Each health monitoring system has different specification as per patient's requirement. This system provides more medical instrument facility on single system on-chip compare to conventional system. This system takes less than 1 minute to calculate result related to health condition. Size also reduces compared to the conventional system because of integration of number of medical instrument on single chip. So, size, cost and complexity also reduce. As consideration of Arduino controller like ATmega(162), Arduino uno controller there is need to connect external peripheral for signal conditioning. Therefore, size, cost and flexibility are more. Hence, as external peripheral increases cost and size also increases. Researchers designed health monitoring system as per patient's requirement. Because of wireless data transmission over internet, health related data will be send to doctor's personal computer or on his mobile. So, need to go hospital every time and sending massage to the doctor gets immediate remedy related to the health condition.

VII. REFERENCES

[1]. Real time wireless health monitoring application using mobile devices, International Journal of Computer Networks & Communications (IJCNC) Vol.7, No.3, May 2017, Amna Abdullah, Asma Ismael, Aisha Rashid, Ali Abou-ElNour, and Mohammed Tarique.

[2]. B.Kehoeetal. A Survey of Research on Cloud Robotics and Automation. IEEE Trans on Automation Science and Engineering, june 2017

[3]. Sumanta Bose, Prabu K, Dr. D. Sriram Kumar, "Real-Time Breath Rate Monitor based Health Security System using Non-invasive Biosensor", Third International Conference on Computing Communication & Networking Technologies (ICCCNT), IEEE 2017.