Real Time Monitoring and Detection of Heart Attack Using Wireless Sensor Networks

AnushreeP[1], Harshitha R Aradhya[2], Arpitha S Nadig[3], Dayana C D[4], Mr. Sangam Kumar G.H[5]

[1, 2, 3, 4] Dept of ECE
[5]Asst. Prof., Dept of ECE
[1, 2, 3, 4, 5] Don Bosco Institute of Technology, Bengaluru, India

Abstract- *In today's fast moving world it has become very important to keep one's health always in check so that they could excel in all aspects of life . The most health risks that occur nowadays are mostly related to heart .World Health Organization (WHO) states that cardiovascular diseases are the world's biggest killers, asserting 17.1 million carries on with a year. Angina Pectoris, Arthrosclerosis, Convective heart failure, Coronary artery disease, Heart attack, Cardiac dysrhythmia, Ventricular fibrillation, Tachycardias are the other main cardiovascular diseases. The principle aim of this project is to build a wireless sensor network framework using IOT that can constantly monitor and detect cardiovascular disease experienced in patients at remote areas and other far off areas. This system is designed to implement a heartbeat monitoring and heart attack detection system using the IoT. The sensors are interfaced onto a micro controller so as to allow the checking of heart pulse readings and transmitting them over Internet.*

Keywords*- Arduino mega, IOT, WSN [wireless sensor network], BLYNK App, cloud based surveillance system, Bluetooth module,*

I. INTRODUCTION

Myocardial Infraction which is also most commonly known as "heart attack" in layman's term is said to be the most common heart risks that occur in human beings in the present days.

Heart Attacks are caused nowadays due obesity, stressful life ,unhealthy habits ,growing poverty ,lack of access to good hospital facilities, and also because of ignorance.

The proposed system is to real time monitor and detect heart attack in human beings with the help of wireless sensor networks, here the system is incorporated with a Bluetooth module which serves as a mode of wireless sensor networks. The system is capable of detecting heart pulse and the temperature of the human body with the help of some sensors. Doctors who are monitoring the particular patient can prescribe and authenticate only that patient to use this device,

hence providing security of information. The doctor are given the privilege to set the threshold for all the criterions. If the variables tend to cross the maximum limitation ,the device sends notification through Bluetooth.
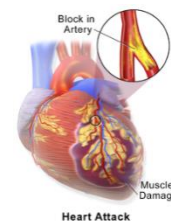

During this time of a growing era and technology there are growing needs of ease in operating any device. The device must be very smooth in working and indeed must satisfy the needs of the user. The massive broadening of electronic devices, smart phones and tablets which can be connected via physical or wireless means has become the basic tool of daily life. The present cohort of a connected world is basically connected wirelessly using a most advance technology – IOT(internet of things).This technology connects many devices like smart phones, actuators, sensors etc.

The main aim of incorporating this technology is to obtain full advantage of IOT to connect anything, anywhere and anytime. The main objective of IOT is to grow the advantages of internet with an ability of remote controlling, sharing of data, constant connection and soon. An embedded sensor device is used to sense the parameters and collect the data. This data is collected and stored on day to day basis in cloud and can be accessed by the hospital authorities for the regular monitoring of the patients. The present internet technology with IPv6 and the IoT along with cloud computing provides more integration between IoT and internet. There are many people in the world whose health may depreciate because they are unable to properly access the hospitals and medical facilities .The IoT majorly operates based on the Arduino UNO board. The data that is being collected from the sensors and are sent via the bluetooth module device which is connected to the BLYNK application on a smartphone. This
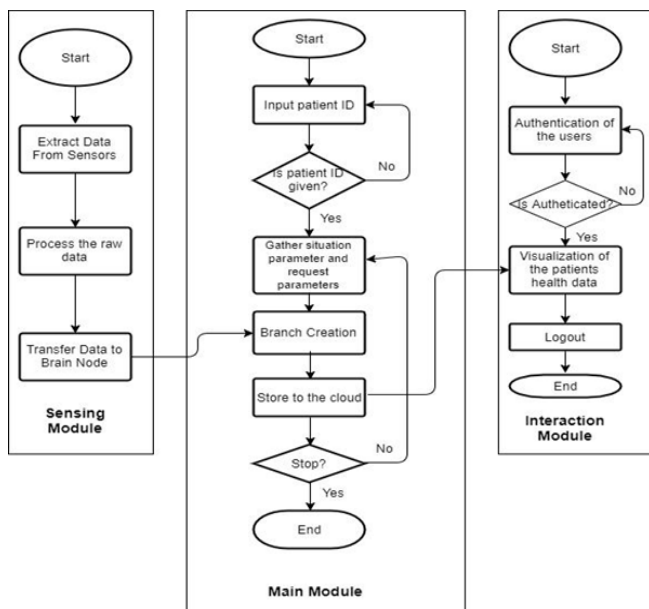
data is easily saved on the BLYNK cloud making storing of data hassle free.

II. THE PROPOSED SYSTEM

The below figures presents the system's architecture and flow diagram of this project.
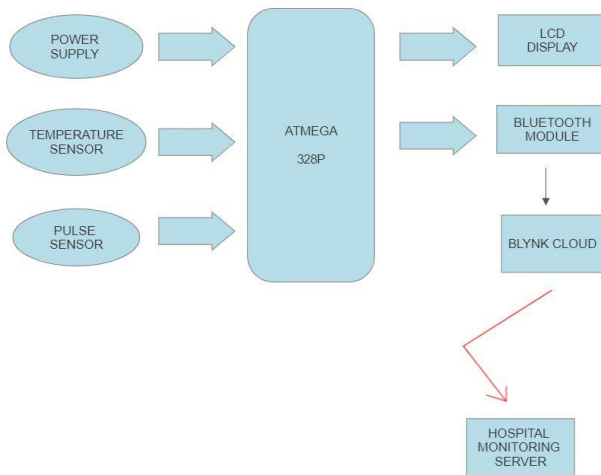
Block Diagram of the presented device

Flow chart of the Proposed System

III. WORKING METHODOLOGY

The suggested project consists of a sensor system connected wirelessly for monitoring in real-time and to detect cardiovascular disease using IoT for great efficient and speedy delivery of health forewarns.

The device is designed to detect ECG signals and also analyze the ECG signal of the authorized cardiac patient

by means remote monitoring and also delivers the data and the warning to doctors , patient , relatives ,health centre, and an extra amenity of transmitting the electrocardiogram signals and preceding records of the user to his medical advisor who is in a faraway location by using cloud storage.

The system is based on photo plethysmography like the device pulse oximeter which has LED fit in the sensor, these led flashes light on the skin of patient with pulsating blood. The light is diffused into the skin and reflected back by the tissues which contain the blood. Hence the reflected blood gives the amount of blood underneath in terms of frequency of the blood. This frequency is used to calculate the heartbeat of a patient with the help of some arithmetic computing using software programs.

The approach consist of two circuits :

   i.   Transmitter circuit,
  ii.   Receiver circuit.

Transmitting circuit consist of the power supply which here is provided by the Arduino IDE board. An AVR family is interfaced on the the arduino board with the temperature sensor and the pressure sensor for sensing the important parameters for the sensing of a patients vitals. The receiving circuit consist of a lcd display to display the values of the sensed parameters. A Bluetooth module is interfaced on the receiving circuit for connecting the system with the smartphones which is installed with the BLYNK app for efficient processing of data and storing of the data onto the BLYNK app cloud servers.Receiver circuit consist of light emitting diode light and a Piezo electric buzzer which are used to caution the user who is supervising the heart beat rate of the patient and sets on the light emitting diode light and the piezo buzzer instantly once the heartbeat level of the patient crosses the pulse rate level set threshold. This device is made available to all the hospital rooms. The authorised doctor can sit in a far of remote place away from the patient and can monitor on the patients vitals on a day-to-day basis..This is done by interfacing the Bluetooth module onto the Arduino board and connecting the Arduino system to smart phone by installing the Blynk app on the phone ,and connecting it to Arduino via phone Bluetooth.

The working of the sensors on the Tx side requires embedded C programming as to sense the required parameters. This can be done by programming embedded C programs for the specific purpose using Arduino IDE software.

IV. COMPONENTSREQUIRED

1. Heart Beat Sensor

Fig-1:Heart beat sensor

An Heartbeat sensor is a medical device that is used to sense a person's heart pulse rate in digital form . A normal human being's pulse rate ranges from 60-100 beats per minute. An optimal heart beart value is 72 bpm(beats per minute). This provides a direct output digital signal.

The heart beat sensor has LED flashes which when on flashes light on the human skin with pulsuating blood. When the light hits a blood in microvascular blood of tissue it gets reflected back at the sensor. Now this reflected light contains the amount of blood flowing and is represented in terms of frequency. This frequency is multiplied with 60 constant which gives the heart beat in terms of BPM .

2. Temperature Sensor

Fig-2: Temperature sensor

LM35 temperature sensor are precisionly integrated circuit temperature of which analog output is in terms of degree centigrade. Its temperature measurement varies from a range of -55C to 150C.There is no requirement of outsider calibration circuitry.

The sensitivity of LM35 id 10 mV/degree Celsius. It's a three terminal sensor. The sensor provides an o/p voltage which is linearly equivalent to the Centigrade temperature.
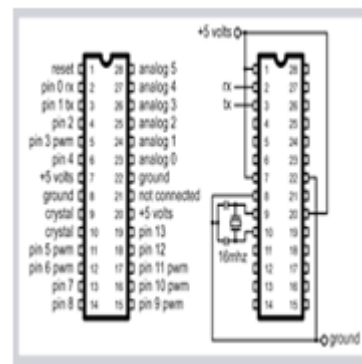
3. ATMEGA 328

Fig-3: Atmega 328

Atmega328 is an Advanced Virtual RISC (AVR) micro-controller. It can support the data up to eight bits. Atmega-328 hasa 32 kilobytes of internal built-in memory.

Atmega 328 consists of a 1 kilobyte EEPROM. This property identifies that if the electrical supply that is being supplied to the microcontroller is removed, and still, after all that it can store the information and can give results after supplying it with the electric supply. Moreover, Atmega328 holds a 2 kilobytes of SRAM.

Atmega 328 do has various other characters which make it the most preferred device in the present market. These highlights comprise of a well advanced RISC architecture, better performance, very low power consumption, real timer counter including separate oscillator, 6 pulse width modulation pins, programmable Serial Universal Synchronous Asynchronous receiver and transmitter, a programming lock for the software's security, throughput up to 20 million instructions per seconds etc. ATmega-328 is the mostly used chip in the arduino UNO.

4. BLUETOOTH

Bluetooth is a remote innovation standard utilized for trading information between fixed gadgets and cell phones over a short separations utilizing short-wavelength UHF radio waves in the industrial, scientific bands from a range of 2.402 GHz to 2.480 GHz, and for building of personal area networks . It was originally made as a wireless alternative to RS-232 data cables.
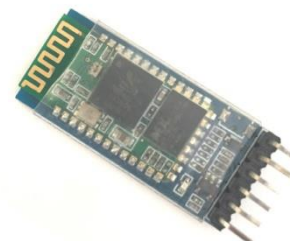

Fig-4: HC05 BLUETOOTH MODULE

5. ARDUINO IDE

The arduino (IDE) is a cross-programme application (designed for the Windows OS, macOS, LinuxOS) which is written with the assistance from C and C++ programming. It is useful in writing the programs and upload the solution onto the boards that are compatible with Arduino and also 3rd party cores and other vendor development boards. The Arduino IDE supports the languages of C and C++ using special decree of code structurings. The Arduino IDE also provides an additional program library from the Wiring project, which provides common input and output procedures.


6. BLYNK

Blynk is a Product compatible with the IOS and the Android apps to control the Arduino, Raspberry Pi over the Internet. It's an advanced dashboard where we can construct a graphic interface for our project's by simply dragging and dropping the widgets on to the project working board. Blynk was specially intended with the end goal of Internet of Things. It is capable of controlling the hardware remotely, it can show sensor information, it can store information, see it and do various other cool things.

Fig-5: BLYNK LOGO
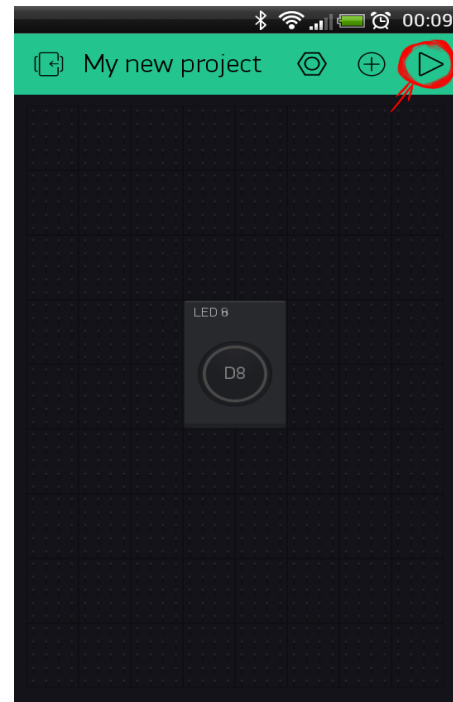
V. ADVANTAGES

1) A very small Portable system.
2) Saves from the danger of respiratory failure as you can check it in home.
3) Affordable system even for people in rural areas.
4) Temperature and Heart beat monitoring is done by a single device.
5) All Patients are observed by single individual seating in Server room in a far off spot.
6) This framework likewise helps for Hospital observing framework.
7) Easy storage of data on blynk cloud platform.

VI. CONCLUSIONS

In the upcoming days there are more chances of increased risk of heart attacks among people. The device that is presented here aids to detect the pulse rate of a person using pulse rate sensing anywhere and anytime. This device also proves to aid the hospital monitoring system, all patients who are authorized to be monitored are being under surveillance of a medica authority present in the server room. This system also assists to measure the body temperature and heart beat, pressure of a person.

VII. ACKNOWLEDGEMENT

REFERENCES

[1] Internet of things:
https://en.wikipedia.org/wiki/internet_of_things.

[2] Heart beats Monitorings and heart attacks detections, Mamdimanisha , Katakanneeraja, IJIET.

[3] Heartbeats Sensings and Hearts Attacks Detections using Internet of Things IJESC.

[4] Hearts Rates monitorings And Hearts Attacks Detections Using Wearable Device IJTRA.

[5] HEART ATTACK DETECTION BY HEART BEAT SENSING USING IoT by Dr.A.A.Gurjar, Neha.A.Sarnaik