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# IoT BASED PATIENT MONITORING SYSTEM USING RASPBERRY PI

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## ABSTRACT

Now a days' death rate is increased in India because of heart attacks. This is due to the cause that the patients are not getting the care for 24 hours. In order to provide the proper check-up for the patient we need to monitor the health of the patient continuously. This system provides continues check-up to the patient and gives update to their caretaker at any moment. This project is designed to monitor the temperature, Blood Pressure and heart rate of the patient using Internet of things. Through this we can easily send the real time information to many users and also can send the alert message to doctor over internet in critical condition. Alert system is used to inform the caretaker who is available nearer to the patient. In this paper, the parameters of human body are monitored using Raspberry Pi. After connecting Internet to the raspberry pi board acts as a server which automatically sends data to the cloud. These parameters can be visualized using cloud from anywhere in the word.

***Keywords:*** *Raspberry Pi 3, Arduino, IOT, HC-05,DH22,*

## I. INTRODUCTION

Internet of things (IoT) is a new and fast growing technology in which everything are connected to the internet for effective communication between these connected things. Internet of things serves as a catalyst for the healthcare and plays a very important role in wide range of healthcare monitoring application. Iot is a network of device which is built with embedded systems, electronic things, actuators, sensors and network connectivity and which enables this objectives to exchange and collect the data information. Using internet of things object can be sensed and control from existing network. The normal human life can be change to smart life using the new technologies of IoT. Internet of things is used to monitor all patients at any situation. Health plays a prominent role in our life. Since from decade the healthcare has drawn significant amount of attention .The patient who are suffering from chronicle disease they need to check-up daily. In patient monitoring system Raspberry pi is a processor for used in many IoT application. Raspberry pi and internet connection is a new innovation technology in healthcare system. After connecting Internet to the Raspberry Pi it acts as a server. Then the server is automatically sends data to the web page. Then the parameters of patient monitoring system heart rate, body temperature and blood pressure are monitored. If these parameters are monitored. If these parameters are goes to abnormal it will automatically send alert message to the doctor and relative.

The patients are not well known with the manual treatment which doctor usually prefer for checking heartbeat. There are several devices available available in the market in order to keep track on the internal changes of the body. But there are many limitations in the maintenance due to the size of the device. So in patient health monitoring system we are designing a small size, low cost and a portable device in order to provide monitoring of the patient health.

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*Fig 1. Conceptual view of IoT*

## II. PARIENT MONITORING SYSTEM

Patient monitoring is the observation of disease, medical conditions and other vital parameters of a patient over a period of time. Continues measurement of patient parameter such as heart rate, blood pressure, temperature and other parameters have become a common feature of the care of critical ill pressure. When accurate and immediate decision making is crucial for effective patient care, electronic monitor frequently are used to collect and display physiological data.

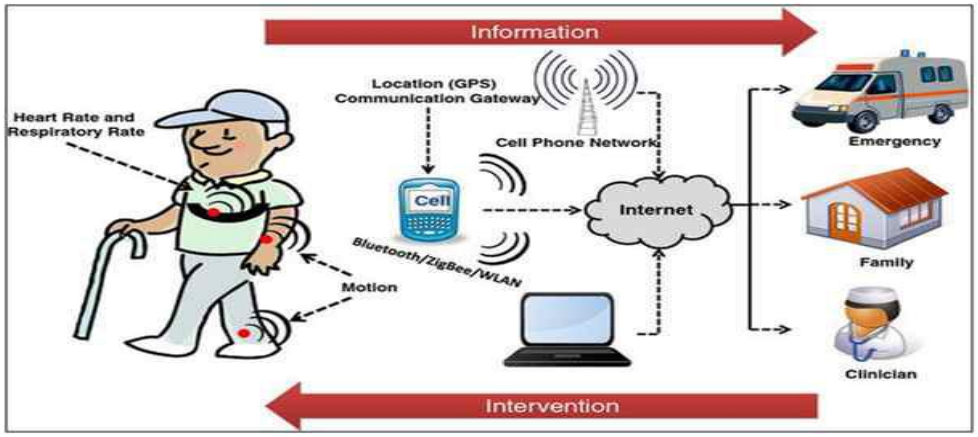


*Fig 2. Patient Monitoring System*

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## III. PROPOSED SYSTEM

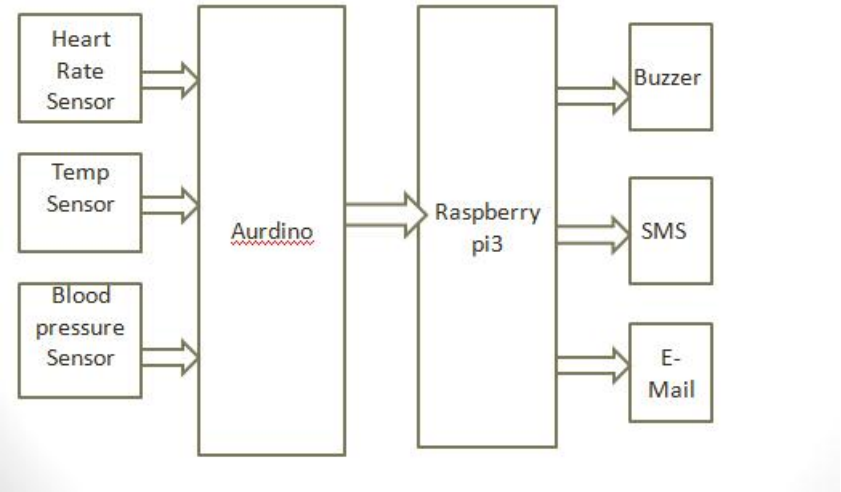


*Fig.3 Patient health monitoring system - Block diagram*

The diagram of project consist of Raspberry Pi, Temperature sensor, Heart sensor, Blood pressure sensor, Aurdino and Wi-Fi, Buzzer.The Proposed method of patient health monitoring system is to monitor's patients body temperature, heart rate sensor, blood pressure sensor using Raspberry Pi. The temperature sensor senses the temperature from the patient's body and send the information to the Raspberry pi. The heart rate sensor collect the heart beat from the patient , the information obtained from the heart sensor in the analog form, in order to convert it into digital form we are using aurdino to convert it into digital form now digital output send to the Raspberry Pi. The blood pressure sensor sense the blood pressure of the body and send information to the Raspberry pi. After connecting internet to raspberry pi it acts as a server. Then the server is automatically sends data to website. Using IP address anybody can monitor the patient's health status anywhere in the world using laptops, tablets and smart phones.

If these system are goes to abnormal it will automatically sends alert message to the doctors and relatives, so that the doctors can instantly tack care the actions on this abnormalities. And simultaneously buzzer is turn on in order to alert the caretaker who is present in the premises.

## IV. IMPLEMENTATION METHODOLOGY

**Hardware description**

**1. RASPBERRY PI:**

Raspberry pi 3 is a credit card size single board computer with 40 pins extended GPIO, Broad camera BCM2387 chipset, 1.2GHz Quad core ARM cortex-A53(64 bit), 802.11 B/G/N Wireless LAN and Bluetooth 4.1, GPU(Dual core video core IV Multimedia Co-Processor), Camera connector, Display connector, Memory card slot, 1GB LPDDR2 memory, Ethernet port, USB host, Micro HDMI on it. Raspberry Pi is a general purpose computer usually with Linux OS.

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*Fig.4 Raspberry Pi Kit*

## 2. Arduino :

The Arduino is an open source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output pins that may be interface to various expansion boards and other circuit. The boards has 14 digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9volt battery. Through it accepts voltage between 7 to 20 volts.

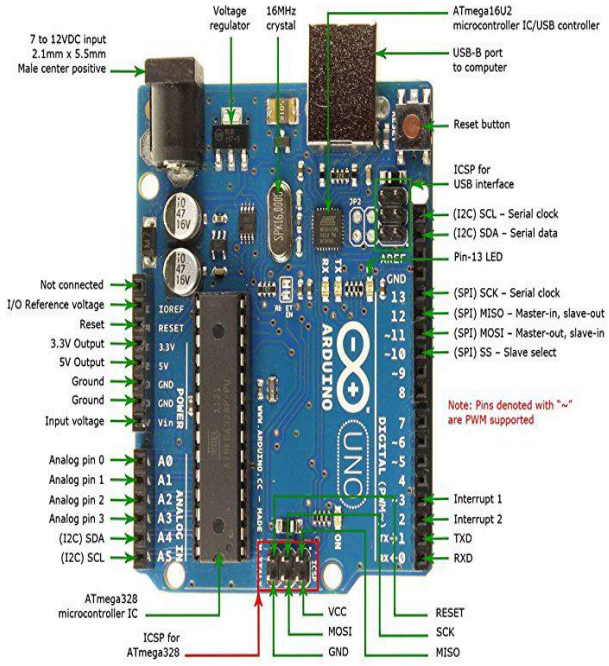


*Fig 5. Arduino Uno*

## 3. Temperature sensor:

It measure the amount of heat energy or even coldness that is generated by an object or system, allowing us to "sense" or detect any physical change to that temperature producing either an analogue or digital output. The DHT11 sensor is digital temperature and humidity sensor. It is very popular because it is very cheap but still providing great performance. The temperature ranges from0 to 50 degrees Celsius with +/- 2 degrees accuracy. And the Humidity range is from 20 to 80% with 5% accuracy. The sampling rate is 1Hz or one reading every second. The

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operating voltage is 3 to 5 volts, the max current used when measuring is 2.5mA. It includes humidity measurement component in order to measure the humidity and an NTC temperature measurement component for measuring Temperature. It offers excellent quality, fast response and cost effective.

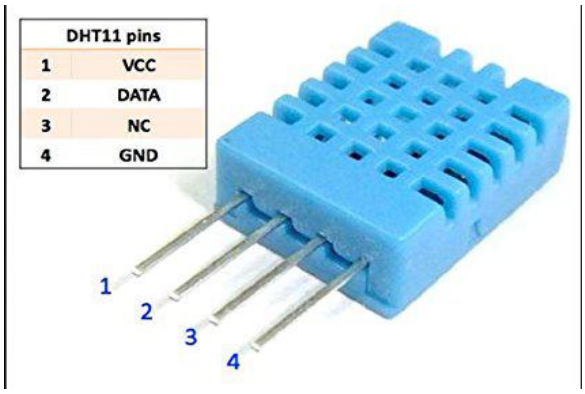


*Fig.6 Temperature sensor*

**4. Heart rate sensor:**

A heart rate is a personal monitor device that allows one to measure one's heart rate in real time or record the heart rate for later study. It is largley used by performance of various types of physical exercise. It measure the variation in the volume of blood through any reason which cause a change in the light intensity through that reason. When the index figure is placed on the heart beat sensor, the variation in an optical power take place when the light falls on the index figure is scattered or absorbed during the path through the blood as the change in heartbeat.


*Fig. 7 Heart Rate sensor*

**5. Blood pressure sensor:**

The Blood Pressure sensor is a non-invasive sensor designed to measure human blood pressure. It measure systolic, diastolic and mean arterial pressure utilizing the oscillometric technique. Pulse rate is also reported. Home blood pressure monitoring is a useful tool for clinical management of patients with hypertension. Its major advantages are the ease with which the techniques can be learned, reproducibility of values, and sensitivity of measurement.

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*Fig. 8 Blood Pressure Sensor*

**6. Buzzer:**

The Buzzer is an electronic device used to produce a sound. This buzzer is prepared by incorporating a piezo electric vibration plate in a plastic case. In this project, this buzzer is used to alert the caretaker during the critical condition of the patient and the sound obtained by this buzzer indicates that the patient health is in risk.

## V. CONCLUSION

The Proposed Method of Patient Monitoring System helps to monitor patient's body temperature, heart rate, blood pressure and body movement using Raspberry Pi. Raspberry Pi also stores the data to the cloud with the help of Internet. Any authorized person can analyze the Patient's health status from anywhere in the world. The Bluetooth protocol is used for communication between Transmission and Receiver Section. Internet of things is expected to rule the world in various field but more benefit would be in the field of healthcare .Hence present work is designed to an IoT based patient monitoring system using a raspberry Pi. In this work the heart rate, blood pressure and temperature of body is monitored using Raspberry Pi 3 and web server. So that the Doctor can take simultaneous proper action for the problems. Hence Patient monitoring system is designed to reduce the death rate and reduced the cost of regular chek-up.

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