

# Medical Monitoring System Using IoT

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**Abstract:** The healthcare sector in the world is facing a number of challenges like increasing population, lack of exercise, change in lifestyle and many more. It affects the health of people of any age group. The people get affected with various health problems such as blood pressure and cardiac problems etc. To avoid these health issues, medical monitoring system can play a vital role by regular monitoring of blood pressure, heart rate and haemoglobin at various interval of time. One can send these data to hospitals/doctors for further analysis. Doctor can send appropriate prescription, necessary actions to be taken with the help of IoT platform. This system can help a normal human being/patient to collect data at their residential premises itself without wasting any time in travelling to the hospitals or clinics. This system can be useful for physically disable, senior citizens. This system is user friendly, portable and saves time of particular patient. The Wi-Fi module is used to communicate with the doctor available at remote hospital, where he views patient's health and prescribe any treatment if necessary.

**Keywords:** Microcontroller, Heart rate, Body temperature, Remote Monitoring, IoT.

## I. INTRODUCTION

In this day and age, the most extreme utilization of asset is constantly complimented. Along these lines, the utilization of remote innovation is improved to address the issue of remote control and observing. Medical monitoring system is an innovation that empowers us to screen tolerant outside of center or doctor's facility without visiting a patient. It might build access to health services and facilities offices while diminishing expense. Medical monitoring system spares time of both patient and specialist, subsequently expanding proficiency and dependability of health services. Heart rate and body temperature are the real signs that are routinely measured by doctors after the entry of a patient. Heart rate alludes to how often a heart contracts and unwinds in a unit of time (for the most part every moment). Heart rate fluctuates for various age gatherings. For a human grown-up of age at least 18 years, an ordinary resting heart rate is around 72 thumps for each moment (bpm). A lower heart rate very still infers more proficient heart capacity and better cardiovascular wellness. Infants have a substantially higher rate than grown-ups around 120 bpm and more established kids have heart rate around 90 bpm. Like heart rate, normal body temperature also varies from person to person and changes throughout the day. The body temperature is lowest in the early morning and highest in the early evening. The normal body temperature is about 37° C or 98.6° F. However, it can be as low as 36.1° C (97°F) in the early morning and as high as 37.2° C (99°F) and still be considered normal. Thus, the normal range for body temperature is 97 to 100 degrees Fahrenheit or 36.1 to 37.8 degrees Celsius.

The current system did not perform two routes correspondence between the patients and specialists, So IOT turns out to be critical. IoT is utilized to the store the patient's information on server and any specialist can see that information at anyplace and whenever. In this new period of internet of things, we can associate the physical world to the internet. Physical world means actually everything like machines and apparatuses which are utilized as a part of our occupations and at homes, and so forth. The things or items can be changed into brilliant things by giving it novel personality on the planet. The items can impart data and convey to each other through internet. We can break down and control the items whenever, anyplace from the side of the world.

## II. LITERATURE SURVEY

### **IOT Based Patient Monitoring System**

These days, doctor's facilities the nation over are setting themselves up for anticipating supplier deficiencies. Patients are confronting long holds up between arrangements or before arrangements, incorporating delays in being moved between various divisions and lacking reaction to solicitations or protests. In this paper, a keen social insurance system is proposed, that comprises of a savvy RFID tag, neighborhood server, web, medicinal server and specialist co-op. Shrewd RFID tag gives physiological condition (therapeutic record) of the patient and that restorative record is analyzed by the specialist through WLAN. The goal of this paper is checking of patient frequently.

### Design of IoT Based Smart Health Monitoring and Alert System

This paper displays a reconfigurable sensor organize for basic wellbeing observing. Continuous and intermittent basic healthcare monitoring system can decrease the likelihood of crumple and the outcomes of potential perilous conditions. Biosensors interfaced with the microcontroller will screen patient's imperative wellbeing. On the off chance that any of the sensor's preset limit esteem is surpassed underneath, a SMS will be sent to specialist and the patient's guardian. The observing system involve web server part: The sensor arrange in which the sensor hubs are furnished with various biometric sensors, sensor information will be frequently exchanged to healing facility database from which it is transfer to doctor's facility's web server consistently. Specialist can screen the patient condition from wherever.

### III. PROPOSED SYSTEM

The proposed system collects data with the help of sensors. An accessible database is created about patient's health history which can be further monitored & analyzed by the doctor if necessary. The data storage can be saved on the server permanently or can be reset via the software. This project proposes a health monitoring system which is capable of detecting multiple parameters of our body such as blood pressure, temperature, heart rate and hemoglobin level & further transmitting this information via IoT platform to server through wireless module. In case of emergency, automatically generating alerts will be sent to doctors and family members if any unusual activity is detected by or near the patient with the help of panic button. Various sensors are used such as heart beat sensor for detection of heart rate; blood pressure and hemoglobin is calculated. LM35 temperature sensor is used to measure surface temperature of skin. These data are acquired using PIC 18 and processed to get the required digital values. These values are the send to a server using Wi-Fi over the internet based on IoT platform

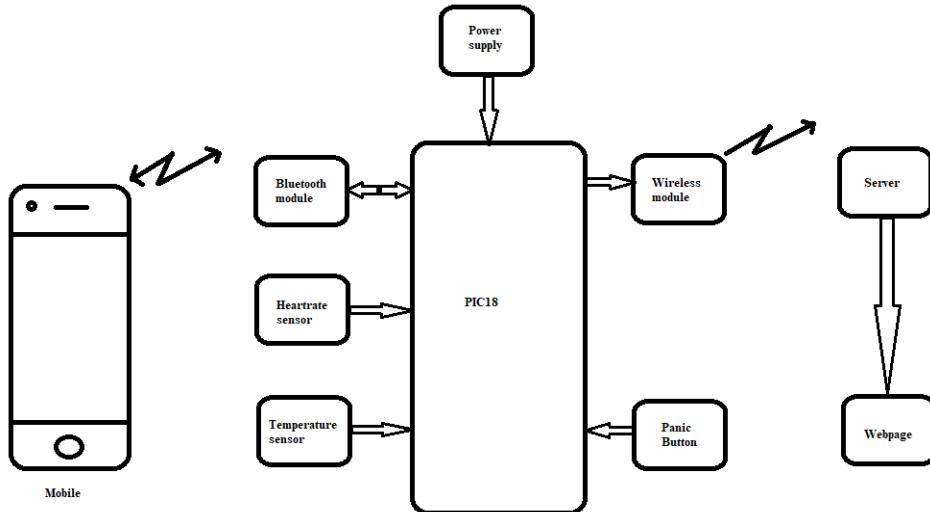


Figure 1: Block diagram of proposed system

#### 1. Microcontroller

PIC18F4550 is an 8-bit microcontroller of PIC18 family. PIC18F family is based on 16-bit instruction set architecture. PIC18F4550 consists of 32 KB flash memory, 2 KB SRAM and 256 Bytes EEPROM.

#### Features:

- Supports USB V2.0 with Speed range from 1.5Mbps to 12Mbps
- 32 KB Programmable Flash Memory
- 2048 bytes Data Memory (SRAM)
- 256 bytes EEPROM
- Supports Up to 48 MHz Operation
- 35 I/O pins

#### 2. Temperature Sensor

The LM35 arrangements are exactness integrated circuit temperature gadgets with a output voltage straightly corresponding to the Centigrade temperature. The LM35 device has favorable position over direct temperature sensors adjusted in Kelvin, as the client isn't required to subtract a substantial consistent voltage from the yield to acquire helpful Centigrade scaling. The LM35 device does not require any outer adjustment or trimming to give regular exactnesses of  $\pm\frac{1}{4}^{\circ}\text{C}$  at room temperature and  $\pm\frac{3}{4}^{\circ}\text{C}$  over a full  $-55^{\circ}\text{C}$  to  $150^{\circ}\text{C}$  temperature go.



Figure 2: Temperature Sensor

### 3. Heart beat sensor

Heart beat sensor is intended to give advanced output of heart beat when a finger is set on it. At the point when the heart beat indicator is working, the beat LED flashes as one with every heart beat. This advanced output can be associated with microcontroller specifically to gauge the Beats per Minute (BPM) rate. It takes a shot at the guideline of light adjustment by blood move through finger at each heartbeat.



Figure 3: Heart beat Sensor

#### Features:

- Heat beat sign by LED
- Instant yield advanced flag for specifically associating with microcontroller
- Compact Size
- Working Voltage +5V DC

### 4. Bluetooth

Bluetooth is a wireless technology standard for trading information over short separations from settled and cell phones, and building individual region systems. HC-05 Bluetooth Module: HC-05 module is a simple to utilize Bluetooth SPP (Serial Port Protocol) module, intended for straightforward remote serial connection setup. Serial port Bluetooth module is completely qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with finish 2.4GHz radio handset and baseband.

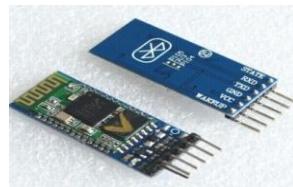


Figure 4: Bluetooth

## IV. RESULTS AND PERFORMANCE EVOLUTION

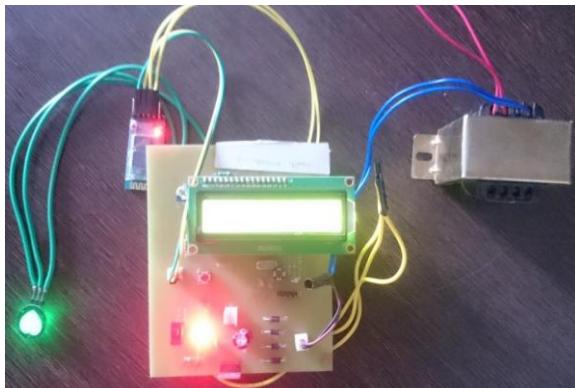


Figure 5: System Hardware



Figure 6: User Data (Android App)

ID	Name	Email ID	Password	Age	Height	Weight	Gender	Mobile No.	Temp	Blood Pressure	Heart Beat	Hemoglobin	Action
1	Anuja kunjwani	anjuk89@gmail.com	11111	27	157	55	Female	940311019	27	125	78	14	Select
2	Suhail Mulay	suhaimulay76@gmail.com	000000	23	174	62	Male	9637682014	39	119	78	14	Select
4	Sumi Kale	sumi.kale62@gmail.com	000000	23	174	62	Male	8379814901	27	120	73	14	Select
5	Admin	admin@gmail.com	000000	33	66	50	Male	2147483647	39	0	1	13	Select
6	Rapeen Bhole	rapeen.bhole22@gmail.com	000000	23	168	64	Male	8928886555	27	120	73	15	Select
7	Amritा	amritaaarame@gmail.com	1994	22	163	53	Female	2147483647	27	120	73	11	Select
8	Amol kale	amol85@gmail.com	000000	36	159	72	Male	866989444	27	120	73	16	Select
9	akb	akb1j@gmail.com	Nnnnnnnn	55	142	55	Male	2147483647	27	120	73	11	Select
10	Anilket	aniket@gmail.com	000000	21	150	55	Male	774388225	27	120	73	11	Select
12	Aloshay Nair	nairalohay@gmail.com	123456	23	172	74	Male	8149635982	39	140	32	15	Select
16	Akhay	akb@gmail.com	555555	24	125	65	Male	8805040477	28	152	81	13	Select

Figure 7: Doctor Database (Webpage)

## V. ADVANTAGE

- 1) The comparably higher accuracy and better comprehensibility, simplicity and low weight of a System.
- 2) This system is useful for the heart patients.
- 3) User friendly system

## VI. CONCLUSION

Here, we proposed a remote physiological monitoring system, which is able to continuously monitor the patient's temperature, blood pressure, heart beat, and other critical parameters in the hospital. The same measured data can be used in future for statistical analysis and prevent similar kind of issues beforehand if it happens in any new patients. They can take proper actions like exercise, food diet etc to prevent from critical diseases. This paper demonstrates the use of smart healthcare system. This new technology has potential to offer a wide range of benefits to patients, supervised rehabilitation, reducing of long waits, early detection of abnormal conditions, continuous patient monitoring, and potential knowledge discovery through data mining of all gathered information.

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