Heart Monitoring System

Mohamed Rizwan K

Department of Networking and Communications

SRM Institute of Science and Technology Kattankulathur, India, mk2912@srmist.edu.in

Yashu Youwaraj

Department of Networking and Communications

SRM Institute of Science and Technology Kattankulathur, India, yy3512@srmist.edu.in

Abstract

The Heart Monitoring system is developed with the objective of monitor a patient or person heartbeat to detect any heart problem like heart failure and heart attack and for regular check-up and this is developed using IOT technology. The important data for this technology is Heart Rate which is used to decide or react to patient if there is any problem. The heart rate data is gathered using by a non- invasive technique Photoplethysmography and the data is sent it to a computer and process the data and alert if there is any problem. The data received from heart rate module can be saved and viewed for further medical usage and this data can be used for further clinical usage.

Introduction:

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 (Sino Atrial) 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 filled with blood. The electrical signals generating from SA node reach the ventricle and cause them to contract. In today's scenario, health problems related to heart are very common. Heart diseases are one of the most important causes of death among men and women. It claims approximately 1 million deaths every year. Heart rate is a critical parameter in the functioning of the heart. Therefore, heart rate monitoring is crucial in the study of heart performance and thereby maintaining heart health.

PHOTOPLETHYSMOGRAPHY:

Photoplethysmography (PPG) is a low cost optical technique that is able to detect volumetric changes in blood flowing through capillaries from the skin surface. Photoplethysmography was developed in the late 1800s where scientists observed real-time blood flow using light bulbs. It was in the late 1930s that the term photoplethysmography was coined by scientists. With advancement in technology, PPG developments now focus on consumer applications using wearable devices. These wearable devices are usually connected to a peripheral device to interpret the results obtained. Today, those peripheral devices have been replaced by smart phones to deliver data to consumers in a user friendly manner. Interfacing with smart phones is done using Bluetooth technology. Bluetooth is a low power consuming wireless communication technology that enables users to connect, transfer, and receive data over the air between two compatible devices.

LITERATURE SURVEY:

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 : In this research paper heart- rate signals were collected from finger or ears using IR TX-RX (Infrared Transmitter and Receiver pair) module which was amplified in order to convert them to an observable scale. A low pass filter was used to filter inherent noise

- 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 : In this research paper implementation of heartbeat monitoring and Heart attack detection system using Internet of things is shown. These days we saw increased number of heart disease and heart attack.

- A Heartbeat and Temperature Measuring System for Remote Health Monioring using Wireless Body Area Network Mohammad Wajih Alam , Tanin Sultana and Mohammad Sami Alam International Journal of BioScience and Bio-Technology Vol.8, No.1 (2016) :

- 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 :

Software Requirement:

1. Arduino IDE

2. Blynk App

Arduino IDE

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.

Blynk App

Blynk is an IoT platform for iOS or Android smartphones that is used to control Arduino, Raspberry Pi and NodeMCU via the Internet. This application is used to create a graphical interface or human machine interface (HMI) by compiling and providing the appropriate address on the available widgets.

Hardware Requirment:

Arduino UNO

Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button.

PULSE SENSOR:

It is an Open Source heart rate monitor which considered as a PPG device used to monitor the non-invasive heart rate. It measures the real- time heart beats and calculates BPM with the aid of algorithms implemented by Arduino. The normal operating voltage is +5V or +3.3V and current consumption of 4mA. The sensor has two sides, one side consists of an LED with an ambient light sensor and the other side contains circuitry which amplifies the signals and filters the noise.

HC-05 BLUETOOTH:HC-05 is a serial port Protocol (SPP) designed for wireless serial connection setup. It was chosen for its ability to simplify the circuit design Send measured data to android application and due to its compatibility with the Arduino. In addition, it was chosen over HC-06 module because it has the ability to operate as both as master and slave modules rather than just a slave in the case of HC-06. TheHC-05 has six Pins, four of them are programmable input/output lines. While the three others, one is GND and the other is for VCC.

JUMPER WIRES:

Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other withot soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed.

BREAD BOARD:

A breadboard is a solder less device for temporary prototype with electronics and test circuit designs. The breadboard has strips of the metal underneath the board and connect the holes on the top of the board.

USB cable:

USB cable is used to connect computer to the Arduino UNO board

Implementation:

In this system we use the pulse sensor with Arduino Uno and Bluetooth HC-05 module, the pulse sensor is placed on the finger and it measures the heart rate and then sends the heart rate to android mobile application via

Bluetooth. Early recognition of the disease is very vital in preventing more complications in the future

The Matt Broker is Blynk App

Diagram:
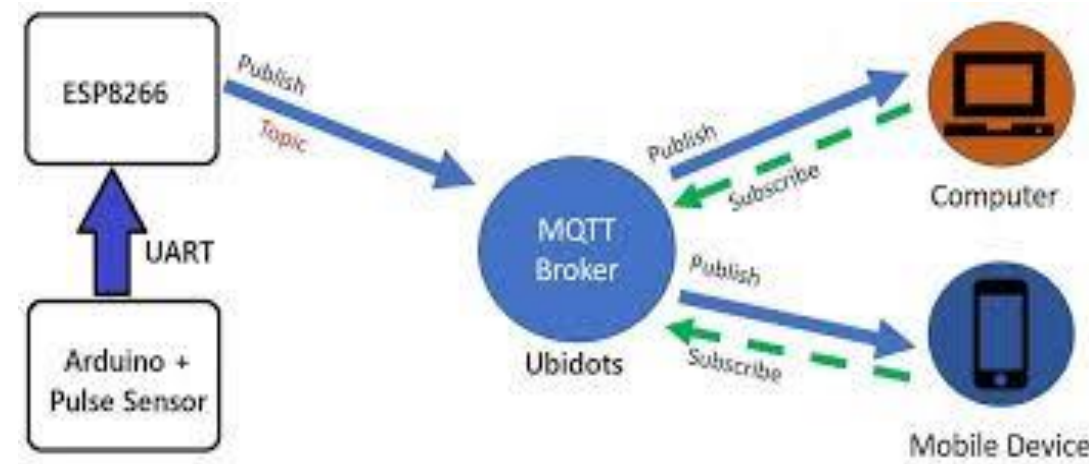
Result:

Low Pulse Rate: The low pulse rate is displayed when the heart rate per BPM(Beats per minute) is>40 and <60. The low pulse rate may lead to medical complications this indicates that the patient needs the doctors help(ex: Low BP)

Normal Pulse Rate: The normal pulse rate ranges is between >60 and <100 which indicates that the patient has the normal range pulse rate with no complication.

High Pulse Rate: The high pulse rate is between>100 and <150 which indicates the patient has the high pulse range that could result in the heart related diseases(ex: High Blood Pressure)

CONCLUSION

An 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 humans 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 Bluetooth to the Android mobile app(Blynk) . From the results obtained, it was found that the heartbeat rate of low if >40 and <60, medium if >60 and <100, high if >100 and <150. Furthermore, this research paper presents an approach that is flexible, reliable, and confidential for a heartbeat rate monitoring and control system using sensor network and

IoT technology. The implemented device can be deployed to the medical field to assist the medical practitioners to do their work efficiently and reliably without difficulties.

Reference:

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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