



HEART ATTACK DETECTION AND HEART RATE MONITORING USING ARDUINO & IOT

S. SATHYARAJ¹, P. HARIHARAN², M. JOTHIBASU³, S. KAVITAMILAN⁴, L. MAHENDRAN⁵

¹ ASSISTANT PROFESSOR ^{2,3,4,5} UG SCHOLAR

BIOMEDICAL ENGINEERING,

GNANAMANI COLLEGE OF TECHNOLOGY.

ABSTRACT

In this project we are implementing 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 microcontroller 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.

Keywords: Pulse, Temperature, Internet technology and IoT.

1. INTRODUCTION

In the new era of communication and technology, the explosive growth of electronic devices, smart phones and tablets which can be communicated physically or wirelessly has become the fundamental tool of daily life. The next generation of connected world is Internet of Things (IoT) which connects devices, sensors, appliances, vehicles and other “things”. The things or objects may include the radio-frequency identification (RFID) tag, mobile phones, sensors, actuators and much more. With the help of IoT, we connect anything, access from anywhere and anytime, efficiently access any service and information about any object. The heart is one of the most important organs in the human body. It acts as a pump for circulating oxygen and blood throughout the body, thus keeping the functionality of the body intact. A heartbeat can be defined as a two-part pumping action of the heart which occurs for almost a second. It is produced due to the contraction of the heart. When blood collects in upper chambers, the SA (Sinoatrial) node sends out an electrical signal which in turn causes the atria to contract.

This contraction then pushes the blood through tricuspid and the mitral valves; this phase of the pumping system is called diastole. The next phase begins when the ventricles are completely filled with blood. The electrical signals generating from SA node reach the ventricle and cause them to contract. This phase of the pumping system is called systole. The tricuspid and mitral valves are closed tightly to prevent the backflow of blood; the pulmonary and aortic valves are opened. This system can detect pulse, temperature regularly with the help of sensor. Doctor can set the threshold for all parameters. If these parameters cross the maximum limit, System send notification on server through WIFI. In the new era of communication and technology, the explosive growth of electronic devices, smart phones and tablets which can be communicated physically or wirelessly has become the fundamental tool of daily life. The next generation of connected world is Internet of Things (IoT) which connects devices, sensors, appliances, vehicles and other “things”.

The things or objects may include the tag, mobile phones, sensors, actuators and much more. With the help of IoT, we connect anything, access from anywhere and anytime, efficiently access any service and information about any object. The aim of IoT is to extend the benefits of Internet with remote control ability, data sharing, constant connectivity and so on. Using an embedded sensor which is always on and collecting data, all the devices would be tied to local and global networks. The term IoT, often called Internet of everything, was 1st introduced by Kevin Ashton in 1999 who dreams a system where every physical object is connected using the Internet via ubiquitous sensors. The IoT technology can provide a large amount of data about human, objects, time and space. While combining the current Internet technology and IoT provides a large amount of space and innovative service based on low-cost sensors and wireless communication. IPv6 and Cloud computing promote the development of integration of Internet and IoT.

It is providing more possibilities of data collecting, data processing, port management and other new services. Every object which connects to IoT requires a unique address or identification with IPv6. There are so many people in the world whose health may suffer because they do not have proper access to hospitals and health monitoring. Fig-1 Internet of Things the Internet of things (stylised Internet of Things or IoT) is the internetworking of physical devices, vehicles (also referred to as "connected devices" and "smart devices"), buildings and other items-embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. In 2013 the Global Standards Initiative on Internet of Things (IoT-GSI) defined the IoT as "the infrastructure of the information society." The IoT allows objects to be sensed and/or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer based systems, and resulting in improved efficiency, accuracy and economic benefit.

2.LITERATURE SURVEY

IOT BASED SYSTEM FOR HEART RATE MONITORING AND HEART ATTACK DETECTION

Heart rate monitoring is a vital aspect of maintaining heart health. People from different age groups have different ranges for maximum and minimum values of heart rate, the monitoring system must be compatible enough to tackle this scenario. In this paper, an IoT based system has been implemented that can monitor the heartbeat from the output given by a hardware system consisting of a NodeMCU and pulse sensor. Further, an alert system is added which is executed if the heartbeat goes below or above the permissible level given in the devised algorithm. The alert message is received by the doctor through a mobile phone application. By using this prototype, the doctors can access the heartbeat data of the patient from any location. The nurses or the duty doctor available at the hospital can monitor the heart rate of the patient in the serial monitor through the real-time monitoring system.

HEART ATTACK DETECTION & HEART RATE MONITOR USING IOT

Now a day we have an increased number of heart diseases including increased risk of heart attacks. Our proposed system user's sensors that allow to detect heart rate of a person using heartbeat sensing even if the person is at home. The sensor is then interfaced to a microcontroller 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.

HEART ATTACK DETECTION BY HEARTBEAT SENSING USING INTERNET OF THINGS IOT

We all know heart attack can kill your life in 3 attempts but now a day it can be dangerous in first attempt also. If checking our health regularly on daily basis then we can detect so many different diseases by detecting them previously, Life is precious. Many people among us lose their life to heart attack. This is because of their diet, age, less physical activity and many other factors. Heart attack is not easy to detect, to overcome and help our society from heart diseases and attack, we are developing such a system

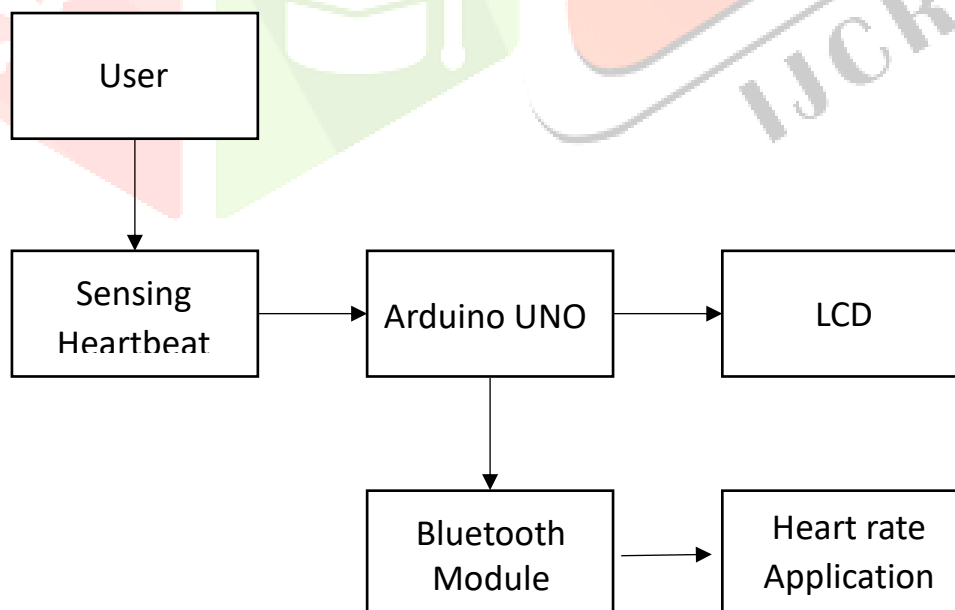
which will help to decrease the death rate and early detection a heart attack. In this system we are implementing a heart beat monitoring and heart attack detection system using the Internet of Things. The sensor is then interfaced to a microcontroller that allows checking heart rate readings and transmitting them over Internet

HEARTBEAT SENSING AND HEART ATTACK DETECTION USING INTERNET OF THINGS: IOT

In this project we are implementing a heart beat 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 microcontroller 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.

3. EXISTING SYSTEM

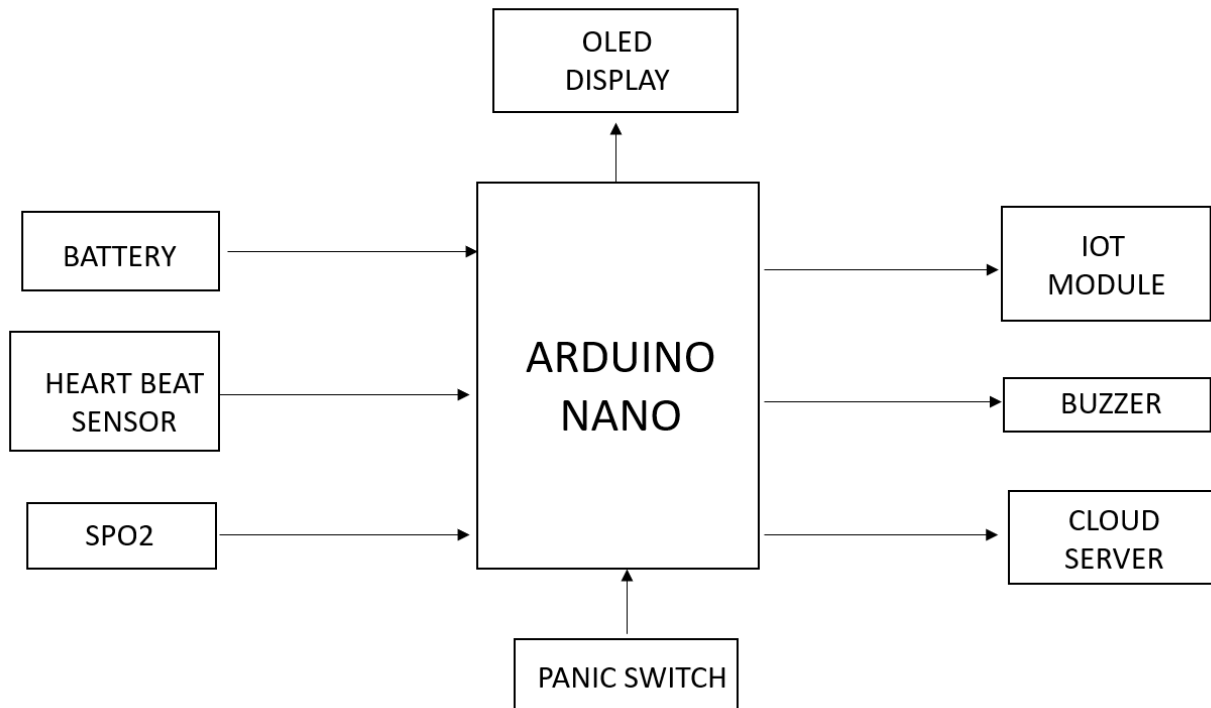
The Heart Rate Monitoring system is developed using IOT technology with an objective of detecting the heart beat of the patient in order to monitor the risk of heart attack and also the regular check-up. Body health monitoring is very important to us to make sure our health is in excellent condition. One of the vital parameter for this device under consideration is the heart rate (HR). In this project we describe the design of low cost heart rate monitoring device from fingertips based on the Bluetooth technology. The entire system is comprised of several parts such as Heart Rate module, Android application and Bluetooth module. The Heart Rate (HR) module picks up heart rate signal by a non-invasive technique (Photoplethysmography) from the subject (patients) and sends it (signal) wirelessly to computer or android application using Bluetooth module. The data received from heart rate module can be saved and viewed for further medical usage. The result from this device prototype can be utilized for various clinical investigations, indeed these Bluetooth's signal can be transmitted between 15 to 20 meters' radius.



4. PROPOSED SYSTEM

This paper proposes of measuring technique of heart rate by using pulse sensor, Arduino microcontroller, and Android Smartphone. It is based on the principle of measuring the variation of blood volume in our body using a light source and detector. The sensor consists of an infrared light-emitting-diode (LED) and a photodiode. The LED transmits an infrared light into the fingertip which is reflected

back from the blood inside of finger arteries. The system makes use of heart beat sensor to find out the current heart beat level and display it on the OLED screen. The transmitting circuit includes AVR family microcontroller interfaced to OLED screen and this transmitting circuit is powered by 12V transformer. Similarly, the receiving circuit includes AVR family microcontroller and RF receiver and also has a 12V transformer. The receiver circuit also includes LED light and a buzzer which are used to alert the person supervising the heartbeat rate of the patient and turns on the LED light and buzzer as soon as the heartbeat level of the patient does not fall within the normal heart beat level set. Now we make this system universal for all the hospital rooms. Operator can seat in single place and able to monitor all the patients. The sensor takes under 15 seconds to detect the value of the heart rate. Notification will be sent the heart rate such as under normal conditions (BPM, Beat Per Minute).



5. HARDWARE COMPONENTS

Arduino Nano
 OLED
 7805 Regulators
 Panic Switch
 Pulse Sensor
 Esp8266 Module
 Buzzer
 Spo2 Sensor
 Temperature Sensor

6. CONCLUSION

In These days we have an increased number of heart diseases including increased risk of heart attacks. Our proposed system user's sensors that allow to detect heart rate of a person using heartbeat sensing even if the person is at home. The sensor is then interfaced to a microcontroller 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. And IoT-based human heartbeat rate monitoring and control system is developed. This system uses the capability of a heart pulse sensor for data acquisition. A human's heartbeat is captured as data signals and processed by the microcontroller. The processed data are transmitted to the IoT platform for further analytics and visualization. Experimental results obtained were found to be accurate as the system was able to sense and read the heartbeat rate of its user and transmits the sensed data via Wi-Fi to the Android mobile app. From the results obtained, it was found that the heartbeat rate of low if >40 and 60 and 100.

7. REFERENCE

- [1]. A microcontroller based automatic heart rate counting system from fingertip Mamun AL, Ahmed N, ALQahtani (JATIT) Journal OF Theory and Applied technology ISSN 1992-8645.
- [2] Heartbeat and Temperature Monitoring System for remote patients using Arduino Vikram Singh, R. Parihar, Akash Y TangipahoaD Ganorkar (IJAERS), International Journal of Advanced Engineering and Science eissn2349-6495.
- [3] A GSM Enabled Real time simulated Heart Rate Monitoring and control system Sudhindra F, Anna Rao S.J, (IJRET) International Journal of Research in Engineering and Technology, e ISSN 2319-3163.
- [4] Heart beat Sensing and Heart Attack Detection Using internet of things: IOT Aboobacker sidheeque, Arith Kumar, K. Sathish, (IJESCE) International Journal of Engineering Science and Computing, April 2007
- [5] A Heartbeat and Temperature Measuring System for Remote Health
- [6] Monitoring using Wireless Body Area Network Mohammad Wajih Alam, Tanin Sultana and Mohammad Sami Alam International Journal of Bio Science and Bio-Technology Vol.8, No.1 (2016)
- [7] Heartbeat Monitoring Alert via SMS 2009 IEEE Symposium on Industrial Electronics and Applications October 4-6, 2009, Kuala Lumpur, Malaysia. Warsuzarina Mat Jubadi, Siti Faridatul Aisyah Mohd Sahak Dept. of Electronics Engineering University Tun Hussein Onn Malaysia Batu Pahat, Johor, Malaysia.
- [8] J. Allen, "Photopltysmography and its application in clinical physiological measurement," Physiol. Meas, vol. 28, pp. R1 – R39, 2007.
- [9] Wikipedia (2016). Bluetooth. [Online]. Available: <https://en.wikipedia.org/wiki/Bluetooth>.
- [10] T. Tamura, Y. Meada, M. Sekine and M. Yoshida, "Wearable photoplethysmographic sensors – past and present," Electronics, vol. 3, pp. 282 – 302, 2014.
- [11] Mahmood, N.H.; Uyop, N.; Zulkarnain, N.; Harun, F.K.C.; Kamarudin, M.F.; Linoby, A., "LED indicator for heart rate monitoring system in sport application," Signal Processing and its Applications (CSPA), 2011 IEEE 7th International Colloquium on, vol., no., pp.64,66, 4-6 March 2011.
- [12] J. G. Webster, Design of Pulse Oximeters, 1st ed. Bristol: Institute of Physics Publishing, 1997.

