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IOT BASED VEHICLE TRACKING USING GPS SENSOR AND GSM MODULE ON RASPBERRY PI

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ABSTRACT. IoT based vehicle tracking system using GPS and GSM consists of three layers. First layer includes GSM and sky facing Antenna which should be placed outside of the vehicle. GSM and Antenna will help us to receive signals from Satellite. Satellite significantly provides location data to the GSM module using its microwave frequency. GSM module should be installed with SIM operator to establish a data communication from vehicle to mobile devices. Controller controls input from GSM device and feed it to GPS device and vice versa. Third layer is external communication layer also called as GPS module. This module is used to send and receive information from vehicle to mobile devices, external database, external servers and external third party apps. In this paper we are going to make use of Raspberry pi controller to capture location of the vehicle using GSM antenna and also forwarding this information to GSM connected devices to represent the data in graphical manner or simulation manner.

1. INTRODUCTION

Planning a vehicle tracking framework which can work compelling, precise and dependable is rising in numerous territories. Such framework is usually utilized GPS innovation to decide area of the vehicle. It tends to be utilized to follow a vehicle or armada of vehicles and get data identified with current

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area of the vehicles. High required working expense of the vehicle following frameworks, including equipment and programming prerequisites, normally, keep these frameworks from being far reaching pertinent. In this paper a vehicle tracking framework dependent on GPS and GPRS is proposed. The area of the vehicle is recovered utilizing implanted GPS sensor. An adjusted coding technique is utilized to encode and pack area information before it is sent to offer financially savvy use of system traffic. The protection of the transmitted information is ensured utilizing a straightforward security component. The encoded and scrambled area information at that point send to following server utilizing GPRS innovation. The approved client can follow a vehicle utilizing a safe web interface.

1.1. **GSM.** A GSM modem is a particular sort of modem which accepts a SIM card, and works over a membership to a versatile administrator, much the same as a cell phone. From the portable administrator viewpoint, a GSM modem looks simply like a cell phone. At the point when a GSM modem is associated with a PC, this permits the PC to utilize the GSM modem to convey over the portable system. While these GSM modems are most habitually used to give portable web availability, a large number of them can likewise be utilized for sending and accepting SMS and MMS messages.

1.2. **GPS.** The Global Positioning System (GPS) is a satellite based route framework that imparts and gets radio signs. A GPS recipient gains these signs and gives the client data. Utilizing GPS innovation, one can decide area, speed and time, 24 hours per day, in any climate conditions anyplace on the planet for nothing. GPS was officially known as the NAVSTAR (Navigation satellite Timing and Ranging). Worldwide Positioning System was initially produced for military. In light of its well- known route abilities and in light of the fact that GPS innovation can be gotten to utilizing little, reasonable gear, the administration made the framework accessible for regular citizen use.

1.3. **Key Benefits.** In addition, this framework can likewise follow the vehicle's present area on a Google Map, which is for the most part gainful when vehicles ought to follow a particular street and if there should be an occurrence of burglary. Additionally geo-throwing can have a significant job in this model. A few sensors, for example, stun/vibration sensor typically joined to the air-packs

in vehicles, are connected to the framework that if there should arise an occurrence of mishap, it will send warnings to the closest medical clinic, police headquarters and common guard. Our proposed model can be used for various executions, both in broad daylight and private parts. When modified with speed restrains in a specific topographical locale, the onboard diagnostic permits the traffic control power to direct infringement of speed limits from inside vehicles instead of outside oversight through certain check focuses.

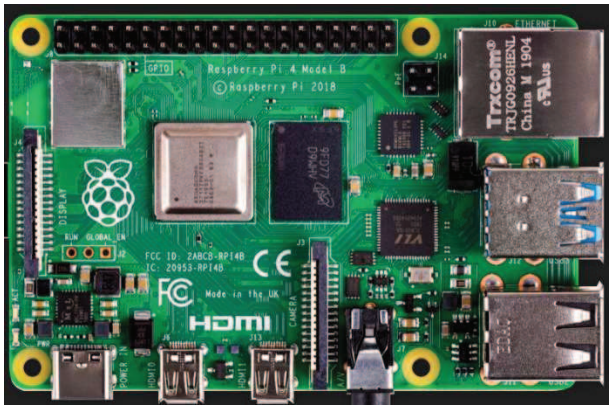

FIGURE 1. Raspberry Pi

1.4. **Raspberry Pi.** Everywhere throughout the world, individuals use Raspberry Pi to get the hang of programming aptitudes, manufacture equipment ventures, do home computerization, and even use them in mechanical applications. The Raspberry Pi is a modest PC that runs Linux, yet it likewise gives a lot of GPIO (universally useful info/yield) sticks that permit you to control electronic parts for physical registering and investigate the Internet of Things (IoT).There have been three ages of Raspberry Pi: Pi 1, Pi 2, and Pi 3, and there has commonly been a Model An and a Model B of most ages. Model A will be a less expensive variation and will in general have diminished RAM and ports like USB and Ethernet. The Pi Zero is a side project of the first (Pi 1) age, made considerably littler and cheaper. Some individuals purchase a Raspberry Pi to figure out how to code, and individuals who would already be able to code utilize the Pi to figure out how to code devices for physical ventures.

Valuable references on the are [1-11].

2. Proposed Methodology

GPS represents Global Positioning System and used to recognize the Latitude and Longitude of any area on the Earth, with accurate UTC time (Universal Time Coordinated). GPS module is the principle part in our vehicle following framework venture. This devices gets the directions from the satellite for every single second, with time and date. In this task, Raspberry pi is utilized for controlling entire the procedure with a GPS Receiver and GSM module. GPS Receiver is utilized for distinguishing directions of the vehicle, GSM module is utilized for sending the directions to client by SMS. What's more, a discretionary LCD is additionally utilized for showing status messages or organizes. We have utilized GPS Module and GSM Module. At the point when we prepared with our equipment in the wake of programming, we can introduce it in our vehicle and force it up. At that point we simply need to send a SMS, "Track Vehicle", to the framework that is set in our vehicle. Sent message is gotten by GSM module which is associated with the framework and sends message information to Raspberry pi. Raspberry pi understands it and concentrate principle message from the entire message. And afterward contrast it and predefined message in Raspberry pi. On the off chance that any match happens, at that point Raspberry pi peruses arranges by extricating required String from GPS module information (GPS working clarified above) and send it to client by utilizing GSM module. This message contains the directions of vehicle area.

To start with, introduce Raspberry pi controller and GPRS module header document into the library of Raspberry pi IDE. Incorporate or include the client's portable number (on which you need to get the GPS area messages) in the source code. Arrange and transfer the code onto the Arduino board utilizing Arduino IDE. When the code is singed, make associations as appeared in the square diagram. Insert a substantial SIM card in the GSM module associated with the Raspberry pi board. Ensure that this SIM has important equalization to send ready messages to the client's cell phone. With the Google Maps API, we include maps based Google Maps information to the web application. The API consequently handles access to Google Maps servers. We likewise use API calls to include markers. We set the middle area of guide by utilizing google.maps.LatLng (). As Google Maps API gives distinctive sort of maps see, we utilized ROADMAP for this web application. For bringing the information into the Google Map, we

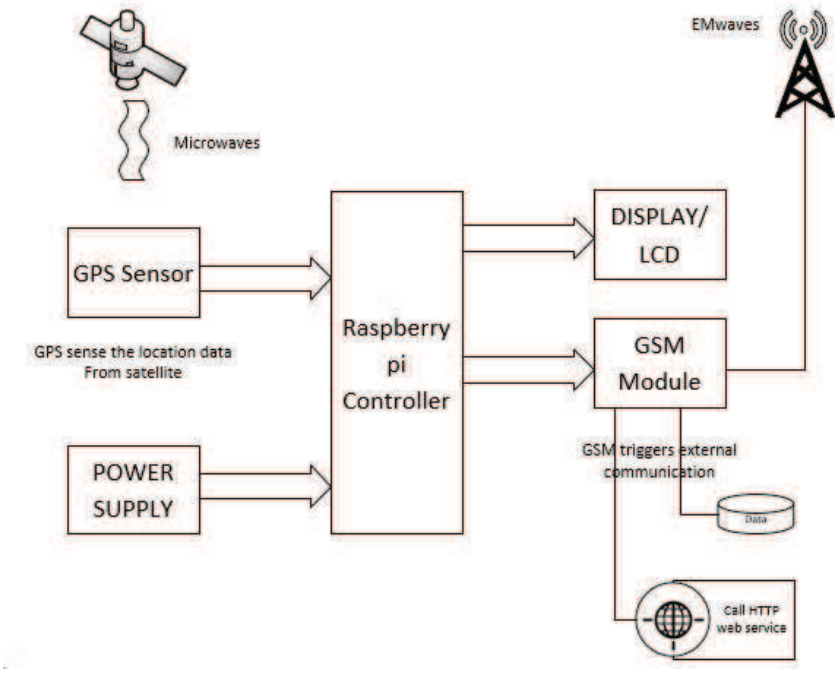

FIGURE 2. Block diagram of vehicle tracking system

have utilized getElementByID () technique. For checking the vehicle area, we have additionally incorporated the component which will send SMS to the client as indicated by client demand. SMS will be incorporated the estimation of scope and longitude of the vehicle. A connection is additionally appended with the SMS, so the client can see the area by utilizing Google map.

3. FLOW DIAGRAM

GSM module, GPS, and Controller should initiate to capture its respective data. When the GPS module initiates it starts receiving coordinates from the satellite. The received information is then passes to the controller. Once the controller receives the information from GSM module then the controller process it. Based on the program written in controller, The Raspberry pi forwards it to the external sources like webservers, goggle maps and SMS. For external access controller should have connected to the external world using GSM module with data communication enabled.

Step 1. GSM, GPS and Controller initialization.

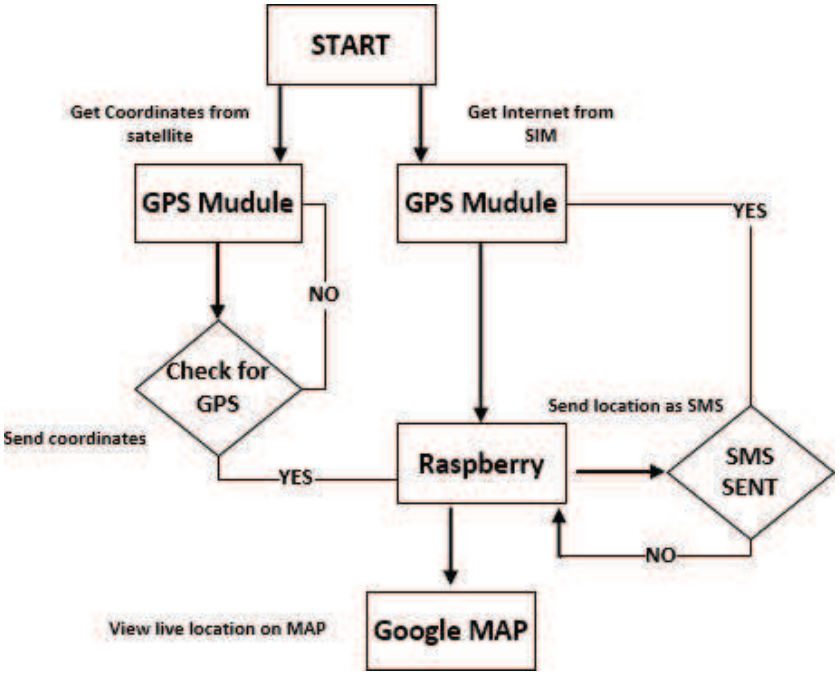

FIGURE 3. Flow diagram of vehicle tracking system

Step 2. GPS sensor receives latitude and longitude data from satellite.

Step 3. GPS sends the coordinate data to the controller.

Step 4. Controller sends the data to the remote device using GSM.

Step 5. The final data can be represented in the form of google MAP or SMS.

4. SIMULATION AND RESULTS

The below simulation result indicates that GPS sensor successfully receives data from satellite for latitude and longitude. The below spectrum is captured for location data with respect to the time. As the location data significantly varies based on the position and location of the sensor installed on the vehicle. Simulation results were captured for three different data such as GPS sensor data, LCD data and Google MAP API. GPS sensor data was given in to the MATLAB simulation tool and capture the output. Likewise the output was captured from LCD connected directly with the controller. Finally based on the link received from GSM and Google MAP URL the data is given to the google map app

for graphical representation. [Fig. 4] shows GPS Sensor Output from MatLab Tool and [Fig. 5] shows Google Map output.

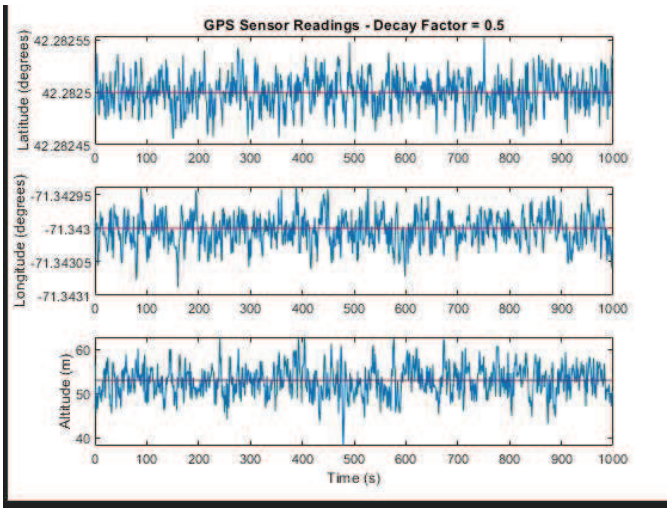

FIGURE 4. GPS Sensor Output

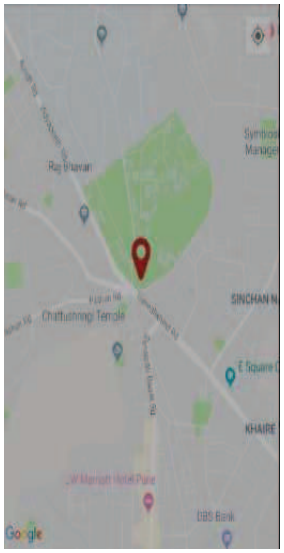

FIGURE 5. Google Map

5. CONCLUSION

We have concluded that the mentioned things are achieved using Raspberry pi controller along with GPS, GSM and Google MAP API. The Vehicle tracking framework is a GPS beacon which is for the most part worked by GPS is appended with the vehicle. Satellite signs is first gotten by it and afterward it decides its position co-ordinates with scope and longitude. These directions are commonly seen on a PC screen and by utilizing mapping programming we can see the specific situation of our vehicle. By and large vehicle following innovation client can get to the data of a vehicle dependent on vehicle's position, speed and separation voyaged and term of every stoppage with a focal working place by entering the portable number of client through cell phones or sites utilizing SMS or Internet. Vehicle tracking innovation is beneficial for following and observing both business and traveler vehicle. As worried about close to personnel vehicle tracking, it permits recuperating our taken vehicle by pin pointing that gives the specific area.

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