

# IOT Based Heart Attack Detection and heart Rate Monitor

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**Abstract** - Nowadays numerous persons are mislaying their life owing to heart attack and shortage of medical attention to patient at correct stage. The Heart Rate Monitoring system is developed using IOT technology with an objective of detecting the heartbeat of the patient in order to monitor the risk of heart attack and also the regular checkup. 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). Hence, in this project we are implementing heart rate monitoring and heart attack recognition system using IoT. The patient will carry hardware having sensors with android application. The heartbeat sensor will allow checking heart beat readings and transmit them over the internet. The user may set the high and low level of heartbeat limits. Once these limits are set the system can start monitoring the patient's heartbeat and as soon as the heart beat readings goes above or below the limit set by the user the system will send an alert about high or low heartbeat as well about chances of heart attack.

**Key Words:** Heart Rate Sensor, IOT web server, Microcontroller, GSM.

## 1. INTRODUCTION

Because of expanding work cost, medical institutions would constrain to decrease nursing staff for patients. Our project aims to develop new innovations for the use of basic nursing care. In this paper, we introduce a secure IoT-based healthcare monitoring system. To achieve system efficiency simultaneously and robustness of transmission within public IoT-based communication networks, we will utilize robust crypto-primitives to construct two communication mechanisms for ensuring transmission confidentiality. By implementing nursing system will get a new dimension and every patient can be monitored remotely. By this on the basis of derived data if a patient is in critical situation, an immediate instruction can be given to the one who is in charge. It may play a vital role to reduce labor cost, rather will be easy to assess from anywhere anytime and will be helpful to take immediate decision. Thus nursing system will be digitalized. In day to day life, people are affected by various serious and complex diseases like Diabetic Mellitus, Cardio Vascular Diseases, and Hypertension etc which are highly sensitive diseases. So, people are continuously anxious about their health condition. They need to consult with doctors, according with reports and check up all of that. Internet of Things (IoT) is a growing present concept which has an effect of many aspect of human life. Various processes of different concepts including data acquisition, data transmission and data analytics enables IoT based system to support smart

solutions especially for health care [1]. In IoT based system, the work progress depends on 3 system which are sensor work, get away and cloud. Firstly, talk about sensor network which is the first step for monitoring patients as well as data collection. Secondly, the gateway system which is a continuous connection networks between sensors and cloud system. The death rate of 55.3 million people dying each year or 1,51,600 people dying each day or 6316 people dying each hour is a big issue for all over the world [2]. So, we are proposing a model where patient can measure heart beat rate and ECG by himself or herself and that report immediately sent to the doctors. Later that, those reports will used to consult with doctors within very short time. It is also reduce valuable time for both patients and doctors. They don't need to wait for the reports because sensors are giving real time data. The model is very effective for rural areas people. 1 IoT serves through GSM/3G/4G technologies data or patient report is sending to the doctors with time and date. This proposed model can use any type of persons like he or she affected with a disease or not. So, they can check it in regular basis because people pay more attention towards prevention and early recognition of disease [3]. Here, all reports also live video recording will be recorded with real time. IoT devices produce large amount of data and information [3]. These health care services are getting better and less costly by recoding and collecting patients monitoring.

## 1.2. MARKET RESEARCH:

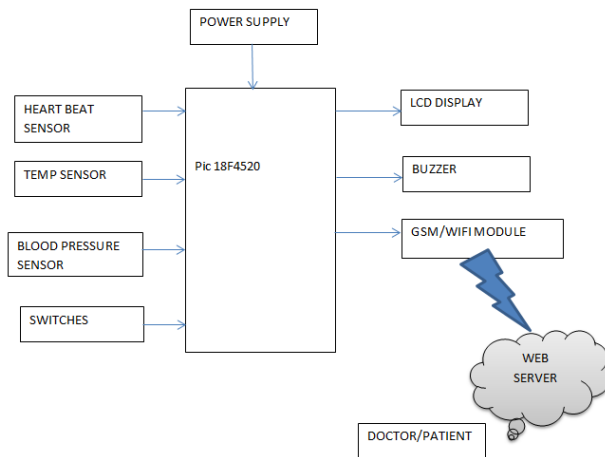
1] A microcontroller based automatic heart rate counting system from fingertip Mamun AL, Ahmed N, ALQahtani (JATIT)Journal OF Theory and Applied technology ISSN 1992-8645 : In this research paper heart- rate signals were collected from finger or ears using IR TX-RX (Infrared Transmitter and Receiver pair) module which was amplified in order to convert them to an observable scale. A low pass filter was used to filter inherent noise. These signals were counted by a microcontroller module (ATmega8L) and displayed on the LCD. Microcontroller is programmed with an algorithm to run the proposed heart rate counting system. The results obtained using this process when compared to those obtained from the manual test involving counting of heart rate was found satisfactory. The proposed system is applicable for family, hospital, community medical treatment, sports healthcare and other medical purposes. Also, fit for the adults and the pediatrics. However, this method in the developed system needs further investigation and need more functionality, which may be useful to consider advance in future research .

2]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. The sensor is interfaced to a microcontroller that allows checking heart rate readings and transmitting them over internet. The user may Set the level 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 patients 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]A Heartbeat and Temperature Measuring System for Remote Health Monitoring 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) : In this research paper, the design and development of a microcontroller based heartbeat and body temperature monitor using fingertip and temperature sensor is shown. The device involves use of optical technology to detect the flow of blood through the finger and offers the advantage of portability over conventional recording systems. Wireless body area network based remote patient monitoring systems have been presented with numerous problems including efficient data extraction and dynamic tuning of data to preserve the quality of data transmission.

**2. PROPOSED SYSTEM**

The proposed system has eminence of detecting heart attack with help of observing heart rate based on internet of thing. Our method uses a pulse sensor, controller board and a GSM module. After setting up the system, the pulse sensor will start sensing heart rate readings and will display the heartbeat of person on LCD screen. Also, with the use of GSM module it will transmit the data over internet. System allows a set point which can help in determining whether a person is healthy or not by checking his/her heartbeat and comparing it with set point. After setting these limits, the system will start monitoring the heart rate of patient and immediately the heart rate goes above or below the certain limit the system will send an alert message. As a part of this project we are implementing an IOT webpage that will track the heartbeat of particular patient and monitor it correctly and give the emergency message on chances of heart attack.



**Fig -1:** Block Diagram

**2.1 PIC 18F4520 MICROCONTROLLER:**

It is an 8-bit enhanced flash PIC microcontroller that comes with nano Watt technology and is based on RISC architecture. Many electronic applications house this controller and cover wide areas ranging from home appliances, industrial automation, and security system and end-user products. This microcontroller has made a renowned place in the market and becomes a major concern for university students for designing their projects, setting them free from the use of a plethora of components for a specific purpose, as this controller comes with inbuilt peripheral with the ability to perform multiple functions on a single chip.



**Fig -2:** PIC18f4520

**2.2 Blood Pressure Sensor:**

Blood Pressure & Pulse reading are shown on display with serial out for external projects of embedded circuit processing and display. Shows Systolic, Diastolic and Pulse Readings Compact design fits over your wrist like a watch. Easy to use wrist style eliminates pumping.

**Features**

- Intelligent automatic compression and decompression
- Easy to operate, switching button to start measuring
- 60 store groups memory measurements
- Can read single or all measures
- 3 minutes automatic power saving device

- Intelligent device debugging, automatic power to detect
- Local tests for : wrist circumference as 135-195mm
- Large-scale digital liquid crystal display screen, Easy to Read Display
- Fully Automatic, Clinical Accuracy, High-accuracy
- Power by External +5V DC
- Serial output data for external circuit processing or display.



Fig -3: Blood Pressure Sensor

### 2.3 Temp Sensor:

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of  $\pm 1/4^{\circ}\text{C}$  at room temperature and  $\pm 3/4^{\circ}\text{C}$  over a full  $-55$  to  $+150^{\circ}\text{C}$  temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy.

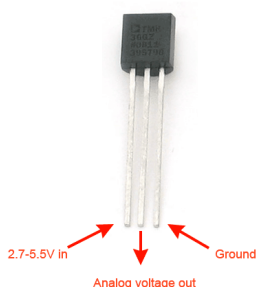


Fig -4: Temp Sensor

### 2.4. GSM module:

This GSM modem has a SIM800A chip and RS232 interface while enables easy connection with the computer or laptop using the USB to Serial connector or to the microcontroller using the RS232 to TTL converter. Once you connect the SIM800 modem using the USB to RS232 connector, you need to find the correct COM port from the Device Manager of the

USB to Serial Adapter. Then you can open Putty or any other terminal software and open a connection to that COM port at 9600 baud rate, which is the default baud rate of this modem. Once a serial connection is open through the computer or your microcontroller you can start sending the AT commands.



Fig -5: GSM Module

### 2.5. LCD display:

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD.

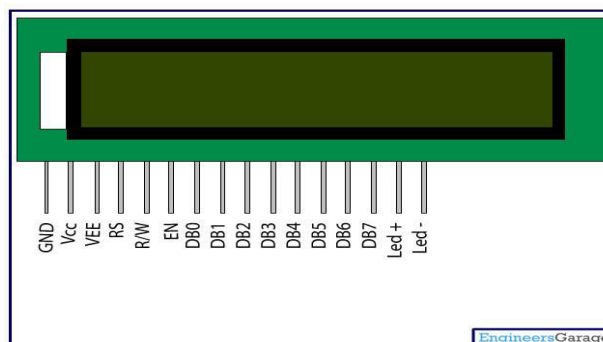


Fig -6: LCD Display

### 2.6. IOT:

“The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.”

Things are either sensors or actuators. A sensor is something that tells us about our environment. Think of a temperature sensor, or even the GPS receiver on your mobile phone. Actuators are something that you want to control, things like

thermostats, lights, pumps, and outlets. The “Internet of Things” brings everything together and allows us to interact with our things. For example, you could have your thermostat control itself based on where you’re located.

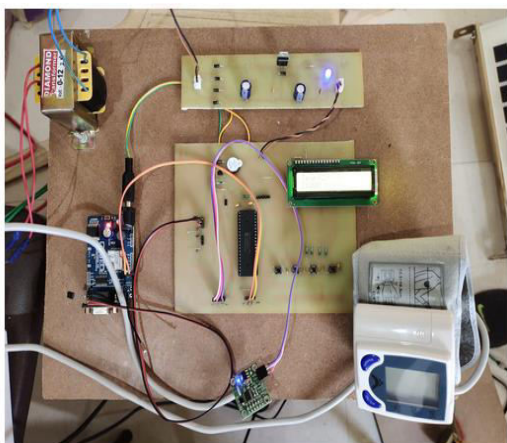
### 2.7. Things Speak Basics:

ThingSpeak is an application platform for the Internet of Things. ThingSpeak allows you to build an application around data collected by sensors. Features of ThingSpeak include real-time data collection, data processing, visualizations, apps, and plugins.

At the heart of ThingSpeak is a ThingSpeak Channel. A channel is where you send your data to be stored. Each channel includes 8 fields for any type of data, 3 location fields, and 1 status field. Once you have a ThingSpeak Channel you can publish data to the channel, have ThingSpeak process the data, and then have your application retrieve the data.

### 3. RESULT:

An IoT-based Heart Attack Detection and heart 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 IOT web Server and SMS. 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



**Fig -9:** hardware of System

### 3. ADVANTAGES:

- 1) 24 \* 7 monitoring of coma patient.
- 2) Continuous recording of patient data after particular time period.
- 3) Cost is low.
- 4) Power consumption less.
- 5) No need of human attention for continuous observation of coma patient.
- 6] High speed communication between doctor and patient through Thing speak cloud as well as Twilit.
- 7] The doctor can easily control on the patient through worldwide, anywhere any time.
- 8] System is completely portable.
- 9] It will help to reduce the time.
- 10] We can store all data’s in the database, so that we will not lose them.

### 3. CONCLUSIONS

In this exploration we have attempted to propose a total paper on detecting heart attack by monitoring the heartbeat of person. The heart beat sensor which is interfaced with microcontroller senses the heartbeat of person and transmits them over internet using GSM module. System allows setting limits of heart beat. After setting these limits person can start monitoring the heart beat and whenever the person’s heart beat goes above certain set point they can get an alert on high heart beat and also about chances of heart attack. Also the system alerts for lower heartbeat.

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