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IoT Based System to Assist Alzheimer Patient

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Abstract: *This Alzheimer's is a long- term disease which degrades the neural capacity. Over time, the illness progressively gets worse. Patients with Alzheimer's are always reliant on other people. Caretakers find it more challenging to manage the patients as the condition worsens. The design and construction process for an electronic gadget used to track Alzheimer's patient care is described in this study. The vitals of a patient will be tracked using the wearable sensors. Several bodily touch sensors gather information. The cloud server receives this data. For this research, we're employing a variety of sensors, including temperature and pulse sensors, to track the patients' health in real time. To identify the patients' major health issues so that effective medical care can be provided. Alzheimer causes patients to lose memory. They occasionally get lost, thus a technology is employed to track them and communicate the information to family members. The Internet of Things (IOT) can play a major part in helping the Alzheimer patient. The smartphone device application will be utilised to guide the Alzheimer patients and aid them in their daily activities. It will also help the doctors, carers, and family members to monitor patients' reports. The purpose of this work is to create a prototype for a system that offers psychological support services and assures secure transmission of data that can be examined by a family member to safeguard the AD patient.*

Keywords: Alzheimer, Raspberry pi, Heartbeat Sensor, Temperature Sensor, Internet Of Things, Global Positioning System.

I. INTRODUCTION

This Since the previous ten years, IoT technology has had a significant impact on human existence in all areas, including medical, health, industry, transportation, education, and agriculture. Alzheimer's disease is a type of mental illness that affects people in their middle or later years and is characterised by progressively worsening issues with reasoning and behaviour. Patients with Alzheimer's have memory loss. They occasionally get lost, thus a technology is employed to track them and communicate the information to family members. Depending on the stage of Alzheimer's, an application will change how it operates. It provides notification of daily reminder of food, medicine and activites. The condition of the patient is sensed utilising an IoT device across a wireless media. The major objectives of this system are to provide patients with a working environment at home, lower healthcare costs, and ease the stress on medical staff.

In this essay, patients with Alzheimer's disease—the most prevalent neurological condition in the last ten years—are the main subject. It is a form of dementia that affects the majority of elderly individuals. When suffering from this sickness, a person loses awareness because they are unable to carry out their daily chores on their own and require constant attention from a family member for their conduct and health. With the present COVID-19 pandemic situation, the Internet of Things can be quite useful. These patients' homes have a variety of wearables, sensors, and actuators attached. These IoT devices are used to collect the data regarding their temperature, medicine intake timings, and movement. The different types of sensors and actuators have been used for their secure.

II. LITERATURE SURVEY

Nagarjuna Reddy A, G Hari Krishnan, and Raghuram D Proposed Raspberry PI for real-time patient health monitoring. Automating these services lessens the stress on humans and facilitates the measurement process because health care services are a crucial component of our society.By lowering doctor visits, hospital stays, and diagnostic testing procedures, monitoring systems are designed to lower health care expenditures. The GSM technology helps the

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server to update the patient data on website. Many further improvements can be made in our system to make it better and easily adaptable such as adding more advanced sensors.[9]

E. N. GANESH proposed a system that would provide patients with better and more efficient health care services. The data gathered would be networked globally via the internet and communication devices, which would then be connected to cloud services so that doctors could use it to quickly and efficiently solve a patient's problem. The proposed model is a well equipped system where the doctor can check his patient anywhere, anytime. Emergency alert e-mail is sent to the patients if the threshold value is reached that to consult the doctor.[6]

Rania Chokri, Wasma Hanini, Wided Ben Daoud proposed GPS module provides the current location data by transferring latitude and longitude data to Arduino and further sent to the GPRS module. GPRS module provides access and transfer data to the internet, so incoming data is sent to web server. Our system aims to ensure the physical safety of the patient by monitoring him/her remotely using a portable device for elderly patients with AD.[1]

K. İleri , A. Duru , I.R. Karas proposes and implements a system architecture that gives a fresh approach to cases of wandering and becoming lost for people with Alzheimer's disease. The system was created using already available technology to create a little tracking device that is connected to the internet. Instant access to location information is made possible by the tracking device's internet connection. As a result, through the built mobile application, carers or relatives of the patients can easily view a map with the patient's coordinates.[4]

Sara Paiva, Carlos Abreua presented a new proposal for a low cost GPS tracking system that rely on a mobile device with GPS functionalities, which at this point is optimized for Alzheimer patients. We established the solution's architecture, which consists primarily of five elements: a web server, a web platform, a web service for the sending location, a supporting database, and a mobile application. We plan to include a feature that enables carers to share their everyday experiences so that others might gain from them as future stages and with relation to the prototype.[11]

A.Bolaji develops a system to give effective healthcare services to patients in their varied locations, including rural areas, this study presents the reports of a simulated model for a real-time mobile health monitoring system for hypertensive patients. Thus, using a mobile medical monitoring system is necessary to address the issue of inadequate medical services in the majority of distant places. Using a modelling language, the model was created. The model was created and simulated using JAVA (standard edition), while the back end utilised MYSQL. Database and Web Server for Health Information. On the system network, it manages all data submissions and requests.[10]

Rui-xia Jia, Jing-hong Liang, Yong Xu,Ying-quan Wang proposed Alzheimer's disease (AD), as the most common cause of dementia, imposes significant financial cost to patients and social health care systems, which spurs researchers to examine a variety of preventative variables, among which physical activity and exercise have been shown to be both efficient and practical from an economic standpoint. Aged persons with Alzheimer's disease can benefit cognitively from exercise and physical activity. Exercise and physical activity have been found to help in accomplishing this goal in a sustainable and affordable way. Exercise and physical activity can help elderly people with AD improve their cognitive function.[7]

III. SYSTEM ARCHITECTURE

Location Tracking:

This system aims to ensure the physical safety of the patient by monitoring him/her remotely using a portable device for elderly patients with AD. The network is vulnerable to a variety of attacks that could target the network or the data produced by sensors. Our location monitoring system safeguards AD sufferers while upholding their right to privacy. We were able to find the Alzheimer's patient using the GPS. GPS draws the location information on a map every two minutes using a cellular data service plan. Geo-zones that are designated can be created, and if the patient departs the zone, a notification alert is sent. The specially made collar keeps track of patients' daily movements. Later, in case of exit from the security zone, an notification will be sent to the family member indicating this information. The messages that will be sent are very sensitive, because they contain private personal information. It is therefore important to protect them.

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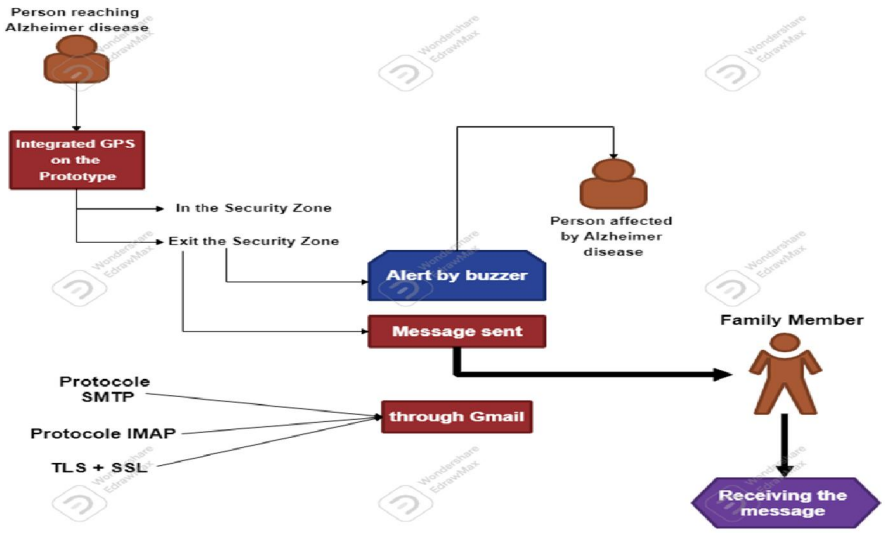

Figure 1: System design for Location Tracking

Health Monitoring :

A health monitoring system consists of several sensors connected to a patient and they communicate the data through the processing unit. In addition to being a CPU, Raspberry Pi is also utilized as a data aggregator. As a monitoring system, the doctor's computer or smartphone is used with the patient. Three sensors are connected to the Raspberry PI: a temperature sensor that measures the patient's body temperature, an accelerometer sensor that tracks activity and sleep, and a pulse sensor that measures the patient's heart rate.

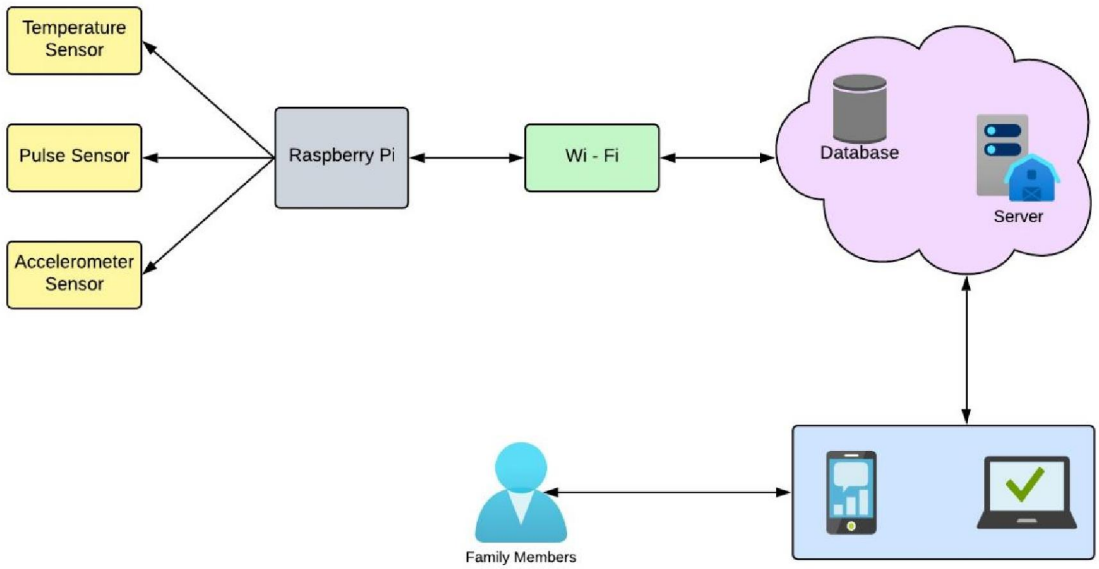

Figure 2 System Design for Health Monitor

Mobile Application:

A background service in the mobile application transmits GPS coordinates and local time to the Web Platform. With this initiative, mobile applications are crucial since they make it simple to track and monitor patients. The patient's data will be displayed in the app, allowing family members to track the patient and send and receive alerts. The app also allows doctors to see a weekly health report immediately. Hence, data from the device is acquired through Bluetooth, preprocessed internally by the application, and then saved in the application. Weekly health report visualization is

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completed after data storing and sent to doctors via WIFI protocol. Alerts related location and health is send automatically to family members through WIFI protocol. For backups all data is stored in database.

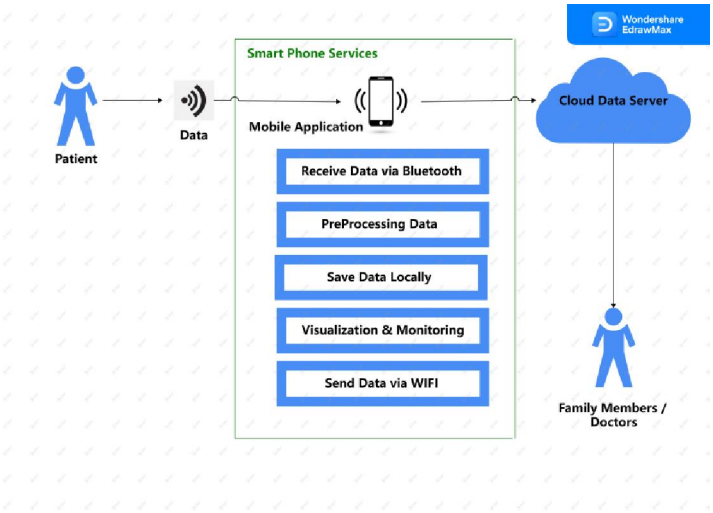

Figure 3 System design for Mobile Application

IV. METHODOLOGY

Three sensors are used in an IOT-based patient health monitoring system. The temperature sensor is the first one, followed by the pulse sensor and the accelerometer sensor. These parameters are then given to the Raspberry PI, which performs various activities including comparing various health parameters, before sending the results to the gateway server.

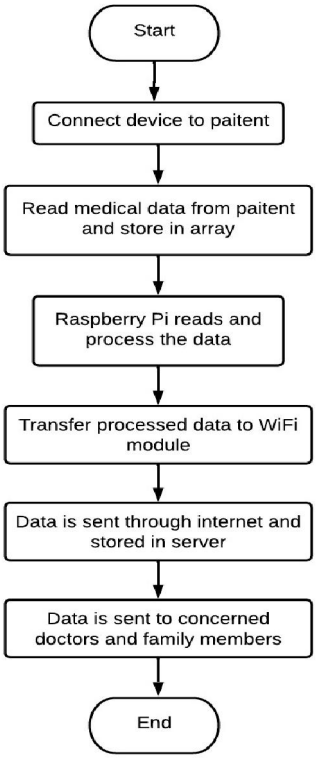

Figure 4 Flow Chart

Three sensors are used in an IOT-based patient health monitoring system. The temperature sensor is the first one, followed by the pulse sensor and the accelerometer sensor. These parameters are then given to the Raspberry PI, which

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performs various activities including comparing various health parameters, before sending the results to the gateway server. Also, it has a GPS tracker that is connected to a Raspberry PI and updates its location every two minutes using a cellular data plan. The GPS tracker then displays the location information on a map. It is possible to create designated geo-zones, and if the patient departs the zone, a message alerting the family is delivered. The project's flow diagram is depicted in Fig. 1. The device is attached to the patient first. A Raspberry Pi continuously collects input from the device and transfers data to the cloud through the internet. The device has all of the patient's medical information. This information will be shown on a mobile application that will allow clinicians and family members acquire reports on AD patients

V. SIMULATION AND RESULTS

DHT11 connection with Raspberry pi 3B+:

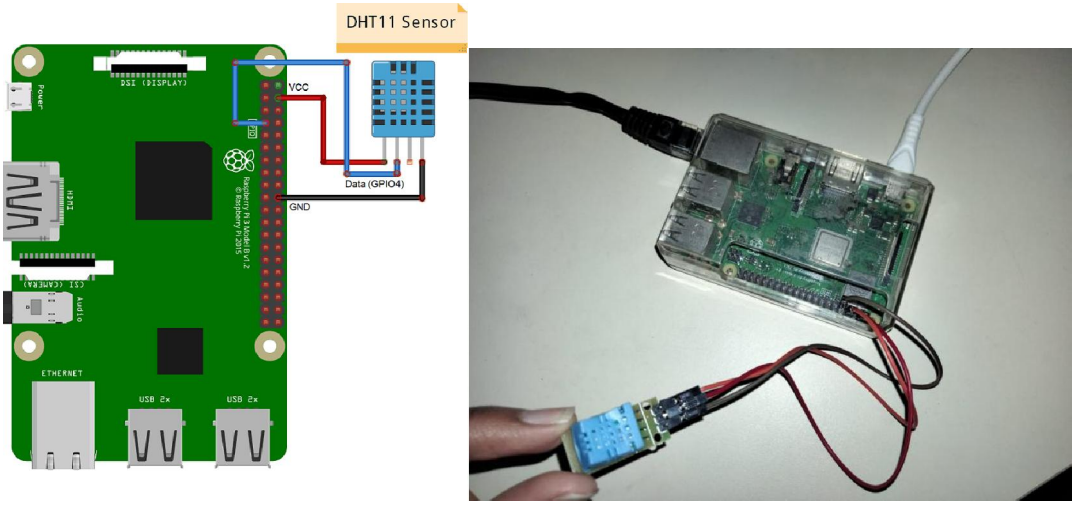

Figure 5 DHT11 Connection with Raspberry pi

System Requirement

- DHT11 sensor
- Raspberry Pi 3B+
- Female to Female Jumper Wires

Connection

- Connect the sensor's VCC pin to the Pi's 5V pin.
- Connect the sensor's GND pin to the Pi's GND pin.
- Connect the sensor's DATA pin to the Pi's GPIO 4 (BCM GPIO 23) pin.

Result

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MPU6050 connection with Raspberry pi 3B+:

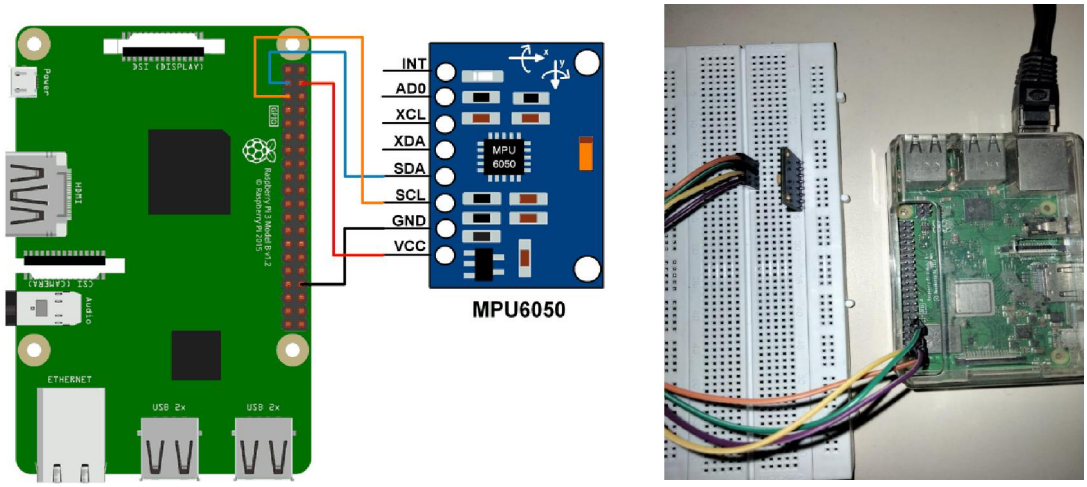


Figure 6 MPU6050 connection with Raspberry pi 3B+

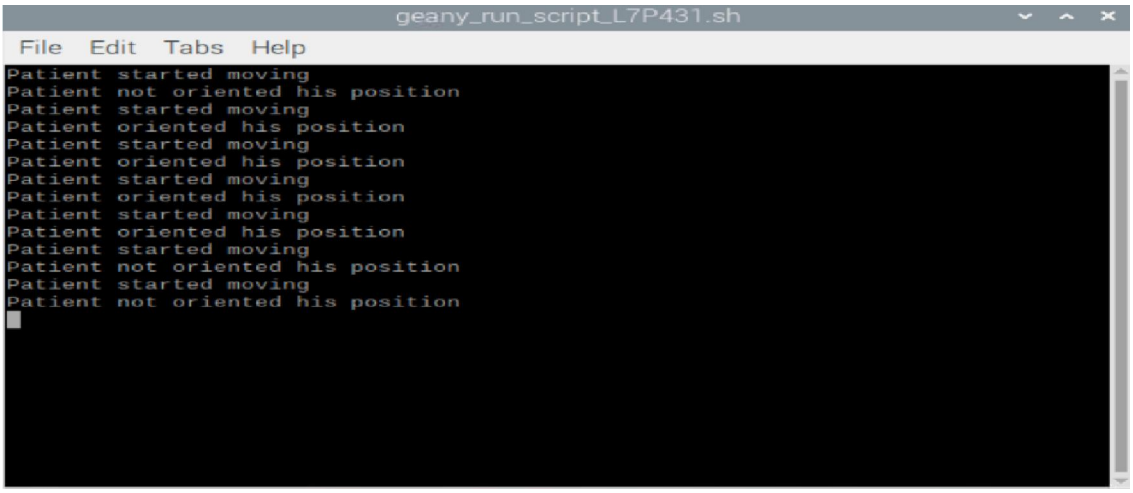
System Requirement

- MPU6050 sensor
- Raspberry Pi 3B+
- Male to Female Jumper Wires
- Breadboard (optional)

Connection

- Connect the VCC pin of the MPU6050 to the 3.3V pin of the Raspberry Pi.
- Connect the GND pin of the MPU6050 to a ground pin on the Raspberry Pi.
- Connect the SDA pin of the MPU6050 to the SDA pin (GPIO 2) of the Raspberry Pi.
- Connect the SCL pin of the MPU6050 to the SCL pin (GPIO 3) of the Raspberry Pi.

Result



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MAX30100 connection with Raspberry pi 3B+:

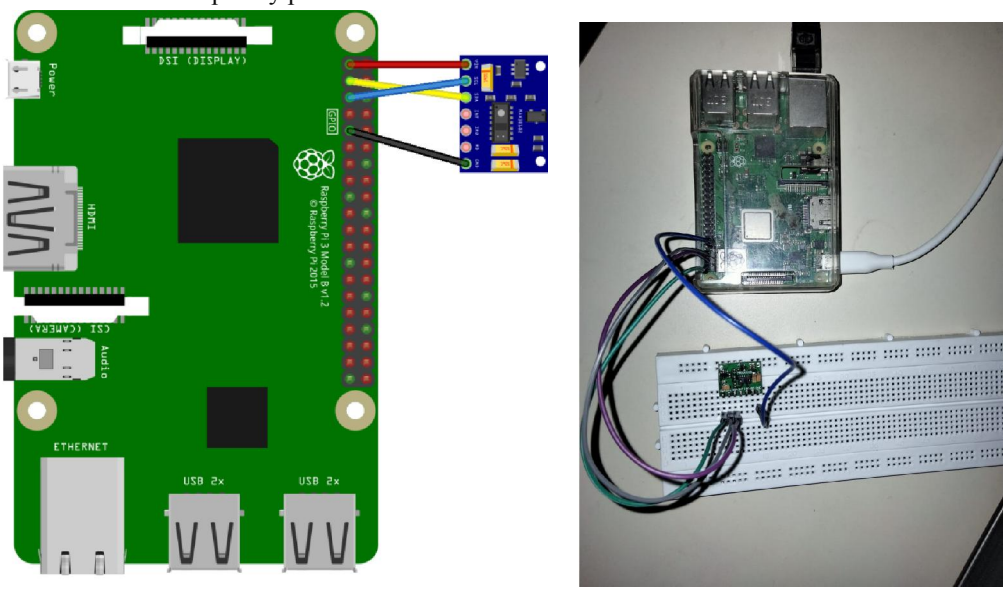


Figure 7 MAX30100 connection with Raspberrypi 3B+

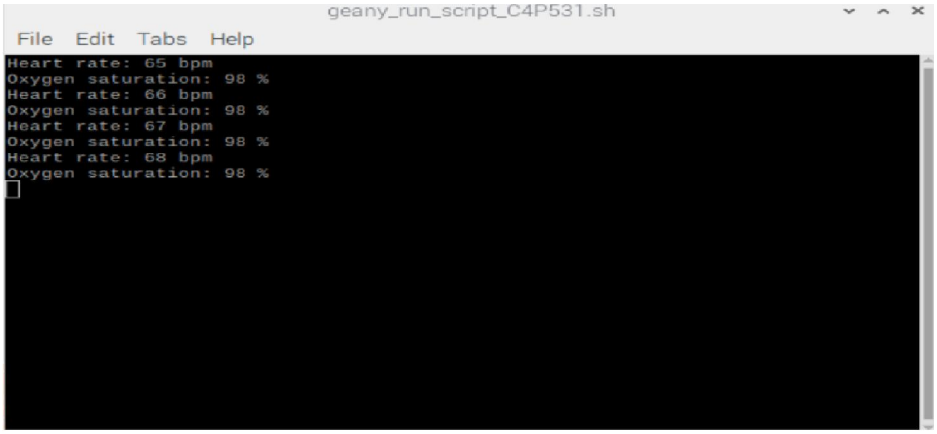
System Requirement

- Max30100 sensor
- Raspberry Pi 3B+
- Male to Female Jumper Wires
- Breadboard (optional)

Connection

- Connect the VCC pin of the MAX30100 sensor to a 3.3V pin on the Raspberry Pi.
- Connect the GND pin of the MAX30100 sensor to a ground pin on the Raspberry Pi.
- Connect the SCL pin of the MAX30100 sensor to the SCL pin (GPIO 3) on the Raspberry Pi
- Connect the SDA pin of the MAX30100 sensor to the SDA pin (GPIO 2) on the Raspberry Pi.

Result



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Neo 6M GPS connection with Raspberry pi 3B+:

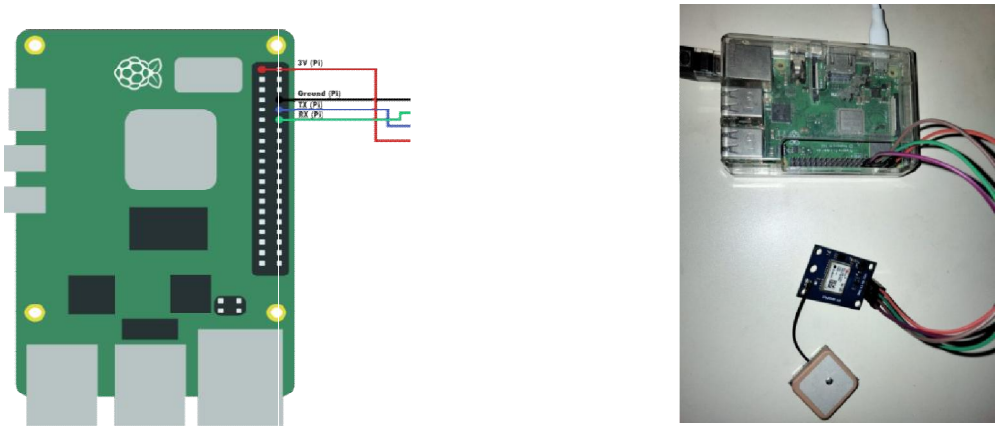


Figure 8 Neo 6M GPS connection with Raspberrypi 3B+

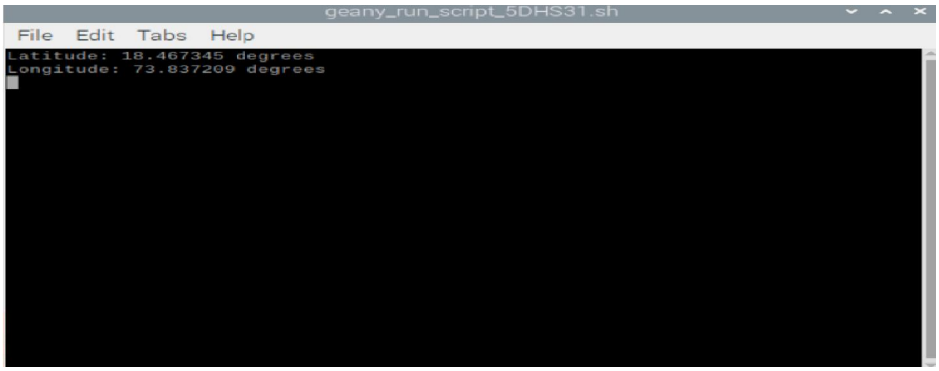
System Requirement

- Neo 6M GPS sensor
- Raspberry Pi 3B+
- Female to Female Jumper Wires
- Breadboard (optional)

Connection

- Connect the VCC pin of the GPS module to a 5V pin on the Raspberry Pi.
- Connect the GND pin of the GPS module to a ground pin on the Raspberry Pi.
- Connect the TX pin of the GPS module to a pin 10 - RXD (GPIO 15) pin on the Raspberry Pi, but it's recommended to use one that is not already in use by another device.
- Connect the RX pin of the GPS module to pin 8 - TXD (GPIO 14) pin on the Raspberry Pi.

Result



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Result of Mobile APP

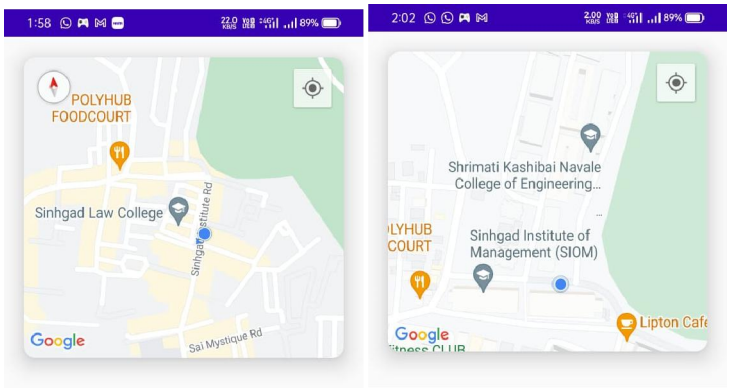

Figure 9 Application showing GPS Tracking

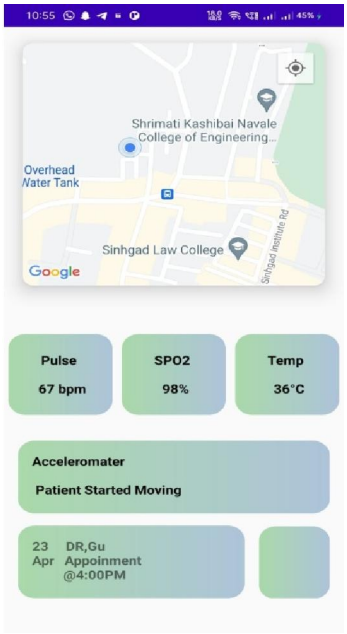

Figure 10 User Interferance of Application

V. CONCLUSION

The project is an IOT system which will assist Alzheimer's patients. Using IoT patient's health can be easily monitored over the internet. The doctor does not need to present every time and everywhere with the patients. Their health status can be easily monitored over the internet using IoT .We have used raspberry pi kit .This is a small sized kit and perform different types of functions..In our system we have implemented three types of sensors .These sensors are Pulse sensor, Temperature sensor, accelerometer Sensors ad mainly GPS tracker to track patient location when his is away from house .Using this system patient's or his family member's smart phone the patient can view his health status.In response to these types of needs, health monitoring systems are being proposed as a low cost solution. Android Application plays an important role in assisting patient thus enhancing their lifestyle. As we have considered assistance required for each stage it makes application unique. frustration due to dependency in patient's, lack of awareness in caretaker like issues are solved.

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