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# REAL TIME MONITORING SYSTEM FOR HYPERTENSION PATIENT USING IoT

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**Abstract -** *People are prone to many diseases in recent times in order to provide an ease way, a system is been developed to periodically monitor the health of the people by their own self-care. The main motive is to monitor the patient health and update their health condition in the cloud using IoT. The main aim of the system is to continuously monitor the blood pressure fluctuation, respiratory rate, pulse rate and to send the signals to the cloud via raspberry pi. It sends an alert signal as periodic way, first when a person is sent to diagnosed with minor illness the signals are his/her relatives around them. Second, if the illness increases the signals are sent to the nearby ambulance and finally during critical cases the signals are sent to both ambulance and the doctor who is about to treat them in the ambulance. These signals are sent via triangulation process which connects to the nearby stations and alerts them. This system can be easily adapted to everyone and people can be easily instructed to how to use it with high end accuracy of particular measures.*

***Key Words***: ***Raspberry pi, IoT, Triangulation, Health monitoring, Cloud.***

## 1. INTRODUCTION

In Today's world many physiological disorders are being widespread even a small child is being affected with respiratory illness which affects the aftermath of their life, meanwhile middle-aged people are frequently obsessed high blood pressure and diabetes, a system is been designed in order to regularly monitor these ailments and provide data to the cloud storage with the help of IoT. In case of an emergency people must ask for help to contact the ambulance or any source of help. So to prevent these if we upload the details of the patient in the cloud in case of emergency the alert will be sent to them with all the details in it and an assistant doctor can also brought along to aid them. Instruments like CT scan, X-rays and MRI scans provides the best reports for diseases that are acquainted in a person. These devices come into action only when the person suffocates a lot in the pre-final stage of the disease. An assist always required to diagnose the persons with illness because devices like sphygmomanometer cannot be used on their own. Hence a periodic diagnosis is required for everyone in order to take a self-care of them which should also be in automatic way to alert the emergency contact and people around them.[1]

## 2. THEORIES PROPOSED

Here IoT application is used along with the triangulation process with ThingSpeak which provides particular data to the authorities which are detailed below.

### 2.1 IoT

The Internet of Things (IoT) is a mechanical and computerized machine that gives special identifiers (UIDs) and moves information over a system without requiring collaboration among people and PCs. Because of the mix of different advances, constant examination, AI, item sensors, and inserted frameworks the idea of the Internet of things has developed. Conventional fields of implanted frameworks, remote sensor systems, control frameworks, robotization (counting home and building mechanization), and others all assistance to empower the Internet of Things. In the customer showcase, IoT innovation is generally synonymous with items that help at least one explicit biological systems and can be controlled through gadgets related with that environment, (for example, lighting installations, indoor regulators, home assurance frameworks and cameras, and other home machines).

**Fig -1: IoT link structure**

An IoT network consists of sensors / devices that "chat" through some kind of connectivity to the cloud. If the data enters the cloud, the program processes it and can then decide to perform an action, such as sending an warning

or modifying the sensors / devices automatically without the user having to.

Types of items that can fall within the reach of the Internet of Things include connected security systems, thermostats, cars, home devices, household and commercial lighting, alarm clocks, speaker systems, vending machines and more.

## 2.2 Triangulation Process

Triangulation is a method / process by which it is possible to determine the position of a radio transmitter by either calculating the radial distance or direction of the transmitted signal from two or three different points to locate a device. In wireless communications / mobile networks triangulation is often used to identify a user's geographical location. In Triangulation process, for triangulation, it uses radio towers that close to your phones. The handset must send out a roaming signal to a radio tower nearby. The phone's location is determined by how intensely the signal is transmitted to every radio tower that receives it.

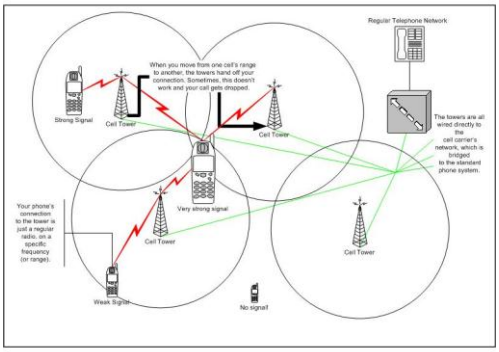


**Fig -2: Triangulation network process**

The number that the cell phone uses can be easily obtained by calling the operator network, and they can determine which radio towers receive the strongest signal from that specific mobile phone number. The triangular approach is then often used to determine which other radio towers receive a signal as well. We will get a rough estimate of the position of cell phones by measuring strong and low signal.

## 2.3 Thingspeak

"ThingSpeak" is an open-source Internet of Things (IoT) framework and an API for storing and retrieving data from objects over the Internet or through a local area network using the HTTP and MQTT protocol. ThingSpeak allows the development of applications for sensor logging, location monitoring and a social network of items with updates of status.

ThingSpeak was initially introduced by ioBridge as a tool in support of IoT applications in 2010.ThingSpeak has incorporated support from MathWorks' numerical computing program MATLAB, enabling ThingSpeak users to analyze and visualize uploaded data using Matlab without needing Mathworks to buy a Matlab license. ThingSpeak is in close contact with Mathworks, Inc. Any of the ThingSpeak data is currently integrated into the Mathworks' Matlab documentation site and also allowing user accounts registered with Mathworks as legitimate login credentials on the ThingSpeak web site. ThingSpeak.com's terms of service and privacy policy lie between the customer agreeing and Mathworks, Inc.


**Fig -3: Connectivity towards Thingspeak**

## 3. CONCEPTUAL FRAMEWORK

The specifics of the doctor's and emergency contacts are stored in the instrument in this device. If a person suffocates due to the illness, the monitoring device will at first signal the person's condition to the emergency contacts, and if the condition is serious then the triangulation process will call an ambulance to the specific address.

The system has a compact design that can be taken anywhere that provides 24/7 health surveillance. Based on their condition the details can be easily stored and segregated. [2]

At first the scheme periodically monitoring device the health consideration of the patient when everything is under perfect balance stipulation then the system remains stalls. When there is a slight change or instability in the somebody 's health condition, the alert sign is first sent to the relatives or the person whose number is been registered in the server. So, when the condition becomes severe then the ambulance is called by the server itself with detail implemented in it.

**Fig -4: Proposed model**

By this the patient can be easily admitted into the hospital at a proper time without a delay. [4][5]

## 3. COMPONENTS

### 3.1 RaspberryPi

The Snort Private detective 3 Modeling B is the third generation Boo Private eye. This powerful credit-card sized single instrument panel computer can be used for many applications and supersedes the original Raspberry Private detective Model B+ and Raspberry Pi II Model B. Whilst maintaining the popular control panel data formatting the Raspberry Pi 3 Model B brings you a more powerful processer, 10x faster than the first generation Raspberry Pi.

It also adds wireless LAN & Bluetooth connectivity which makes it the ideal answer for powerful connected designs.

**Fig -5: Raspberry Pi**

### 3.2 LM35 Temperature Sensor

The LM35 series are accurate, integrated circuit temperature devices with a linear-proportional output voltage to temperature at Centigrade.

No external adjustment or trimming is required by the LM35 system to provide typical accuracies of ±1/4 ° C at room temperature and ±3/4 ° C over a full temperature range −55 ° C to 150 ° C. At water point, lower costs are ensured by trimming and calibration.

### 3.3 Pressure Sensor

A pressure sensor is a device for press measurement of gases or liquids. Pressure is an expression of the force required to stop a fluid from expanding, and is usually stated in term of force per building block area. Normally a pressure sensor functions as a transducer; as a function of the pressure applied, it produces a symbol . [3]

### 4.4 Heartbeat Sensor

An individual's pulse is the sound of the valves in his/her's heart contracting or extending as they power blood starting with one area then onto the next. The occasions the heart pulsates every moment (BPM), is the heart beat rate and the beat of the heart that can be felt in any vein that falsehoods near the skin is the beat.

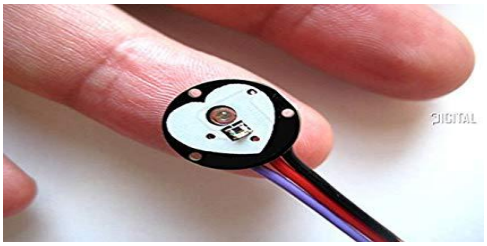

**Fig -6: SEN11574 heart beat sensor**

### 3.5 RF Transmitter and Receiver

An Releasing hormone module (short for radio set - frequency module) is a (usually) small electronic device used to transmit and/or receive radio signal between two devices. Wireless contact with another computer is also desirable in an embedded network.

### 3.6 GPS

Initially, the sign of time is sent from a GPS satellite at a given point. Thusly, the time contrast between GPS time and the purpose of time clock which GPS collector gets the time sign will be determined to create the good ways from the recipient to the satellite. A similar procedure will be finished with three other accessible satellites. It is conceivable to compute the situation of the GPS collector from good ways from the GPS recipient to three satellites.

Nonetheless, the position produced by methods for this technique isn't exact, for there is a blunder in determined separation among satellites and a GPS recipient, which emerges from a period mistake on the clock joined into a GPS collector. For a satellite, a nuclear clock is fused to produce on-the-spot time data, however the time created by tickers consolidated into GPS recipients isn't as exact as the time produced by nuclear timekeepers on satellites. Here, the fourth satellite comes to assume its job: the good ways from the fourth satellite to the recipient can be utilized to register the situation in relations to the position information created by separation between three satellites and the beneficiary, thus lessening the room for give and take in position exactness.

### 3.7 Python

Python is a multi-perspective programming language. Thing orchestrated programming and sorted out composing PC programs are totally supported, and an extensive part of its features reinforce utilitarian programming and point arranged programming (checking by meta programming and meta objects (charm strategies). Python uses dynamic making and a blend out of reference checking and a cycle-recognizing city laborer for memory the administrators. It similarly incorporates dynamic name objectives (late legitimate), which ties procedure and variable names during program execution. Python's architecture provides some support for the Lisp tradition of functional programming. It has functions to sort, map, and reduce; list comprehensions, dictionaries, sets, and expressions of generators.

## 4. CONCLUSION

High death rate because of cardiovascular infections coming about because of high BP is the significant issue looked by all countries, governments and human services offices. Because of headways in data and correspondence innovation, it is currently conceivable to have continuous observing and examination of BP insights to foresee and forestall the danger of hypertension in a beginning period at remote destinations. In this paper, IoT based human services observing framework is proposed for ceaseless checking of BP and other wellbeing parameters to recognize phases of hypertension. Counterfeit neural system is used for anticipating the hazard level of hypertension attack. A Self-supported framework that deals with the physical strength of a patient which is effectively spreadable and versatile to the anybody's information and stays away from hand of other individual. It likewise collects the subtleties into the cloud firewall at a specific putting away focus and sets up the concerned individual's subtleties at whatever point required to the comforts accommodated them. The consequences of examination and assembled clinical data of every client are put away for all time on distributed storage for imparting to area specialists, for example, clinicians, specialists, individual parental figures and with clinical foundations to give different prudent steps and proposals on schedule.

**Fig -7: Virtual representation**

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