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## IoT based Heart Attack Detection and Heart Rate Monitoring System using Raspberry Pi

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**Abstract:** *In this modern era, we have seen increased number of heart diseases and increased risk of heart attacks. Heart attacks pose a serious health risk and can be life-threatening. They occur when a blockage in the coronary arteries disrupts blood flow to the heart, which can cause permanent damage. Hence it is very much imperative to detect the Heart Attack on time and provide necessary life saving medical care to the patients. In our proposed project, the system provides sensors that allow detecting heart rate of a person using heartbeat sensing even if the person is at a remote place (i.e. home, office, travel etc ). The sensors are then interfaced to a microcontroller that allows checking heart rate readings and transmitting them over internet. The user is enabled to set the various levels i.e HIGH, LOW levels of heart beat limit. Once these limits are setup / configured, the system starts monitoring and as soon as patient heart beat goes above a certain limit ( i.e. crossing the Thresholds ), 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 heartbeat rates. Whenever the user logs on for monitoring, the system also displays the live heart rate of the patient. Thus, concerned stake holders can monitor heart rates and receive alerts of heart attack to the patient immediately from anywhere and the person's life can be saved on time.*

**Keywords:** *Raspberry Pi , Internet of Things (IoT) ,MAX30100 sensor, GPS Module*

### I. Introduction

This project describes about to build heart rate monitoring and heart attack detection system using onboard Wi-Fi module. Remote monitoring is seen as an effective method of providing immediate care as it allows for continuous as well as emergency transmission of patient information to the doctor or healthcare providers. Remote patient monitoring will not only redefine hospital care but also work, home, and recreational activities. These new technologies enable us to monitor patients on a regular basis, replacing the need to frequently visit the local doctor for a recurring illness. Recent report says chronic diseases are the leading cause of deaths in India. People who have suffered from chronic diseases are monitored their vital signs continuously. Vital signs include the measurement of temperature, pulse rate, blood pressure and blood oxygen saturation. It provides information about a patient's state of health. They can identify the existence of any medical problem, illness and person's body physiological stress. In hospitals both in ICU ward and general ward nurses take care of chronic disease patients. In the system we designed an integrated patient monitoring device with low cost and this way of technology is mainly used to continuously monitor the patient health condition, for effectively and accurately measuring the patient physiological parameter such as temperature, pulse rate and spo2 of the patient. Recent years have seen a rising interest in wearable sensors and today several devices are commercially available for personal health care, fitness, and activity awareness. IOT related heart rate monitoring system is based on IOT as a network of devices that connect directly with each other to capture and share vital data. In this sensor data is further analyzed. Data mining techniques are used to find the healthy and unhealthy vital signs data using classification model without nurse help.

### II. Introduction to IoT in HealthCare

Internet of Things (IoT): It is commonly defined as a network of physical objects. As we all know, that internet is a network of computers, but instead of that internet has evolved into a network of device of all type and sizes, vehicles, smart phones, home appliances, toys, cameras, medical instruments and industrial systems, animals, people, buildings, all connected, all communicating & sharing information based on stipulated protocols in order to achieve smart reorganizations, positioning, tracing, safe & control and even personal real time online monitoring, etc. IoT in general provides a vision where things such as alarm clock, wearable

watch, home devices become smart and alive through communicating, sensing, computing by embedding small devices which interact remote objects or persons through connectivity.

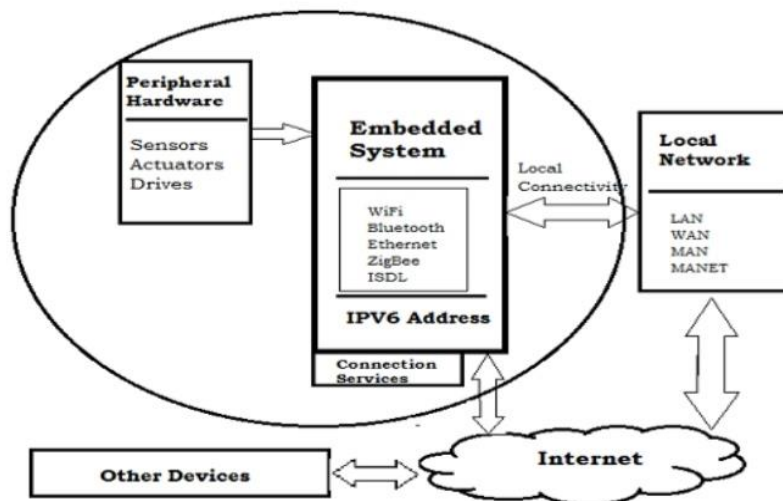
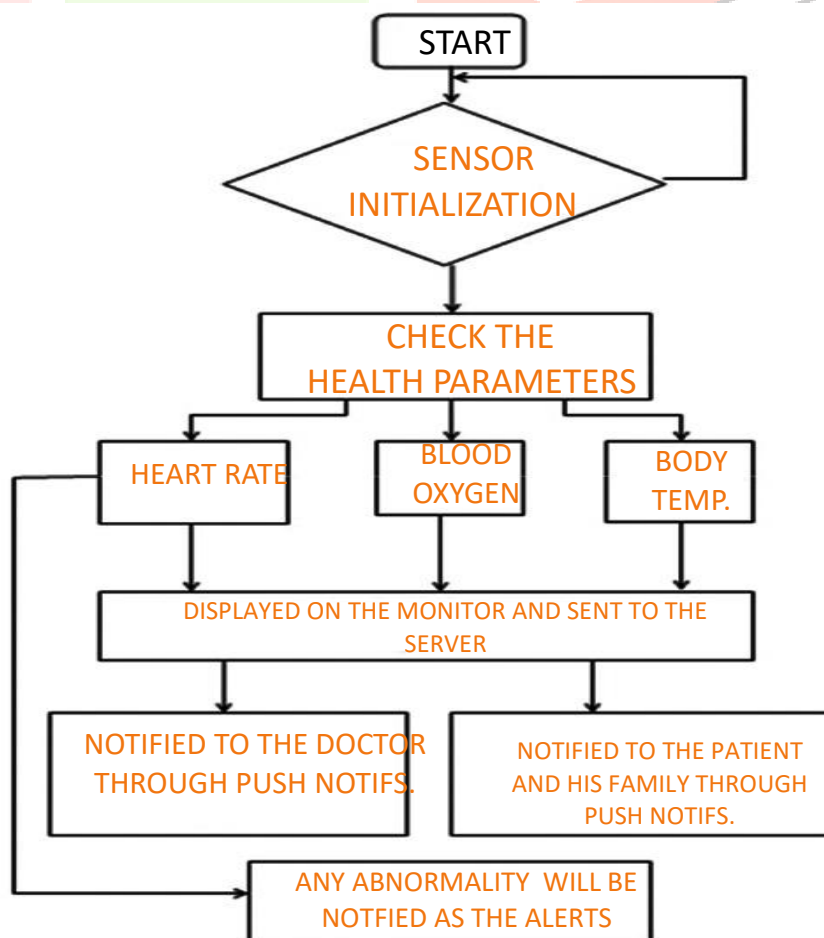


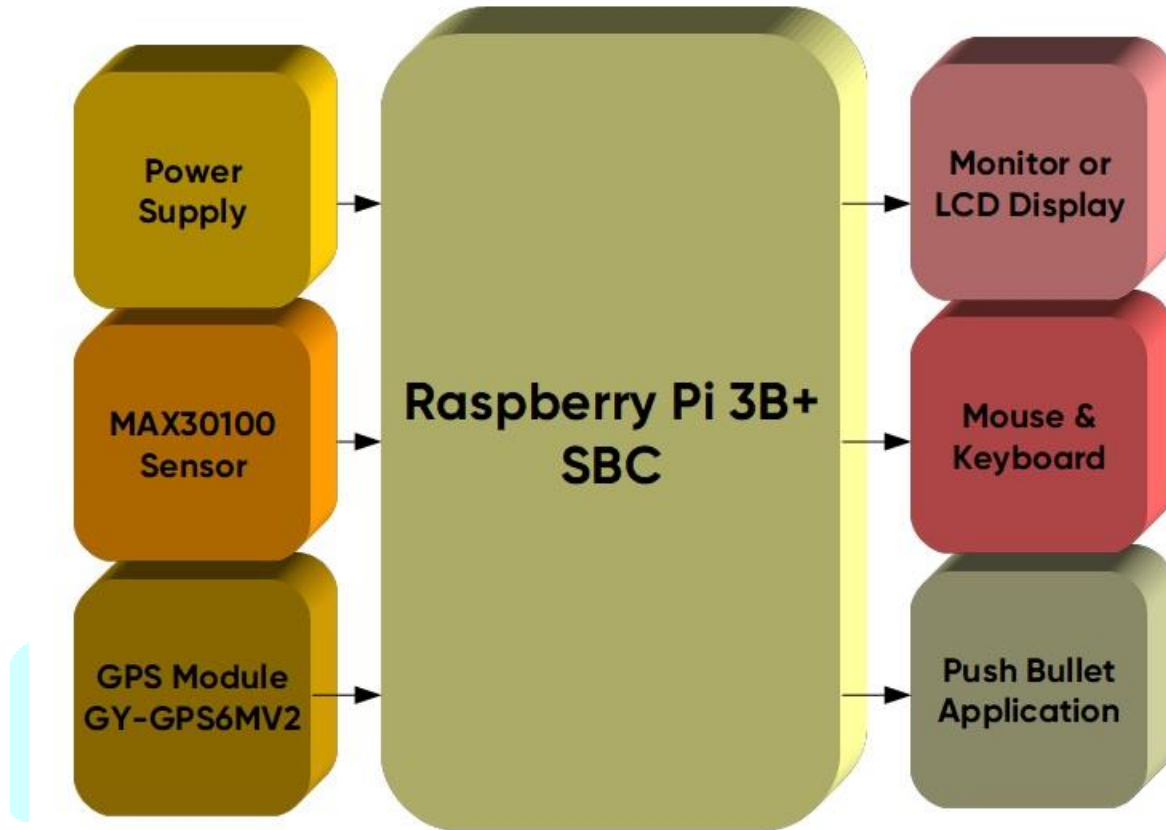
Figure-1: Vision of Internet of Things

By using Internet of Things, the communication is extended via Internet to all the things that surround us. In simple words, the Internet of Things is much more than machine to machine communication, wireless sensor networks, 2G/3G/4G, GSM, GPRS, GPS, Wi-Fi, microcontroller, microprocessor etc. The above mentioned are considered as the enabling technologies that make the “Internet of Things” applications possible.

### III. MEHODOLOGY



## IV. BLOCK DIAGRAM



- The MAX30100 sensor which is simply known as Pulse oximeter sensor, that measures the heart rate, SpO2 (saturated oxygen) and temperature.
- The three parameters of a human body can be measured, when a person or patient places his/her fingertip on the MAX38100 sensor as heart rate, SpO2 and temperature can be detected from there. This sensor emits and detects the light rays (Infrared light and red light) in to the finger and display those parameters on the monitor or LED. Infrared red light is used to measure only heart rate and emitting red light is used to measure both heart rate and oxygen levels in the blood.
- The pins of MAX30100 sensor are connected to the Raspberry Pi. Generally, there are two important pins of MAX30100 sensor, SCL (serial clock pin) and SDA (serial data pin).
- When oxygen enters in to lungs & then it is passed in to blood, then blood carries this oxygen to the various organs in our body. There is an increasement in oxygenated blood when the heart pumps blood. When heart relaxes, the volume of oxygenated blood is decreased. During this increasement and decrement of oxygenated blood determines the heart rate and these regular intervals can be calculated by using Serial Clock Pin (SCL) and the data which is sent between two devices is calculated by using Serial Data Pin (SDA).
- Raspberry Pi connected to the internet with built in Wi-Fi module that updates the sensor output values through IoT.
- Push bullet connects the two or more devices in to one. The main of this application to manage mobile notifications from any device by sending those notifications to monitor/computer. It is a way to do SMS messaging in windows, if any notification received on device like emails and texts, then this same notifications will be sent or displayed on the monitor and also provides a feature to share the links between devices.
- The Global Positioning System (GPS) is a satellite navigation device that is capable of receiving information from satellite's and then calculate the device's geographical position. It works at all times and in almost all weather conditions. In this project, the GPS generally used for tracking purpose, that monitors the object or persons.



MAX30100 SENSOR

## V. CONCLUSION:

Monitoring your beloved ones becomes a difficult task in the modern day life. Keeping track of the health status of the patient at home is a difficult task. Specially old age patients should be periodically monitored and their loved ones need to be informed about their health status from time to time while at work. So, a system with an innovative system that automated this task with ease. This system puts forward a smart patient health monitoring system that uses sensors to track patient health and uses internet to inform their loved ones in case of any issues. Our system uses temperature as well as heartbeat sensing to keep track of patient health. The sensors are connected to a raspberry pi to track the status which is in turn interfaced to a GPS module to track the patients location.

If system detects any abrupt changes in patient heartbeat or body temperature, the system automatically alerts the user about the patients status over IOT and also shows details of heartbeat, temperature and SPO2 of patient live over the internet. The sensors to webpages with Internet of Things (IoT) concept experimentally tested for monitoring three parameters. It also sent the sensor parameters to the Push Bullet (application). This data will be helpful for future analysis and it can be easily shared to other end users. Then the collected data and analysis results will be available to the end user through the Wi-Fi. Thus IOT based patient heartrate monitoring and heart attack detection system effectively uses internet to monitor patient health stats and save lives on time.

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