Iot Based Myocardial Infarction Detection Using Heart Pulse Monitoring

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Abstract:- **Heart diseases have caused millions of deaths worldwide. In the past few decades due to the increased population. The major cause of sudden heart attack is due to the lack of pre-requisite care and also not proper care of emergency. Prevention and proper treatment is necessary for heart attack. People are diagnosed with symptoms like body temperature fluctuations, high bp, profuse sweating, improper cardiac pulse etc.our solution is to monitor and detect the abnormal heart rate of a person using a heart rate sensor and microcontroller. After the first hear attack, the heart muscles become weak and they lack oxygen this can be prevented earlier by detecting the abnormal heart rate and the detection of stroke in a person. The most common reason for critical situations is patient unawareness and lack of warning about the symptoms. Our project helps us to detect the myocardial infarction which causes abnormal heart rate and sudden stroke that can be detected based on iot module and the patient's location is sent to the nearby hospital using gps**.

Keywords: Myocardial Infarction, Pulse Rate, Stroke,Microcontroller, IOT module, GSM, heart rate sensors, stroke sensor.

I . INTRODUCTION

Heart disease is becoming a major cause of increasing deaths in human life as reported by the World Health Organisation (WHO). The main cause of the heart attack is due to the lack of blood supply and oxygen to the heart because of the presence of heart block in the coronary artery. This happens because the arteries that supply blood to the heart becomes harder and thicker due to the formation of cholesterol and fat which is termed as plaque. This results in a blood clot and blocks the blood supply leading to a severe heart attack. The heart muscle dies due to the lack of blood supply and this damage the heart. Basically the symptom of heart attack is detected by Electrocardiogram (ECG) which is the electrical recording of the heart rate. An abnormal ECG indicates the sudden arrival of heart attack at any time which can be a massive heart attack too. An electrical impulse initiates muscle contraction, which results in heart beating [1]. Doctors can identify the patient's condition by observing the ECG that is recorded. Some heart attacks are intense and happen suddenly while some are mild and start initially. Heart attack has several symptoms like abnormal heart pulse, chest pain, shortness of breath, stroke, sweating, body temperature variation. In our project we have used parameters like heart rate sensor and stroke sensor to detect the early heart attack. The Internet of Things (IoT) is inter communication of embedded devices using network technology. The most emerging trends in future is IoT. The parameters that are used for sensing and monitoring will send the data through sensors [3]. A buzzer is also connected to give a warning sign to the people nearby to indicate the emergency of the patient. A GPS module connected to the Microcontroller and is used to send the patient's location to the nearby hospitals during emergency. The main aim of our project is to develop a low power and more reliable outcome which gathers the information of the body and displays the data to the patient using the technology employed.

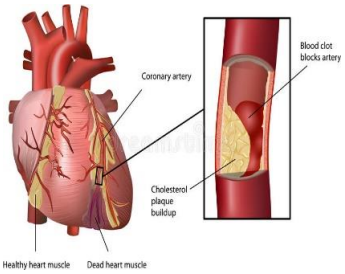

Fig1:Blood clot in the artery

II . SYSTEM METHODOLOGY

A. Heart Pulse Sensor

The heart pulse sensor is connected to the PIC microcontroller, upload the source code and run the code. It operates in 5V supply and draws 4 ma currents. LCD display is turned on to display the human-human heart rate that is obtained by the heart pulse sensor. Place your index finger in front of the heart pulse sensor and a LED (red) will blink. Place your finger lightly until the heart rate reading is displayed on the LCD.

Figure 2: Heart Pulse Sensor

B. Buzzer

A Buzzer is an electromechanical audio signalling device. It gives an alert to the surrounding people when a patient is detected with an abnormal heart pulse in case of emergencies.

C. GPS Module

GPS (Global Positioning System) is a device that helps us to identify the location. Using a proper software, the device shows the location of the patient and it also provides directions for a quick arrival during emergency. It can also be connected using Bluetooth, Compact Flash, USB or serial cable.

D. IoT ModuleESP8266

Internet of things is now in the emerging fields; physical things are embedded with electronics to generate a good reliable output to the people. ESP8266EX (simply referred to as ESP8266) is a system-on-chip (SoC) that integrates a 32-bit Tensilica microcontroller, standard digital peripheral interfaces, antenna switches, RF balun, power amplifier, low noise receiver amplifier, filters and power management modules into a small package.

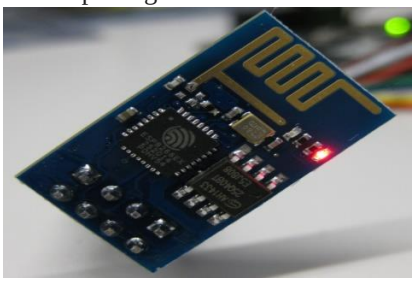

Figure 3: IoT Module ESP8266

It provides capabilities for 2.4 GHz Wi-Fi (802.11 b/g/n, supporting WPA/WPA2), general-purpose input/output (16 GPIO), Inter-Integrated Circuit (I²C), analog-to-digital conversion (10-bit ADC), Serial Peripheral Interface (SPI), I²S interfaces with DMA (sharing pins with GPIO), UART (on dedicated pins, plus a transmit-only UART can be enabled on GPIO2), and pulse-width modulation (PWM). The processor core, called "L106" by Espressif, is based on Tensilica's Diamond Standard 106Micro 32-bit processor controller core and runs at 80 MHz (or overclocked to 160 MHz). It has a 64 KiB boot ROM, 32 KiB instruction RAM, and 80 KiB user data RAM. (Also, 32 KiB instruction cache RAM and 16 KiB ETS system data RAM.) External flash memory can be accessed through SPI. The silicon chip itself is housed within a 5 mm × 5 mm Quad Flat No-Leads package with 33 connection pads — 8 pads along each side and one large thermal/ground pad in the centre.

E. Accelerometer

Accelerometer is a device that measures the acceleration of a body. Accelerometers are used to detect and monitor vibration in the human body when an electronic system is placed on their body. Modern accelerometers are MEMS (Micro Electro Mechanical Systems). It measures overall body dynamic accelerations or movements. In our project we have used accelerometer to detect symptoms like stroke or other sudden changes or vibration in the human body.This device is connected to the amplifier to amplify the signal. The output can be measured either in an analog or digital form.

III .SYSTEM DETAILS

PIC MICROCONTROLLER

PIC16f877a has its applications in a huge number of devices. It is used in remote sensors, security and safety devices,home automation and in many industrial instruments. An EEPROM is also featured in it which makes it possible to store some of the information permanently like transmitter codes and receiver frequencies and some other related data. The cost of this controller is low, and its handling is also easy. Its flexible and can be used in areas where microcontrollers have never been used before as in coprocessor applications. The PIC microcontroller PIC16f877a is one of the most renowned microcontrollers in the industry. This controller is very convenient to use, the coding or programming of this controller is also easier. One of the main advantages is that it can be write-erase as many times as possible because it uses FLASH memory technology. It has a total number of 40 pins and there are 33 pins for input and output. PIC16F877A is used in manymicrocontroller projects**.** PIC16F877A also have many applications in digital electronics. It has A, B, C, D and E ports. Here A and E ports are used for analog outputs whereas the remaining ports are used for digital outputs. The pin 1 is MCLR which is master slave pin and hence it should be given 5V supply. Port B is a bidirectional input and output ports which has TRIS AND PORT for the input and output operations.

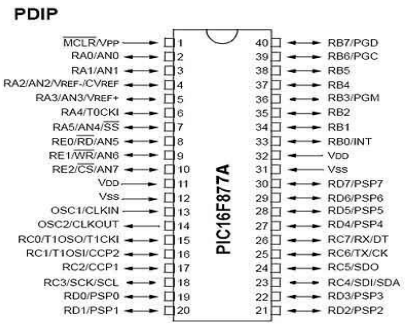

Figure 4: Pin Configuration of PIC16f877A

IV. PRPOSED MODEL

Heart attacks are bringing a huge impact to the people's life and resulting in sudden death. In order to perceive heart attacks we have introduced heart pulse sensor and accelerometer to detect the risk of heart attack in a person.

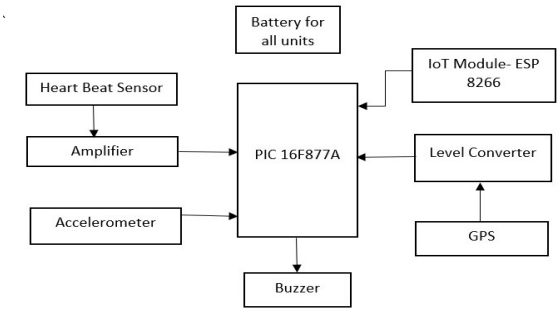

Figure: 5 Block Diagram

Heart attack patients have symptoms like abnormal heart rate, profuse sweating, chest pain and discomfort, faintness, feel sick, shortness of breath, change in body temperature, blood pressure, discomfort in one arm or both the arms and stroke. In our project with the help of PIC microcontroller we are going to detect abnormal heart pulse and the possibilities of stroke symptoms. When a person is having some discomfort their heart rate is monitored with the help of heart rate sensor and the accelerometer helps to detect any vibrations or changes in the body. Buzzer gives an alert to the surrounding people to help the patient during emergency. Using IoT module we analyse and detect the heart attack in a patient immediately. GPS module will send the location of the patient to the nearby hospital and save the patient's risk of death.

V. CONCLUSION

Generally, in this paper we proposed to save many heart attack patients and their lives of many people using IoT Module. By identifying the symptoms of abnormal heart rate pulse and variations in the body using accelerometer, we can save the life of many people in this heart attack disease. It gives great support and immediate help to the people in need. This project approach helps to save the people who are at risk of heart attack and help them immediately during emergency.

VI. REFERENCES

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