

# HEART RATE MONITORING SYSTEM USING IOT

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**Abstract** - A growing number of people in developing countries, such as India, are being forced to seek new solutions for the continuous monitoring of health check-ups. It has become necessary to visit hospitals on a regular basis for doctor's consultations, which is both financially and time-consuming. To address this issue, we propose a design for monitoring the patient's health conditions, such as heartbeats transmitted to a webserver via an IOT device. The recent development of the internet of things (IoT) connects all objects and is regarded as the next technological revolution. One of the IoT applications that monitors a patient's health status is patient monitoring. The Internet of Things improves the efficiency of medical equipment by allowing for real-time health monitoring. Using IoT, the doctor can continuously monitor the patient's status on his smartphone, and the patient's history will be saved on the web server, which the doctor can access.

**Key Words:** IOT, Patient health monitoring system, Heart rate monitoring.

## 1. INTRODUCTION

Today, medical electronic sensors (Esensors) play an important role in healthcare centers. Electronic patient health monitoring (ehealth) is one of the greatest advances in research. Here, a temperature sensor and a heart rate sensor are used to monitor the patient's body pulse and heart rate, respectively. This proposed model (device) can be used to check the patient's health at home. Without first aid information for affected patients, it is now very economically expensive to consult a doctor or go to a diagnostic center. Describes the design of an advanced / high performance integrated wearable health monitoring system based on a node MCU (microcontroller unit).

### 1.1 Block Diagram

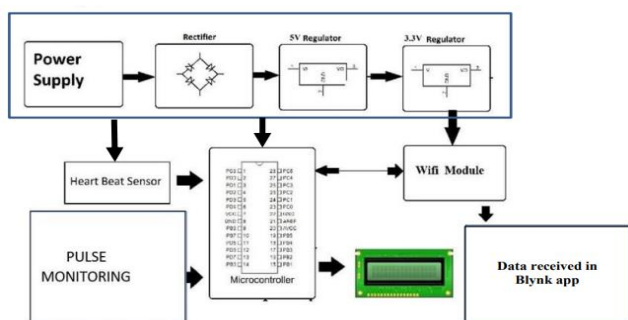


Fig -1: Block diagram

This health monitoring system project includes various components such as a microcontroller, 5V regulated power supply, heartbeat sensor, WiFi module, receiver module and LCD display. The microcontroller is used as the brain of the entire project to monitor the patient's heart rate and pulse rate. How this monitoring system project works is demonstrated using a block diagram containing various blocks such as: B. A power block that powers the entire circuit, a temperature sensor that calculates the patient, and a heart rate sensor that monitors the patient's heart rate. The heart rate sensor module has lights to help you measure your heart rate. When you place your finger on the pulse sensor, the reflected light changes according to the amount of blood in the capillaries. This variation in light transmission and data received by the reflections of the Blynk app can be obtained as a pulse from the pulse sensor output. You can then adjust this pulse to measure your heart rate and program it to read as your heart rate using the Node MCU accordingly. In the transmission part, there is a heartbeat sensor that monitors the heartbeat, and the data is transmitted to the microcontroller. The data is sent first and then wirelessly encoded into serial data by the radio frequency module. Your heart rate per minute is shown on the LCD display. The data is sent to the receiver using IOT. In the receiver section, the receiver is placed on the other end to receive the data, the received data is decoded using the decoder, and the transmitted data (heartbeat pulse) is stored in the microcontroller. Compare with and get the resulting data on the displayed LCD screen. The doctor receives the data, continuously reads the patient's health status such as heart rate and pulse rate, and displays the result on the doctor's mobile phone.

### 1.2 Blynk app

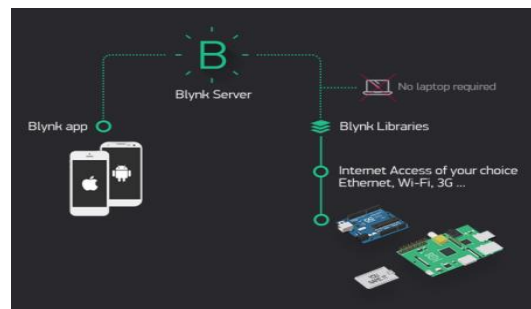


Fig -2: Blynk app

Blynk is a new platform that allows you to quickly create interfaces for controlling and monitoring hardware projects from iOS and Android devices. After downloading the Blynk app, you can create a project dashboard and place buttons, sliders, charts and other widgets on your screen.

## 2. MODULE DESCRIPTION

Modules are part of a program that contains hardware and software components, or one or more routines. The project "Heart Rate Monitoring System Using IOT" consists of two main modules.

1. Hardware
2. Software

### 2.1 Hardware

#### Node MCU

Node MCU is an open source LUA-based firmware designed for the ESP8266 wifi chip. By examining the features of the ESP8266 chip, the NodeMCU firmware comes with an ESP8266 development board / kit, Node MCU development board.

#### Pulse sensor

A pulse wave is a change in the volume of a blood vessel that occurs when the heart pumps blood, and the detector that monitors this change in volume is called a pulse sensor.

#### ESP8266 Wi-Fi

The ESP8266 NODE MCU Compatible Module is a low cost WiFi chip with full TCP / IP capabilities. Surprisingly, this small board integrates an MCU (Microcontroller Unit) that offers the potential of digital I / O control pins in a simple way. Almost like a programming language, you can easily control pseudocode.

### 2.2 Software

#### Send sensor data privately to the cloud

Sensors are everywhere in our homes, smartphones, cars, urban infrastructure, factories and more. Sensors capture and measure all kinds of information. They send this data in some way, for example as a number or an electrical signal. Sensors and objects collect data and usually operate locally. Blynk allows sensors, devices, and websites to send data to the cloud and store it on private or public channels. Blynk stores data in private channels by default, but you can use public channels to share your data with others. Once your data is in the Blynk channel, you can analyze and visualize it, calculate new data, or interact with social media, web services, and other devices.

### Analyze and visualize the data

You can easily access your data by storing it in the cloud. Online analysis tools allow you to inspect and visualize your data. Discover data relationships, patterns, and trends. You can calculate new data. Visualize with charts, graphs and gauges. You can easily access your data by storing it in the cloud. Online analysis tools allow you to inspect and visualize your data. Discover data relationships, patterns, and trends. You can calculate new data. Visualize with plots, diagrams and gauges

## 3. SYSTEM USED

### 3.1 Hardware used

- Microcontroller
- Heartbeat sensor
- Power supply
- Wi-Fi
- LCD display

### 3.2 Software used

- Node MCU Compiler
- IOT Gecko
- Blynk app

## 4. SYSTEM STUDY

### 4.1 Existing system

The GSM-based heart rate monitoring project is primarily aimed at allowing doctors or relatives of patients to remotely check their health. The system calculates the patient's heart rate and temperature, and when these exceed certain limits, an information alert is sent immediately to the registered number.

In this fast-paced life, it is difficult for people to be there continuously for loved ones who may need them while suffering from illness or disability. This also makes it more difficult to continuously monitor the patient's physical parameters such as pulse rate. To eliminate human error and reduce the burden of monitoring patient health from the doctor's head, this method represents a very large remote patient monitoring method over the GSM network. This technology triggers an alarm when the patient is at risk, but cannot provide detailed information about the patient's health and cannot display all recorded data on the same platform.

## 4.2 Proposed System

Internet of Things (IoT) is that the growing paradigm, that includes colossal amount of practical item and practical gadgets linked to the internet for communiqué with one every other. IoT gadgets are hired in numerous fields that construct the users' daily lifestyles softer. These practical gadgets are accustomed gather temperature, pressure, sugar stage etc. which are accustomed decide the fitness circumstance of the affected person. Communication the gathered facts to the doctor, growing accurate name at the information gathered and notifying the affected person is that the tough project inside the IoT. PHMS conjointly notifies the affected person with conceivable preventive measures to be practiced through them. This approach indicates the affected person with remedy and subsequent step to be accompanied simply in case of crucial kingdom of affairs. We generally tend to introduce a alternative way of enforcing PHMS with Node MCU named as AN IoT based totally pulse price statement System victimization Node MCU. Information generated through the sensors are processed through Node MCU microcontroller. ESP8266 offers first-rate cap potential to go into Wi-Fi talents internal one-of-a-kind systems. It gives a whole and self-contained Wi-Fi networking solution; it can be accustomed host the equipment or to sell off Wi-Fi networking features from every other utility processor. the information generated from Node MCU is accessible inside the IoT with the usage of Wi-Fi module.

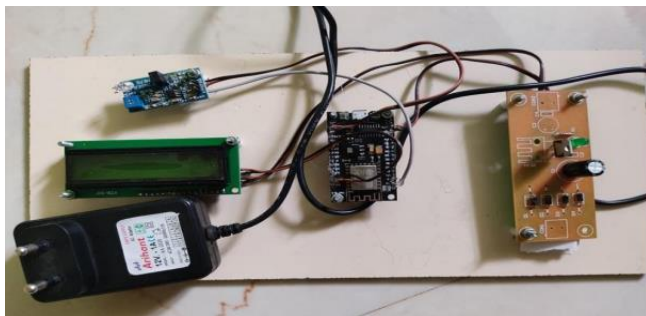


Fig -3: Proposed System

## 5. SYSTEM TESTING AND IMPLEMENTATION

### 5.1 System testing

System testing is the pre-implementation phase of the system, where the system is error-free and the necessary changes are made. The system was tested with test data and made any necessary modifications to the system. All reports are reviewed and approved by the user. The system was very user friendly and there was online help to assist the user when needed.

### 5.2 System Implementation

System implementation is the phase of the project where the theoretical design is tailored to the running system. Failure

to carefully control and plan the phases of the implementation system can be confusing. Therefore, it can be seen as the most important phase for the success of the new system and the confidence that the system works and is effective.

The implementation stage in a project involves, Careful Planning investigation of the current system, checking constraints and the implementation.

A software application in general is implemented after navigating the complete life cycle method of a project. Various life cycle processes such as requirement analysis, design phase, verification, testing and finally followed by the implementation phase results in a successful project management.

The software application which is basically a Windows based application has been successfully implemented after passing various life cycle processes mentioned above.

As the software is to be implemented in a high standard industrial sector, various factors such as application environment, user management, security, reliability and finally performance are taken as key factors throughout the design phase. These factors are analyzed step by step and positive and negative results are recorded before the final implementation.

Security and authentication are maintained at both user and management levels. The data is stored in a very reliable and easy-to-use MySQL, user-level security is managed with the help of password options and sessions, and ultimately all transactions are guaranteed to run securely.

Application validation is performed taking into account the entry levels available in the various modules. Possible limits such as number formatting date formatting, and confirmation of both save and update options ensure that the correct data is sent to the database. Therefore, all aspects are recorded and a complete project survey is actually successfully implemented for the end user.

## 6. CONCLUSION

We analyzed a microcontroller-based heart rate monitoring system using IoT. Heart rate abnormalities are directly recognizable and communicated to each patient advisor via the internet. Our system is simple, energy efficient and easy to understand. It helps to closely monitor patients 24 hours a day, 7 days a week through our system. The project hardware has been installed and the initial results have been fully verified.

## 7. FUTURE ENHANCEMENT

In the current version of the system, you can place parameters (heartbeats) on the web. However, there is still room for improvement. Other parameters such as blood pressure, blood sugar, BMI (body mass index), and waist

circumference can also be measured. The patient's complete health status is then recorded and available on the internet. This makes it much easier for doctors to monitor the progress of a patient's health and give advice on the patient's health. You can extend your system to include additional features such as: B. Links to emergency services, a list of major doctors and their areas of expertise, hospitals and their special facilities, and more. Physicians can create awareness of illnesses and their symptoms via mobile applications. From the results obtained from the evaluation and analysis, the system is better for patients and physicians to improve their medical evaluation.

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