

Survey Paper on Heart Attack Detection and Heart Beat Monitoring using Augmented Reality and IoT

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Abstract

This paper is focused on implementing a heartbeat monitoring and heart attack detection system using Internet of things and Augmented Reality. These days we have an increased number of heart diseases including increased risk of heart attacks. The sensor is interfaced to a particle photon that allows checking heart rate readings and transmitting them over internet. The user may set the high as well as low levels of heart beat limit. After setting these limits, the system starts monitoring and as soon as patient heart beat goes above a certain limit, the system sends an alert to the controller and alerts the concerned user. Also, the system alerts for lower heartbeats. Whenever the user logs on for monitoring, the system also displays the live heartbeat of the patient in augmented view along with graphical representation of heart beats per minute and the same data is stored in the cloud and can be accessed by concerned users. Also, the system sends an alert for lower heart beats; the system displays the heart rate. Thus concerned ones monitor heart rate as well get an alert of heart attack of the patient immediately from anywhere and the person can be saved on time.

Keywords: - *IoT, Augmented Reality, Heart rate sensor, Android Smart phone*

INTRODUCTION

Nowadays, heart diseases cause more than 1,500,000 deaths each year and are now the leading cause of death in the country. Usually, patients with heart diseases live at home and ask for healthcare service when they feel sick. However, usually they won't feel sick until the very late stage of the disease, and it is so late that the damages have already turned irreversible. And most of the patients die before they get any treatment. Therefore, the key to improve heart diseases healthcare performance and reduce the death rate is turning the passive healthcare mode into a pervasive way. That means the physical status of patients should be monitored by physicians, who will decide when to delivery healthcare service based on patients' real-time status.

The essential part of this pervasive healthcare mode is the real-time monitoring system. In this paper, we proposed an IoT-based monitoring system for pervasive heart diseases healthcare. This monitoring system fulfills the basic needs of pervasive healthcare for heart diseases, also takes the cost into consideration to ensure the pervasive mode as economical as possible. Furthermore, it can also be combined with real-time analysis algorithms to assess patients'

health condition and give warnings to potential attacks in advance, which can make the pervasive healthcare more intelligent. We are also implementing augmented reality concept for the realistic view of the heart rate.

LITERATURE SURVEY

Nikunj Patel, Prince kumar Patel and Nehal Patel proposed a system that has eminence of detecting heart attack with help of observing heart rate based on internet of thing. The method used a pulse sensor, Arduino board and a Wi-Fi module. After setting up the system, the pulse sensor will start sensing heart rate readings and will display the heartbeat of person on LCD screen. Also, with the use of Wi-Fi module it will transmit the data over internet.

System allows a set point which can help in determining whether a person is healthy or not by checking his/her heartbeat and comparing it with set point. After setting these limits, the system will start monitoring the heart rate of patient and immediately the heart rate goes above or below the certain limit the system will send an alert message. They implemented an android application model that will track the heartbeat of particular patient and monitor it correctly and give the

emergency message on chances of heart attack.

Gowrishankar, S., M. Y. Prachita, and Arvind, 2017, proposed a remote sensing parameter of the human body which consists of pulse and temperature. The parameters that are used for sensing and monitoring will send the data through wireless sensors. Adding a web based observing helps to keep track of the regular health status of a patient. The sensing data will be continuously collected in a database and will be used to inform patient to any unseen problems to undergo possible diagnosis. Experimental results prove the proposed system is user friendly, reliable, economical.

Aboobacker, Arith, Balamurugan, Deepak, Sathish, 2017, proposed a application in which they implemented a heartbeat monitoring and heart attack detection system using the Internet of things. These days we have an increased number of heart diseases including increased risk of heart attacks. The sensor is then interfaced to a micro controller that allows checking heart rate readings and transmitting them over internet.

The user may set the high as well as low levels of heart beat limit. After setting

these limits, the system starts monitoring and as soon as patient heart beat goes above a certain limit, the system sends an alert to the controller which then transmits this over the internet and alerts the doctors as well as concerned users. Also, the system alerts for lower heartbeats. Whenever the user logs on for monitoring, the system also displays the live heart rate of the patient. Thus concerned ones may monitor heart rate as well get an alert of heart attack to the patient immediately from anywhere and the person can be saved on time.

Ajitha, U., et al., 2017, introduce a real time remote monitoring of heart rate is presented in this paper. This system uses an alert and LCD display that are capable of monitoring the heart rate. A low cost, efficient and flexible heart rate detection and alert system using wireless module has been implemented in this paper. The sensors sense and measure the heart rate and detected signals are sent to control unit for further processing.

The processor displays the heart rate on LCD which is then preceded to alert system. If there is a large difference between the normal and measured heart rates, then an alert will be provided by the system. This system is continuous, real

time, safe and accurate in monitoring the heart rates.

Manisha, Mamidi, et al., 2016, proposed a system which will detect heart attack with the help of different scenarios i.e.; monitoring heart rate and smart blood pressure system based on internet of things.

This proposed work not only detects heart attack but also other heart diseases. To get rid of these heart attacks or to reduce these heart diseases they have developed this system to reduce the death rate.

Mayur, Suraj, Shubham, Nikhil, 2016, presented an android based portable ECG monitor. The patient will be given a small device which senses the ECG data. This small device sends the sensed data to the patient's Android mobile through Bluetooth. The Android mobile will be having an application which will be running a heart attack detection algorithm. If in case any abnormalities are found the patient will be notified through an audible alarm and first aid techniques will be shown to the patient in the phone's display. This first aid instruction will increase the chance of survival of the patient.

An ECG report will be sent to the patient's doctor through email so that he can prepare himself for the treatment. And also an SMS will be sent to the hospital that contain exact patient's location(GPS) so that help can be given at the earliest even if the patient is traveling.

The goal is to provide early heart attack detection so that the patient will be given medical attention within the first few important hours, therefore greatly improving patient's chances of survival.

Yadav, Yashasavi, and ManasaGowda, 2016, developed a system which will help to decrease the death rate due to heart attack by early detection of heart attack. They smart bands/ health bands which are easily available in market. These smart bands will continuously monitor heart rate of a user. When the heart rate of a user goes below a danger value, the near smart phone will get notified and the application installed in the smart phone will notify to concerned people of the user and will also notify to ambulance service. The smart band and the application will be connected by Bluetooth.

Mallick, Bandana, and Ajit Kumar Patro, 2016, proposed a technique of measuring the heart rate through a

fingertip and Arduino. It is based on the principal of photophelthysmography which is non-invasive method of measuring the variation in blood volume in tissue using a light source and detector. While the heart is beating, it is actually pumping blood throughout the body, and that makes the blood volume inside the finger artery to change too. This fluctuation of blood can be detected through an optical sensing mechanism placed around the fingertip.

The signal can be amplified and is sent to arduino with the help of serial port communication. With the help of processing software heart rate monitoring and counting is performed. The sensor unit consists of an infrared light-emitting-diode and a photo diode.

The IR LED transmits an infrared light into the fingertip, a part of which is reflected back from the blood inside the finger arteries. The photo diode senses the portion of the light that is reflected back. The intensity of reflected light depends upon the blood volume inside the fingertip. So, every time the heart beats the amount of reflected infrared light changes, which can be detected by the photo diode. With a high gain amplifier, this little alteration in the amplitude of the reflected light can be converted into a pulse.

Md. Ashrafuzzaman, Md Mazaharul Huq, Chandan Chakraborty, Md. Rafi Monjur Khan, Taslima Tabassum, Rashedul Hasan, 2013, proposed [9] a system capable of estimating the heart beat rate using just a camera from a commercially available smart phone and also using a mobile stethoscope to record heart sound for detecting the occurrence of heart attack and also some other heart related disease. Fuzzy Logic is used here, which is a part of Data Mining, the expert problem solution for human illness. In general, case people could not understand whenever they face this problem and this is the main cause of death. Our research is about to determine this problem earlier to reduce the death rate of heart attack.

The advantage of this method is that the user does not need specialized hardware, and he/she can take a measurement in virtually any place under almost any circumstances. In addition, the measurement can be used as a tool for health coaching applications or effective telecare services aimed in enhancing the user's well-being.

Table I. Comparison Table

Author	Year	Components/Design
Nikunj Patel, Prince kumar Patel and Nehal patel	2018	Arduino Uno, Pulse Sensor, Nodemcu
Gowrishankar, S., M. Y. Prachita, and Arvind Prakash	2017	Pulse sensor, ESP8266 Wi-Fi module, LM35 temperature sensor, Arduino Uno
Aboobacker, Arith , Balamurugan, Deepak, Sathish	2017	Pulse sensor, wi-fi module, Arduino Uno.
Ajitha, U, Aswathi P, Aswathi Sasidharan, Muhammed Salman V,Vishnu Anand, Asha Arvind	2017	Analog sensor, wireless module, ECG leads, AVR microcontroller
Mamidi Manisha , Katakam Neeraja , Vemuri Sindhura , Paruchuri Ramya	2016	MI Band 2, android phone, Big Data Analytics
Mayur, Suraj, Shubham, Nikhil	2016	ECG monitor, Android phone
Yadav, Yashasavi, and Manasa Gowda	2016	Smart band, Android phone
Mallick, Bandana, and Ajit Kumar Patro	2016	Fingertip sensor, Arduino Uno, Nodemcu
Md. Ashrafuzzaman, Md Mazaharul Huq, Chandan Chakraborty, Md. Rafi Monjur Khan, Taslima Tabassum, Rashedul Hasan	2013	Smart Phone

PROPOSED SYSTEM

Therefore proposed system is focussed on heart beat monitoring and heart attack detection using iot and augmented reality.

Particle photon is an Arduino compatible IoT board. The program code then can be written on Web IDE at the Particle's website and transferred to a registered IOT board over the internet. If the selected

Particleboard, Photon here, is switched on and connected to cloud service of the Particle, the code is burnt to the selected board over the air via an internet connection and the board starts operating according to the transferred code. Once the program code is transferred to the particle photon, it starts operating according to it. The particle photon should be connected to any internet hotspot via Wi-Fi. The Arduino compatible code on photon reads the data from the heartbeat sensor. The Augmented Reality App used in the project is built using Vuforia Augmented Reality Software Development Kit along with the Unity Editor. The development platform allows compiling a readily

available database uploads target images and creates UI elements on the Unity Editor.

The user interface can be easily linked with the downloaded database by dragging and dropping UI elements. The application can be then linked with the data logging URL of the Photon board to capture data in real time. The platform allows compiling the project to a cross platform mobile application for use on any smartphone. The augmented reality app is linked to the data logging URL. It fetches the data from the URL and displays it on the buttons in UI of the app.

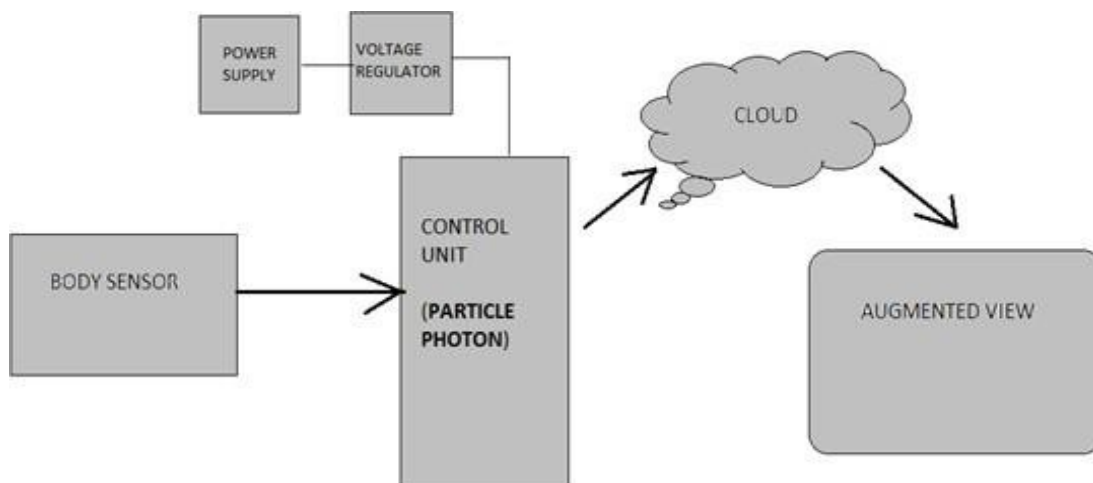


Figure: 1

COMPONENTS REQUIRED

Heart Beat Sensor



Figure: 2

Heart beat sensor is used to measure the pulse rate of heart in digital output. LED is used to detect the heart rate. The normal heart beat range is 78 bpm. This provides a direct output digital signal.



Figure: 3

Particle Photon

Particle's Photon, is a tiny Wi-Fi development kit for creating connected projects and products for the Internet of Things (IoT). It is easy to use, powerful and connected to the cloud. Particle combines a powerful ARM Cortex M3 micro controller with a Broadcom Wi-Fi chip in a tiny thumbnail size module called the P0 (P-Zero).

Advantages of Proposed System

- Portable System.
- Save risk of heart attack as you can check it in home.
- Affordable system.
- This system also helps for Hospital monitoring system.

CONCLUSION

After surveying through these many papers it is observed that we reviewed the current state and projected future directions for integration of remote health monitoring technologies into the clinical practice. Sensors when equipped with IoT intelligence, offer attractive options for enabling observation and recording of data in home and work environments, over much longer durations than are currently done at office and laboratory visits. This data, when analyzed and presented to physicians in easy-to-assimilate visualizations has the potential for radically improving healthcare and reducing costs. In this way we are developing the system which able to detect any heart anomalies and heart attack by tracking heartbeat of a user. In coming future as the technology gets advance more feature will be added to the smart bands.

This proposed system will help old age people to track their heart rate and in case of any heart anomalies it will notify to emergency contact. It can also be used by the users who have just undergone to heart surgery. It combines the design and problem solving skills of engineering with medical and biological science to improve patient's health care and the quality of life of individuals. This project will eventually reduce man power in the very near future.

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