

An Efficient Body Line Health Monitoring System with Alerts Triggered Through Predictive Data Analytics

Jasti Sowmya Sree, Mohammed Ali Hussain

Abstract: In actuality, there is a need to monitor the patient continually. Till now there is no programmed cautioning framework has been executed. In this task, we screen heart rate, temperature and produce ECG signal with the assistance of sensor. A sensor sense and record the esteem and sends those to android telephone of the aide or relative to a patient if there is any occurrence of crisis. And furthermore if any traffic is overwhelming the crisis vehicle will redirect to another course by utilizing Google maps. Also, we present a model of an essential social insurance observing framework, which cautions, continuously to the patient and patient's relative about the encountered issue and corresponding medicinal consideration or hospitalization. The proposed system can reduce the time, easy to utilize. It is also used for self monitoring the patients anywhere at any time. In this way by using this Smart health observing framework reduces the effort of experts and paramedical staff to screen the patient for 24 hours and moreover decreases the time and cost.

Index Terms: Internet of Things, raspberry pi, health monitoring, temperature sensor, ECG sensor

I. INTRODUCTION

Internet of things is nothing but one device can connect with another by using internet. The person represents as "thing" that the sensors are connected and the data is transferred by using internet [1]. Some of the applications of IoT like smart home, smart traffic, and smart health.

Now a day's health is the major issue in India. The death ratio of people around the world was increasing day by day. To reduce the risk by connecting sensors to the human body we can predict the health condition of the patient easily. The embedded technology helps the object to interact with internal and external environment. The devices can be controlled from anywhere by connecting through internet using internet of things [2]. The smart health monitoring system through IoT approach is used to decrease the work of doctors by monitoring and observing the patient condition through personal computer. We, therefore, proposing an adjustment in remote sensors innovation by structuring a framework which included distinctive remote sensors to get data with separate human body temperature, heart rate so on that will be without a doubt additionally transmitted on an IoT stage which is available by the client by means of web. Many of the devices are proposed the health monitoring system. It mainly monitor some of the parameters and it connects wirelessly to android mobile or personal computer and we can use any web or mobile application to view the data [3].

Revised Manuscript Received on April 17, 2019.

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The database of patient is available which can be monitored and dissected by the specialist if essential. The information stockpiling is saved in the server for any time and it can be reset by means of the product. The paper discussed about wellbeing monitoring framework is equipped for distinguishing various parameters of our body, for example, temperature, pulse, ECG values is transmitted to the IoT server. Additionally if there should be an occurrence of crisis, naturally creating cautions will be sent to specialists and relatives if any out of the ordinary action is recognized by or patient's relative. The record contains all the information of the body wellbeing parameters is used to recognize sickness in an increasing way [4-6]. Presently a-days, individuals give careful consideration towards counteractive action and early acknowledgment of ailment. Notwithstanding it, new age cell phones advances and their administrations give an essential effect on the improvement of system assortments (3G, Bluetooth, remote LAN, and GSM) and so forth. The AD8232 ECG sensor is used for wireless observing of ECG, circulatory strain sensor (4811) is utilized to gauge systolic weight and diastolic weight and heartbeat rate for few moments [7]. Temperature sensor is used to measure the human body temperature. Acceptable work is done in wellbeing checking by utilizing raspberry pi just as IoT.

In this paper we have proposed a device which can detect the employee condition in a company by wearing sensors and monitored the temperature and heart condition continuously. If any problem detected, the alerts will triggered by sending the SMS to the patient and patients relative. The patient will reach to the nearer hospital in fastest route by using Google maps.

II. LITERATURE SURVEY

Shreya Rajkumar *et al* proposed the health details records in the database with his doctor's contact number and number of pills need to taken by the patient with the respective times. If any abnormalities are present it will indicate the doctor by sending the SMS. The raspberry pi receives the data by using fit bit [8]. Palma Oscar Antonio *et al* monitor the people's temperature and heart condition that is in the archaeological site to prevent the heart stroke. The own database is created by using My SQL and it implements in WAMP server. the sensor readings are uploading to arduino. By using bootstrap template SBAdmin2 the website is developed. In this Twilio survive is used for the SMS alerts [9].

S. Sreejith *et al* used polar h7 Bluetooth smart heart rate sensor.



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The output of the sensor data is transferred to the android mobile API. The data transmit up to 30 feet. In this the author divided the application into two sections, client part and the server part [10]. In the client part android app is present and in server part the web interface is developed by using My SQL and PHP. Nor Aini Zakaria *et al* discussed about the infant body temperature monitoring LM35 temperature sensor and controlled by arduino Espresso lite 2.0 microcontrollers. The data is stored in the thing speak and the information is send to the android and it is connected wirelessly by using Wi-Fi module [11].

III. PROPOSED WORK

In our proposed work the patient is monitored and the predefined values of the patient condition is stored in IoT cloud by using thing speak as a gateway. The patient is continuously monitored by using sensors like body temperature sensor, pulse rate and ECG sensor. After sensing the data will send to the Raspberry pi which is connected to the cloud by using gateway. The data is continuously checks with the predefined data stored in the cloud. If any data cross beyond the limit (or) normal level it automatically sends alerts to the patient and family by sending SMS. If the patient is in emergency condition, by using Google maps the patient will reach the hospital in the fastest route to avoid risk and heavy traffic. The advantage of this proposed system is we used ARIMA algorithm it works based on time stamping.

A. Block diagram

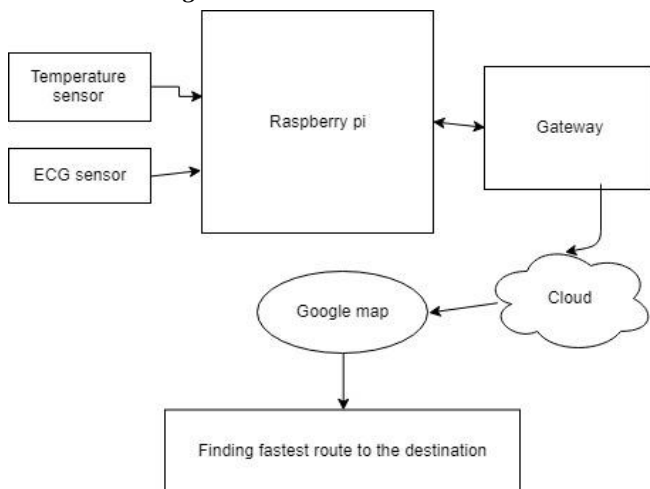


Fig 1. Block diagram of the patient health monitoring system

B. Hardware requirements

a) Raspberry pi

The Raspberry Pi is also known as solitary board acts as a processor and it has minimal effort. The main advantage is it has highly configured pc. The raspberry pi board has a program memory. It contains design chip, central processing unit, graphic processing unit, Ethernet port, general purpose input/output pins, control source connector and other

different devices are interfaced. The Raspberry Pi includes on-board Wi-Fi module, Bluetooth and USB ports.



Fig 2: Raspberry pi

b) Temperature sensor

DS18B20 human body temperature sensor is one of the best sensors. It ranges from $\pm 0.5^\circ\text{C}$ accuracy from -10°C to 50°C . It has 3 pins VCC, GND and DATA. The DS18B20 is a waterproof sensor it can place either in tongue, forehead and underarm. The Power supply of DS18B20 is 3.0v to 5.5v [12]. It measures the temperature and main feature of this sensor is it powered from DATA line also. DS18B20 is used to measure the body temperature conditions of the patient.

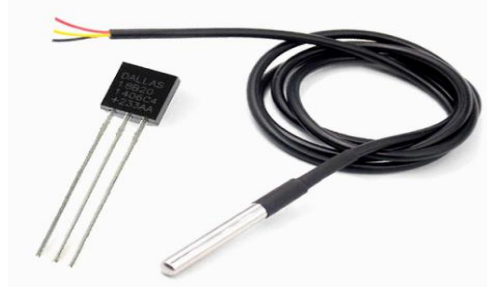


Fig 3: Temperature sensor

c) ECG sensor

AD8232 is a cost effective sensor. This sensor measures the activity of the heart. The heart produce noisy signals to those noisy signals op-amp are used. The output of the AD8232 is analog. It has 6 pins there are SDN, LO+, LO-, OUTPUT, the operating voltage is 3.3V and Ground(GND) is present. The 3 electrodes are connected to hands (Right, Left) and right leg of the patient. The LED indicator is present. The operating voltage is -3.3v . Output of the ECG sensor is in analog and it has a shutdown pin [13]. The ECG sensor is used to monitor the patient heart condition and shows the heart beats range of the patient.



Fig 4: ECG sensor

IV. ANALYSIS

Once the hardware is connected the predefined health data of the employee is stored in the cloud. The body temperature sensor, pulse rate and ECG sensors attached to the human body. All the sensors are interfaced with Raspberry pi board. The sensed data is send to microcontroller and uploaded in cloud using thing speak. Data is compared with the predefined data and check, if the limit exceeds it will alert the patient and family by sending the messages. When the patient is in critical condition it will access the nearer hospital data and patient will select the best hospital. The patient immediately reaches to the nearer hospital if any traffic is present the emergency vehicle will divert to another route by using Google maps to reach the destination fastly.

A. PSEUDO CODE

Step 1: System initialization.

Step 2: Read the sensor values form the sensors continuously.

Step 3: If the sensor values of the temperature and the ECG sensor exceeds the threshold value it will alert the patient and patient's relative by sending the SMS to the android mobile.

Step 4: If the temperature and ECG sensor values do not exceed the threshold value the system continuously monitored the patient. The step 2 is repeated.

Step 5: Process terminated.

B. FLOW CHART

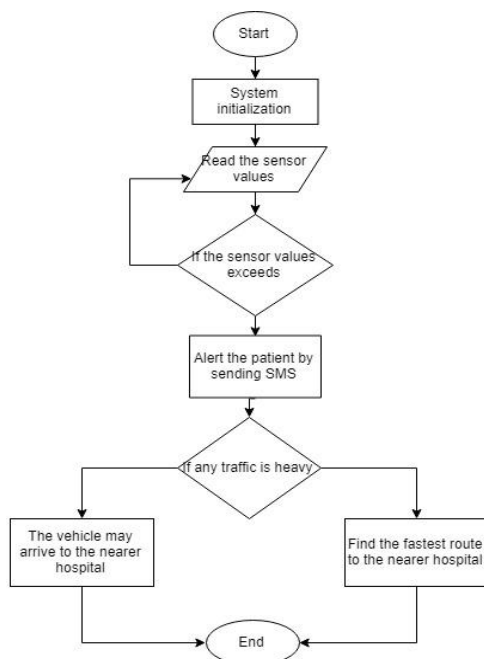


Fig 5. Flow chart of the patient health monitoring system

V. RESULTS

The proposed system is implemented and designed by using Raspberry pi, temperature and ECG sensor. The sensors are interfaced with the raspberry pi and the output values of the sensors are uploaded to the cloud. By using ARIMA algorithm the ECG values are noticed by using time stamping method.

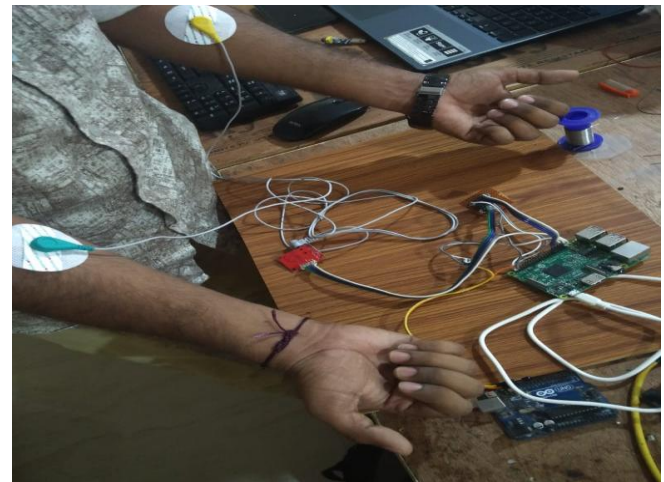


Fig 6. Hardware overview of patient health monitoring system

The fig 7 and fig 8 represents the ECG peak values and filtered wave of ECG.

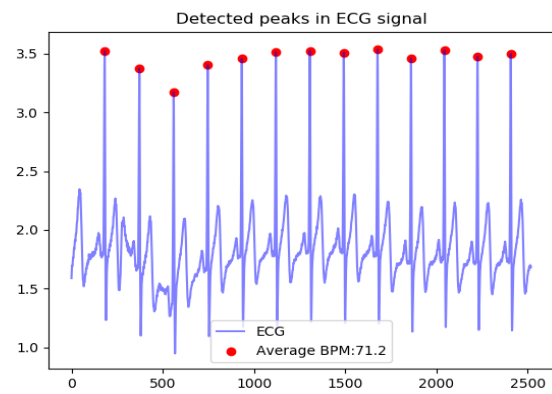


Fig 7. ECG graph

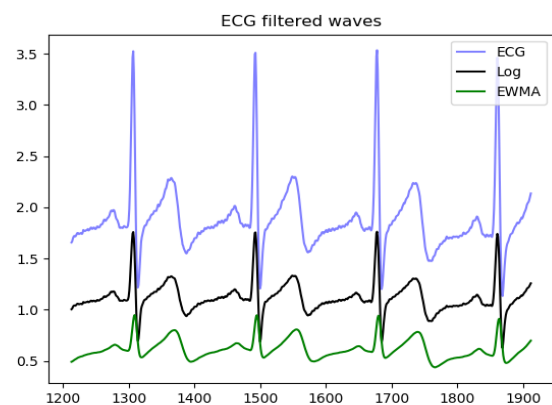


Fig 8. ECG filtered waves

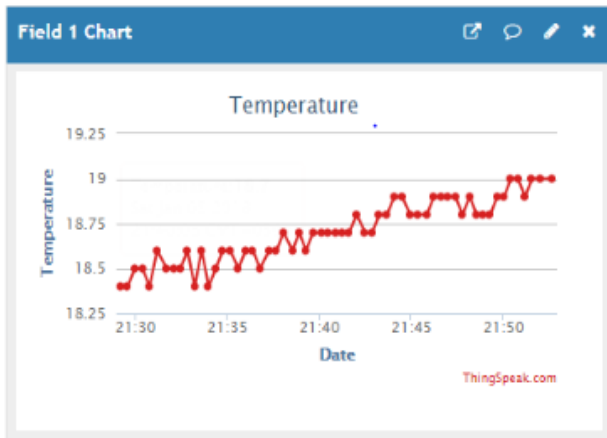


Fig 9. Temperature graph

Fig 9 represents the temperature graph in thing speak. If any abnormality is detected the patient and patient's relative will alert by receiving the SMS on the android mobile.

VI. CONCLUSION

The proposed system plays a key role in the present health monitoring system. The parameters are diagnosed successfully by using temperature and ECG sensors. The ECG values are observed by using ARIMA algorithm the forecasting takes place. It is less expensive and by continuously monitoring the patient we can avoid the health risk.

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