

## HEARTBEAT MONITORING SYSTEM

<sup>1</sup>Aditya Nath Rao, <sup>2</sup>Aditya, <sup>3</sup>Ruchika Doda

<sup>1,2</sup> Students, <sup>3</sup> Assistant Professor & Guide

Department of Electronic and communication Engineering  
Mahavir Swami Institute of Technology, Sonipat, India

**Abstract:** - As we all know one among the fatal problems which cause the death of humans is respiratory problems. On the off chance that checking our wellbeing consistently, at that point we can identify various sicknesses by recognizing them well in advance. Many individuals have lost their lives to coronary syndromes. Especially at this point time (Corona virus period) doctors cannot physically meet and treat the patients until and unless the situation is critical.

So, we have developed a system using Internet of Things to assist individuals and help them get immediate treatment. In this system we use a pulse sensor which when a finger is placed on it calculates the heartbeat of the person. In this system there are two segments the hardware which is used to calculate heartbeat and the other is to continuously monitor heartbeat data which is collected in the previous step. This sensor is then interfaced to an Arduino UNO microcontroller that permits checking of the heartbeat value and communicating them to the reading system

### 1- INTRODUCTION

In recent year the mortality rate is increased through the heart attack is occurred in the human being, so the heart rate analysis is very important to reduce the mortality rate in the world. The heart rate is monitoring with help of the real time sensors like heart beat sensor is used to fix on human chest and monitor every second, and the sensed data is sent to the controller if any variation is occur in the data the alert signal is send to the medical person. The heart rate is varied with respect to the human age, like the normal person having 72 bpm (beats per minute), the aged person having 90 bpm and the child having 120 bpm. In that heart rate is increasing when the human doing an exercise and the rest of the time it is going to a normal condition, but the heart rate is lower when compared to the normal range is called has a bradycardia and higher range is called as tachycardia. The heart rate analyser is fixed to the human fingertip to counting the pulse over every 30 seconds and the signal given to the controller. In existing methods, the analysed data is multiple by 2 because it has more error, many type of electronic device is measure the heart rat like ECG but the cost of this device is high. The low-cost device is available in the wristwatch type is measure the temperature also, so this type of device is efficient and cost effective. The principle behind the working of the Heartbeat Sensor is Photoplethysmography. According to this principle, the changes in the volume of blood in an organ is measured by the changes in the intensity of the light passing through that

organ. Usually, the source of light in a heartbeat sensor would be an IR LED and the detector would be any Photo Detector like a Photo Diode, an LDR (Light Dependent Resistor) or a Photo Transistor. With these two i.e., a light source and a detector, we can arrange them in two ways: A Transmissive Sensor and a Reflective Sensor. In a Transmissive Sensor, the light source and the detector are place facing each other and the finger of the person must be placed in between the transmitter and receiver. Reflective Sensor, on the other hand, has the light source and the detector adjacent to each other and the finger of the person must be placed in front of the sensor.

### 2 - LITERATURE SURVEY

#### 2.1 EXISTING SYSTEM

There have been many methods developed to ensure that the heartbeat rate of a human is under control. All these methods have the similar drawback of accuracy. It can cause a life to death. To overcome this many methods have been proposed in this field as follows

- FINGERTIP BASED HEARTBEAT MONITORING SYSTEM USING EMBEDDED SYSTEMS-2017.

A journal paper on “FINGERTIP BASED HEARTBEAT MONITORING SYSTEM USING EMBEDDED SYSTEMS” got published in 2017 where the heartbeat rate is counted based on the ECG device.

In recent technological innovations in the field of disease prevention and maintenance of patient health have enabled the evolution of fields such as monitoring systems. Heart rate is a very vital health parameter that is directly related to the soundness of the human cardiovascular system. It can be measured either by the ECG waveform or by sensing the pulse - the rhythmic expansion and contraction of an artery as blood is forced through it by the regular contractions of the heart. The pulse can be felt from those areas where the artery is close to the skin. This paper describes a technique of measuring the heart rate through a fingertip and Arduino. It is based on the principal of Photo Phelthysmo Graphy (PPG) 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 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.

2018 IEEMA Engineer Infinite Conference (eTechNxT)

Another paper on "SMART HEART RATE MONITORING SYSTEM" predicts the heart rate using infrared transmitter and receiver circuits where Photoplethysmography (PPG) implemented.

Heart rate, or pulse, is one of the vital signs used to measure basic functions of human body. Heart rate is the number of times one's heart beats per minute. The method that has been used to measure heart rate in this project is widely known as photoplethysmography (PPG). The constructed device can be used to find out the heart rate of a person and to analyse readings using existing software. Theoretically, any body part can be used to measure heart rate through the sensor of the device, although fingertips and earlobes are commonly targeted.

Arduino based Wireless Heart-rate Monitoring system with Automatic SOS Message and/or Call facility using SIM900A GSM Module Publisher: IEEE Saikat Mukherjee; Arpita Ghosh; Subir Kumar Sarkar

Another paper on "ARDUINO BASED WIRELESS HEART-RATE MONITORING SYSTEM WITH AUTOMATIC SOS MESSAGE AND/OR CALL FACILITY USING SIM900A GSM MODULE" uses Arduino Lilypad as the main governing microcontroller to transmit circuit wearable.

This paper represents a design and implementation of a Wireless Heart rate monitor system using ARDUINO Lilypad which is enabled with the feature of sending SOS messages or calls through GSM module. Upon monitoring if abnormal conditions arise, a call-ring (for 5 sec) or message (customized message) will be sent to a predefined mobile number depending upon how bad the situation is. There are two parts of the whole process, a transmitting circuit, and a receiving circuit. The most important part (the transmitter section) for any medical assistance system is the part which will be associated with the patient. So it has to be easy to use and most importantly easy to carry. In this work ARDUINO Lilypad has been used as the main governing microcontroller board which makes the transmitting circuit wearable. The patient only needs to wear the transmitting circuit in his/her hand with the Pulse sensor attached to the finger. A RF module has been used to make the data transmission wireless and the programming has been done in ARDUINO IDE. Keywords— ARDUINO Lilypad, Pulse Sensor, RF Module, ARDUINO UNO, SIM900A GSM Module.

## 2.2 PROPOSED SYSTEM

The proposed system is based on the working of infrared light is passing to the blood value and analysis the heart rate. In this device is placed on the human fingertip and measure the heart rate through heart beat sensor and send the signal to the controller and GSM. First the sensor is fix into the human fingertip the blood is circulated to the fingertip at the time sensor infrared light is passing to the photo diode via blood value to measure the pressure of blood and this measured value is given to the arduino controller. The controller analysis the sensed value and threshold value if any difference occurs in the output the controller send the signal to user via GSM, also the arduino controller display the value

of sensor output in the LCD display. The heart beat sensor having the photo diode and IR sensor, the working of this sensor is IR passed to the finger one side and the photo diode is receiving the signal and measure the pulse, blood count for 30 seconds. The intensity of the blood is decrease and increase is respect to the heart rate, so easily found the heart is normal or abnormal. The sensor measure value is converted into the voltage variation respect to the op-amp function and the output value is given to the controller in DC voltage from. The communication of this heart analysis system is using the GSM module, this module send the data through the user mobile in the range of 850MHz to 1900MHz frequency band of this proposed system communication. In this proposed system the output value is send to the user via mobile and also display value in the LCD display to the consumer. The LCD interfacing to the arduino is very simple and easy steps, the display coding is return in the controller to show the output value of the sensors. The 16\*2 LCD display is mostly used in the proposed system, the '16' is denote the how many characters in the line and '2' is denote to the how many rows in the display, 20\*4 display is also available in the market '20' is denote 20 characters of the line is available and '4' is the how many rows are present in the display is shown in LCD. The 14 pins are available in the LCD display '8' pins are data, '2' pins are power and '3' pins are control pins contrast adjustment is having one pin this is the pin details of the LCD display.

## 2.3 OBJECTIVE

Individual can check their heartbeat rate by just using our device and their very own mobile phone. Those who constantly needs to keep track of their heartbeat rate can just use the device and their mobile phone where it shows the increase and decrease of the heartbeat rate. Avoid travelling to clinic and hospital saves the hassle.

## 3 - RESEARCH METHODOLOGY

Heartbeat and Temperature sensor will help reduce disease in the community. The date research collected by many highly knows doctors were used as our data of programming. The users will be able to monitor their heartrate so that they can keep track of any unexpected disease that might hit or get to them.

### HARDWARE

Nowadays, people facing problem to measure temperature and heart beat frequently. People need to used thermometer for measure temperature which takes time and for heart beat we have to go to the clinic or hospital. If got once device to measure the temperature and heart rate in frequently, it will be easier to keep the body hydrated and stable. Thus, this is one key to prevent heatstroke and know about heart rate easily.

### INTERFACE

Nowadays people are facing problems to monitor body temperature and heart rate frequently. Most of the people are now busy with their work. As proven by articles in newspaper, states that most of the parents are not concern

about their children body temperature and heart rate. Furthermore, it also very hard for them to monitor their body temperature and heart beat when they are at workplace and their children at school. So people need a device that can monitor and record body temperature and heart beat at a distance. This will reduce time and cost. Internet of Things (IoT) system will help the community by providing a lot of advantages.

**SOFTWARE**

Nowadays, people facing problem to measure heartrate and temperature frequently. People need to go nearby clinic for measure of heartrate and temperature which takes time. Thus, hydration is one of key to prevent heat stroke. Everyone need to monitor their body temperature and heartrate time to time so that, can prevent them from heat stroke. If got one device to measure the temperature and heartrate time to time it will be easier to keep their body hydrated from anywhere based in Internet of Thing (IoT).

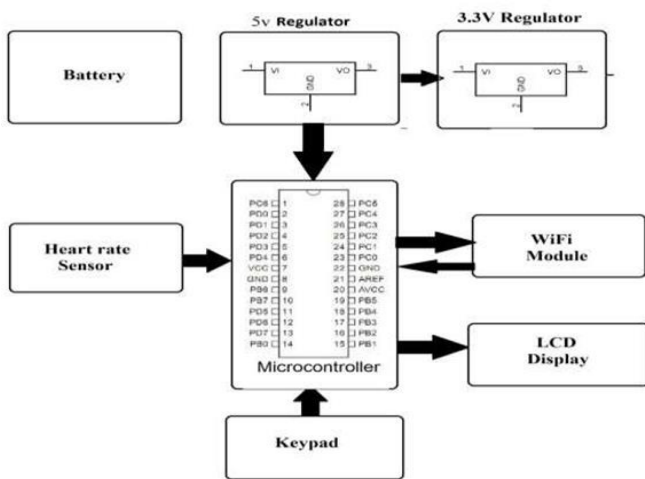


Figure 3.1: Flow Chart

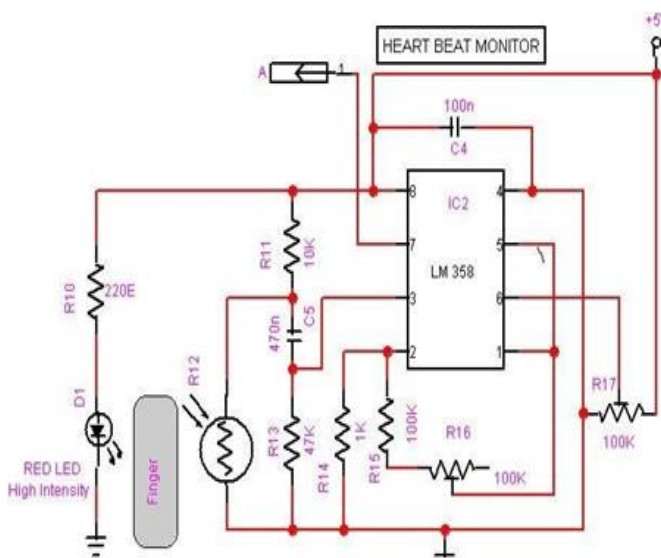
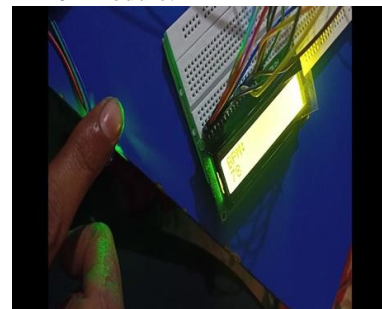


Figure 3.2: Circuit Diagram

**4-RESULT AND CONCLUSION**

**4.1 RESULT**

- Temperature Measurement When the power is turned on, all the LEDs on PCBs starts glowing, indicating that circuit is working properly. Here there is a use of the industrial temperature sensor i.e., LM 35 which gives us room temperature in °C. That temperature is displayed on the LCD.
- Heartbeat Measurement There is a cavity for measurement of the heartbeat, which consist of an arrangement of LED and LDR. Patients' finger in placed between LED and LDR, and the heart pulses are detected. The analog voltages are further processed with an operational amplifier LM 358, and this chip has two built in OPAMPs. Result is displayed on the LCD. This collected data is transmitted using nRF24L01 module. This data is received at the receiver section using same nRF24L01 module.



**5-CONCLUSION**

- We have analyzed the wireless patient health monitoring system of temperature and heartbeat of human's using nRF24L01. The heartbeat was measured with the help of photodiode and bright LED while the temperature was measured by using precision integrated temperature sensor LM35.
- Both the data were processed in the arduino uno and sent to the remote end wirelessly by using nRF transmitter and received at the remote end by using nRF receiver. The received data was processed in the Arduino uno and the data measured was displayed successfully with the help of LCD at the remote end.
- The wireless communication was preferred because it gives greater mobility to the sensor equipment and reduces the cost wherein there are multi-transmitting sections.

**APPLICATION**

- An optical heart rate sensor measures pulse waves, which are changes in the volume of a blood vessel that occur when the heart pumps blood. Pulse waves are detected by measuring the change in volume using an optical sensor and green LED.
- A simple project involving Arduino UNO, 16x2 LCD and Heartbeat Sensor

3. Module is designed here which can calculate the heart rate of a person. This project can be used as an inexpensive alternative to Smart Watches and other expensive Heart Rate Monitors.
4. Can be used in sports activities do get an accurate reading of the heartbeat.

#### FUTURE SCOPE

Design the system is implemented to efficient measuring and the reduction of noise in the output of the communication system. Also, to implement the design of controller and GSM module likes transmission efficiency.

To implement the device accuracy is done on various people in different ages and more testing is taken to the system is developed.

The temperature sensor is also implemented in the system like the LM35 is used to measure the body temperature and given to the controller for accurate operation.

In future more health parameters are found patient and monitor in single device is implemented, so the time is saved and identify more problems in patient health.

The pulse measurement is implemented to the patient is very important to take a action in very short period, this is help to rescue the patient in quick way.

The controller is given the signal to mobile via GSM module to alert a user and the GPS is implemented is used to easily find the location of patient area.

This proposed system is implemented in the minimizing of the PCB space is very useful to wear the sensor in patient body.

The proposed system kit is implemented to inbuilt battery is useful to wear in long distance.

#### REFERENCES

1. Matina Kiourexidou, Konstantinos Natsis, Panagiotis Bamidis, Nikos Antonopoulos, Efthymia Papathanasiou, Markos Sgantzios, Andreas Veglis "Augmented Reality for the Study of Human Heart Anatomy" International Journal of Electronics Communication and Computer Engineering 2015.
2. Souvik Das "The Development of a Microcontroller Based Low-Cost Heart Rate Counter for Health Care Systems" International Journal of Engineering Trends and Technology- Volume4Issue2- 2013.
3. Embedded Lab. Introducing Easy Pulse: A DIY photoplethysmographic sensor for measuring heart rate. <http://embedded-lab.com/blog/?p=5508>, 2012.
4. Sankar Kumar S, Gayathri N, Nivedhitha D, Priyanka A S "A Cost-effective Arduino Module for Bedridden patient's Respiratory Monitor and Control" International Journal of advanced research trends in engineering and technology (IJARTET) VOL. II, SPECIAL ISSUE XXI, MARCH 2015.
5. Ch.Sandeep Kumar Subudhi,'Intelligent Wireless Patient Monitoring and Tracking System (Using Sensor Network and Wireless Communication)", 2014.
6. Bhagya Lakshmi.J.M1 Hariharan.R2 Udaya Sri.C3 Nandhini Devi.P4 Sowmiya.N "Heart Beat Detector using Infrared Pulse Sensor" IJSRD - International Journal for Scientific Research & Development| Vol. 3, Issue 09, 2015.Based\_Automated\_ENotice\_Board\_using\_Mobile\_Technology
7. Embedded Lab. PC-based heart rate monitor using Arduino and Easy Pulse sensor. <http://embeddedlab.com/blog/?p=7485>, 2013."
8. Hashem et al., —Design and Development of a Heart Rate Measuring Device using Fingertipl, IEEE International Conference on Computer and Communication Engineering (ICCCE), ISBN: 978-1-4244-6235-3, 2010.
9. Embedded Lab"Arduino measures heart beat rate from fingertip