

Advanced Iot Based Health Monitoring System: A Review

Ahona Sen Sharma and Anjuvan Singh*

Department of Biotechnology, School of Bioengineering and Biosciences, Lovely Professional University, Phagwara 144 411, Panjab, India

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ABSTRACT

Health Monitoring system is a system build for the convenience of the patient. The collected information and analysis help the doctor to diagnosis the patient better. For the execution of the project a sensor is implemented in a smart phone which would connect the patient with the doctor. This system will help the doctor to connect with the patient from anywhere. In this proposed system, through the sensors doctors could easily get access to patients' previous history, heartbeat, pulse rate and ECG graph, r4aspberry pi is set up which would transfer the analysis to the doctors and medical staffs via internet access. The patient and the doctor can monitor with the help of the URL. An alert is sent to the patient through SMS if the sensors show abnormality. Thus, the patient's health parameters are regularly observed and action is taken effectively. The regular monitoring through IOT will provide the patient with effective treatment which will make their recovery easy.

Key words : Health monitoring system, Diagnosis, IOT

Introduction

Health is a very important factor in everyone's life, people spend a huge amount of money for maintaining a healthy life. There are many people who are suffering from the fear of not getting proper treatment when required. Some fear the distance between the villages and the city, whether they would be able to make it to the hospital or not. Many surveys have proved that people often lose their lives due to lack of knowledge and guidance related health issues. It has also been noticed that majority of patients lose their life on their way to the hospital and also because of the time the doctors study their history and get back to treatment.

In this paper we introduce an advanced IOT based health monitoring system consisting of a device which would connect the patient to the health

monitoring system. We are mainly focusing on the time management, so that the patient starts getting proper treatment as soon as call for the emergency. This device consists of sensors which would give details about the patient's previous health history and would also tally the present heart beat count, blood pressure, oxygen fluctuation counts etc.

It's main purpose is to build health monitoring system for critical patients with cardiac problems to monitor his/her vital body parameters like ECG and heart rate. Before reaching the hospital, the patient's treatment should get started on the basis of the details available on the health monitoring system.

The device will be modified in such a way that it will have tabs about the previous history, Heart beat sensor, temperature sensor, analysis of ECG graph, current blood pressure level. If the counts are not normal, the doctors in the hospital will have an exact idea of what the patient is

going through.

History of Internet of Things (IOT) Based Monitoring System

In the history of modern medical sciences, some remarkable work has been done by using IoT based human monitoring system. Tamilselvi *et al.*, 2020. Introduced a system which would give information about the patient by analyzing the parameters like heart beat rate, percentage of oxygen saturation, body temperature and eye movement, the raspberry pi processor is used. The drawback of his work, there was no specific measurable performance described for any patients. (Acharya *et al.*, 2020). He introduced a health monitoring system with basic detections like heart beat sensor, BP sensor, temperature, pulse rate. He used raspberry pi as processor transmitted to IOT device. The major drawback of the system is that no interfaces for data visualization are developed. (Banerjee *et al.*, (2020). He introduced a sensor to detect pulse rate with the use of a noninvasive technique. The proposed system correspondingly showed digital results and made it work efficiently. This method was proved likely to be more reliable than any other invasive techniques. (Gregoski *et al.*, 2012). He proposed a system with heart rate sensor. The system was designed in such a way that the finger of the patient was placed on the camera light to check his blood flow level. The proposed system provided explained as system with advanced wireless technology which transmits patient's pulse rate to the device. It has a advanced feature for the heart beat parameter, patient's heart beat rate could be transmitted by just looking at their device and not by using their hands. This device is helpful, but it is not feasible if continuous heart monitoring is needed. Oresko *et al.*, (2020) introduced a system which could provide a sensor to detect cardiovascular diseases. Equipment's were identified to provide sufficient time for detection. The proposed system however, only tracked coronary rhythm in real-time, did not track heart rate over time, and could not detect any cardiovascular disease. Trivedi *et al.*, (2017) suggested a mobile device regulated Arduino-based health parameter surveillance framework. the sensors used in this system are connected to Arduino board which transmits the data wirelessly via Bluetooth to the other person's smart phone. The readings are calculated and are kept under for observation, then the readings are transferred to the cloud and the parameters 's

threshold is observed. Nevertheless, all machine elements are not integrated in one unit. Sarfraz Fayaz Khan, (2017) his paper describes about the monitoring cycle and effective healthcare monitoring system designed by using the IoT and RFID tags. The major drawback of this paper is it does not focus on medication and precaution should be taken according to the patient's health condition by controlling the appliances and providing the prescribed medicine.. Freddy Jimenez *et al.*, 2015. have focused on monitoring the parameters of the patient's health and delivering it to the doctors, patient and their family members. However, he did not explain about the maintenance of the appliances, which has been discussed in our project, it only deals with the Monitoring part and informing the relevant people about it. Felipe Fernandez *et al.*, (2014) tell us about the difficulties that we face when we use an IOT based system. It also tells us about how it is reliable for regular usage. Boyi Xu *et al.*, (2014) the proposed system is very flexible as it allows to monitor patient from anywhere. In the proposed system the continuous observation of thee patient is focused using several sensors which is connected to the Ardiuno board and the necessary data is send to the server using Ethernet shield attached to the Ardiuno board. The IOT allows to provide the health state of the patient in no time and alerts the doctor for assistance. Danilo F. S. Santos *et al.*, (2014) in this proposed paper , discussion of connected Personal Health device is done with the help of which accurate results are obtained from the sensors. A standard architecture is obtained from this paper, which connects the smart phones and the cloudbases data.

Methodology

Operating Mechanism: The operating mechanism is shown here in stepwise as outlined below:

STEP 1:.The system is introduced with a sensor which would show the heart beat graph of the patient. The heart beat of a patient i8s recorded as the patient place their finger on the sensors, the bio signal then present delivers the records to the processor (raspberry pi), with help of cloud it reaches to the monitoring systems.

STEP 2 NTC type thermistor is used as a temperature sensor. To check the body temperature of the patient.

STEP 3 ECG sensor is also inbuild which gives a proper graph. If the graph exceeds its threshold

value, then the app will alert the patient and would send a default SMS to the doctors concerned.

STEP 4 Patient's previous history is also transferred to the medical staff and the doctor for less consumption of time. And rapid start in the treatment, the newly proposed area, in this paper is that the patient and the doctors will be alerted through a SMS if there is any abnormality identified by the system.

STEP 5 All these values are transferred to PC via raspberry pi and by using the link of the URL. (Himadri Nath Saha *et al.*, 2017)

Proposed System

The reality is that the number of patients is way more as compared to the doctors and it becomes very difficult for the doctors as well to look after each patient properly. As we have learned from today's pandemic situation that the world is not ready for such immediate crisis.

The health monitoring software also helps to check the availability of the beds in the hospital. After monitoring all the parameters, the doctors can take decisions whether the patient could be treated

at home or should be admitted to the hospital. In this way the doctors would be able to focus on people who are more critical. This software is also beneficial for the people staying away from their parents, could easily access on their parents or relative through this application.

Also, the continuous monitoring by HMS, helps a patient recover after going through a surgery or major attacks. With the help of this advanced software the doctors can advise patients who needs to be admitted to the hospital and to the patients who can be treated at home. The advantages feature of this app can be stated as below

- 1) With the help of this app the doctors and the medical staffs would be able to assign beds for the patients as per need.
- 2) Human monitoring system is easily accessible for the patient as well as the doctors.
- 3) Track records of the chronic disease patients who needs monitoring regularly, so that in any emergency the medical staffs are alarmed of the worsen situation.
- 4) It is time efficient, and with the help of HMS patients receive immediate treatment on their way to hospital in ambulances itself.

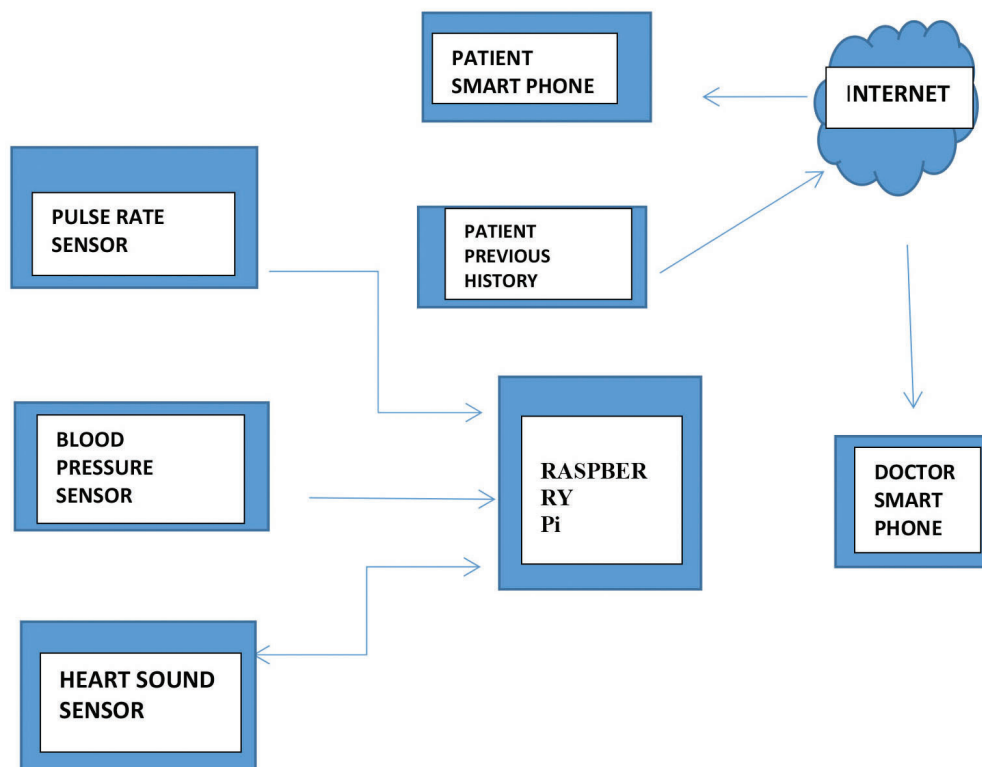


Fig. 1. Block Diagram of the Proposed System

A health monitoring system is built upon with different sensors connected to the device and they deliver the data through the processor. Here, Raspberry Pi acts as a data processor. The smartphones/pc owned by the doctors and the patient respectively works as a monitoring system.

As shown in Figure 1, the system is connected with different sensors which communicate the information and the readings such as the ECG graph, pulse rate, heartbeat count through the processor (raspberry pi) which is an IOT module. The data then are received by the doctors and the patient in their pc/smartphones in the presence of internet. If the doctor finds any abnormality, a SMS alert is sent for urgency. Through this app the doctors will also have an access to the previous history of the patient, for a rapid treatment.

Patient could also be able to check the availability of their respective hospitals. In case of any critical complication the patient could avail the treatment from the ambulance.

Conclusion

IoT Technology is a collaboration of various technologies, which helps to connect various technologies to different devices in the presence of different network. The proposed system is designed for the betterment of people. It helps to connect the patient and the doctor within few seconds. With the help of this app doctors can be communicated worldwide through internet. The proposed project is a modern system developed with several sensors, which would give a quick reading of analysis of the patient, a SMS alert system is developed which will alarm the doctor if the threshold value is reached. The model is built in a way that if the patient is critical and an immediate action is to be taken then the patient can look for the availability of hospitals through the app, calling for ambulance is done from the system, the system provides all the previous history of the patient so that without further due the treatment could be started from the ambulance itself. This will definitely create a difference for the betterment of the patient. This system is helpful for the people who need 24/7 healthcare services. This system is of low maintenance and it also is cost efficient.

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