Cloud based Vehicle Tracking System

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Abstract

Vehicle tracking is beneficial for a variety of purposes, including personal vehicle security, public transit systems, fleet management, and more. Furthermore, the number of automobiles on the road is predicted to increase considerably internationally. As a result, a cloud-based vehicle tracking system based on the Global Positioning System (GPS), Global System for Mobile Communications (GSM) modem, and the Raspberry Pi processor board is being developed with the goal of allowing customers to easily and conveniently find their automobiles. The GPS and GSM modules in the tracking system are used to readily find the user's vehicle. The GPS module is used to track the vehicle's location using information such as latitude and longitude. These values are sent to the user through SMS using a GSM modem. Alcohol consumption is detected with the MQ-3 Alcohol sensor. The user can monitor the sensor data via the thingspeak channel. The latitude and longitude coordinates, as well as a webpage to plot the exact position of the vehicle, will be supplied to the user by e-mail. The Raspberry Pi processor board receives the data and outputs the result. The hardware prototype for a cloud-based vehicle tracking system is shown in this study. The GPS receiver module, GSM module, I2C Protocol, Raspberry Pi board, camera, and MQ-3 alcohol sensor are the system's primary hardware devices.

Key-word: GPS, GSM, Raspberry Pi, MQ-3.

1. Introduction

The vehicle tracking system is a complete fleet management and security solution. It is the technology that determines a vehicle's location using various techniques such as GPS and other navigation systems that operate via satellite and ground-based stations. Modern vehicle tracking systems employ GPS technology to track and position our vehicle anywhere on the planet, but other types of automatic vehicle location technologies are sometimes utilized as well. The vehicle tracking device is installed within the vehicle and offers accurate real-time location information. The data may also be stored and transferred to a computer for later study. This system is a necessity for tracking a car whenever the owner wishes to keep an eye on it, and it is becoming incredibly popular among those who own costly automobiles for theft prevention and recovery. The information gathered may be seen on electronic maps using software and the internet [1]. The system is equipped with cutting-edge hardware and software that allows it to monitor and locate vehicles both online and offline. A tracking system is made up of three major components: a vehicle unit, a fixed-based station, and a database with software [2]. The hardware component of the vehicle unit is a Raspberry Pi 3 b+, GPS, and GSM modem installed inside the vehicle to be tracked. The main component of the device is a modem that uses a GPS antenna to receive signals from the satellite. This modem then transforms the data and sends the car position information to a server through SMS [3]. The Fixed Based Station is made up of a wireless network system that receives and sends data to the data center. The base station has software and a map that may be used to locate the vehicle. The based station, which has an in-built Web server, offers maps of every city.

Database and software are applied to provide the position of each visiting area, which is kept in the database and afterward presented on a screen using Google maps [4]. We will provide a method for control and tracing urban transport vehicles using Raspberry Pi and GPS Antenna in this article. The GPS module, which is used to collect the vehicle's location, and the GSM modem, which is used to broadcast the position to the owner's mobile through SMS, are the two primary components of the vehicle tracking system. A notification with the location will also be sent via email. The Raspberry Pi processing board receives the values and generates the output. An image of the driver will be obtained using a Raspberry Pi camera. The data linked to the vehicle's position and time, as well as the alcohol sensor value, will be shown on the Thingspeak cloud by the vehicle's owner anywhere in the globe.

2. Literature Review

| Name of the project	Name of the Institute	Year	Page Link
IoT Based Vehicle Tracking and Monitoring System Using GPS and GSM	JNTUH, Hyderabad	2019	https://www.ijrte.org/wpcontent/uploads/papers/v8i2S11/B12750982S1119.pdf
GPS and GSM Vehicle Tracking System	Technologic-al University, Kyaukse, Myanmar	2019	https://www.researchgate.net/publication/334123684_GPS_and_GSM_Based_Vehicle_Tracking_System
Design and Implementing of Vehicle Navigation System Using IoT	Aeronautical Engineering Dundigal, Hyderabad	2017	https://iopscience.iop.org/article/10.1088/1757-899X/225/1/012262/pdf

These three systems are quite similar to our work. In the first work, Arduino, GPS, GSM, IoT, MQ3, RFID, Thingspeak have been used. The second project work, they have used Arduino UNO, GSM module, GPS module, mobile, LCD. In the third work, GSM, GPRS, GPS, Temperature sensor, Raspberry Pi Gas Sensor and Android Mobile have been used.

The advantage of our work over the previous works is that by using Thingspeak cloud by the owner, calculation of the fuel and time arrival will be done which is the major advantage of this work. Using Raspberry Pi will provide information regarding vehicle identity, speed and position on a real-time basis which is important information for tracking vehicles.

3. Proposed Methodology

This section will go through the components of a cloud-based vehicle tracking and warning system in depth. Figure 1 shows the vehicle tracking system's block diagram. GPS, GSM, Raspberry Pi board and MQ-3 Sensor are the hardware components. Thingspeak cloud is the software channel that is used in this work.

Fig. 1 - System's Block Diagram
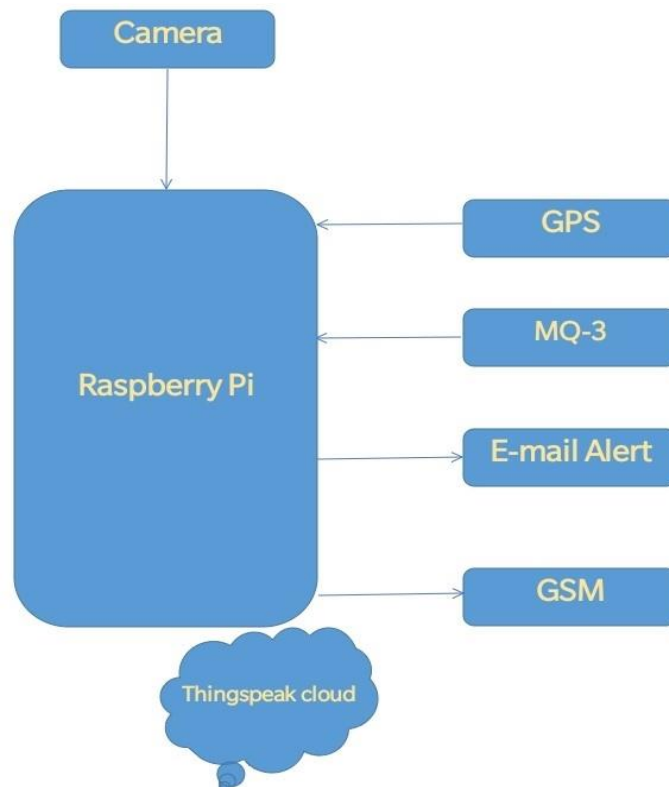
System Description

1) Real-time GPS Vehicle Tracking System

Position of the vehicle:

The vehicle's position will be recorded in terms of latitude and longitude.

Position coordinates will be transmitted into the raspberry pi database.

2) Raspberry Pi Camera

The camera will capture the driver's face for security purposes. This data will be transmitted into the raspberry pi database.

3) MQ-3 Sensor

The sensor will sense the presence of the alcohol. This data will be passed to the I2C protocol. And then passed into the raspberry pi database.

4) GSM

The latitude and longitude coordinates will be transmitted from the raspberry pi to the GSM, then the coordinates along will date and time will be sent into the owner's phone in the form of SMS.

5) Raspberry Pi 3 B+

Raspberry Pi is the heart of the model. All this data information will be stored in the raspberry pi database. We will be using python language, The python program that contains the raspberry pi database will be stored in the SD memory card.

Fig. 2 - Final Model
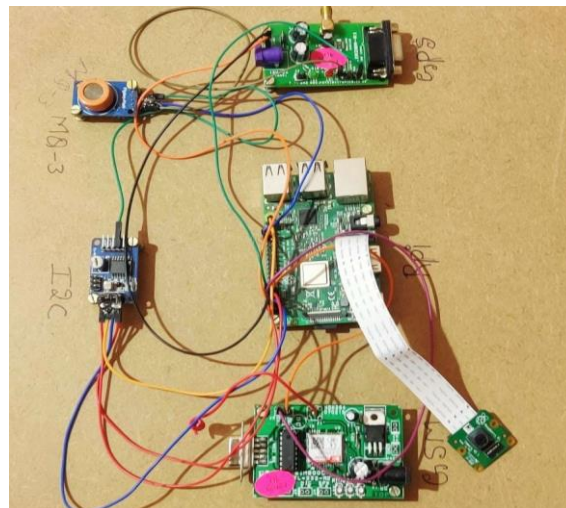
There are three ways to convey the data information to the owner of the vehicle:

A. An SMS Message that is Sent through the GSM

An SMS message will be sent to the owner that contains the data information of the latitude ad longitude values along with the date and time. This message will be sent every 5 min.

Fig. 3 - SMS Message

Your vehicle is at location
lat:13.7570666666666666
lon:77.5009433333333333
Date and Time:07_Mar_2021|17:19:23

B. Thingspeak Cloud

The data information that contains the latitude and longitude values along with the alcohol sensor value are going to be displayed on the thingspeak channel. These data will be uploaded from the raspberry pi server. This message will be sent every 5 minutes.

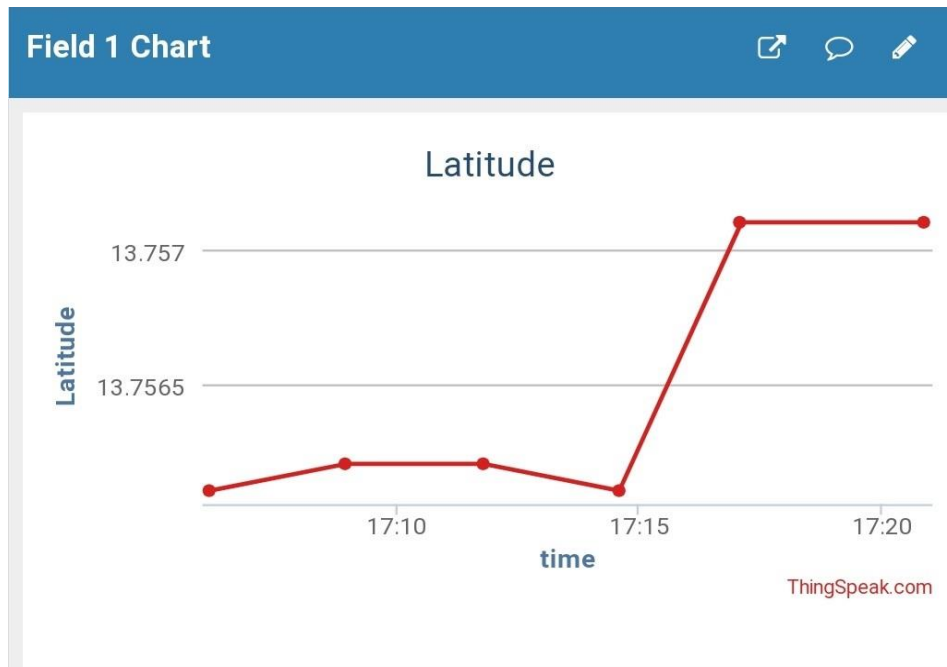Fig. 4 - Latitude Coordinates in Thingspeak Channel

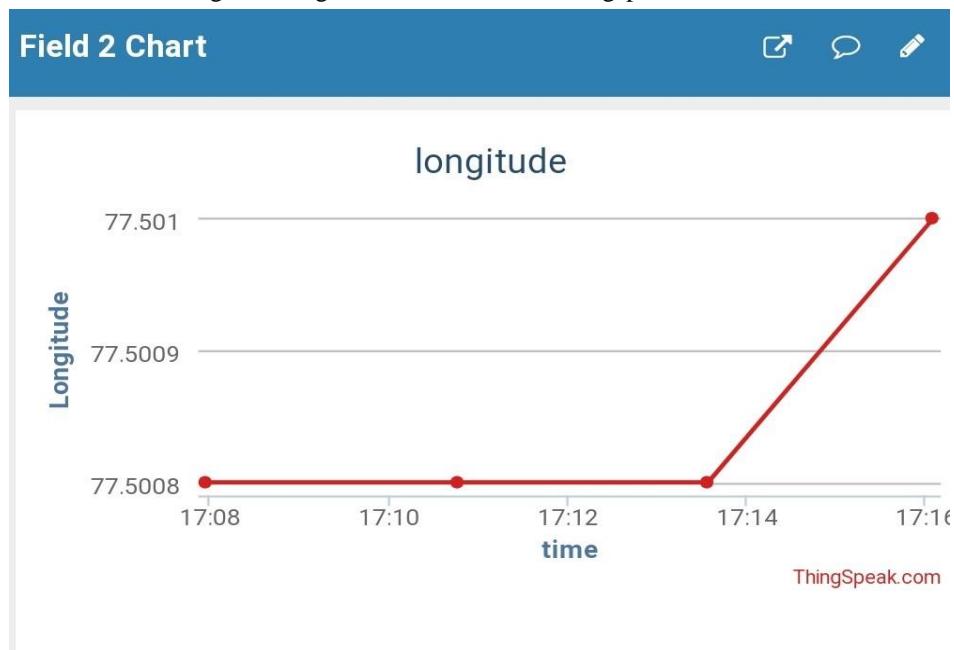Fig. 5 - Longitude Coordinates in Thingspeak Channel

Fig. 6 - Alcohol Value Coordinates in Thingspeak Channel

C. E-mail Message

A website link that contains the real-time location of the vehicle along with the captured image of the driver will be shared to the owner's e-mail. This message will be sent every 5 min.

Fig. 7 - E-mail Message (Website to Access the Location along with Image Captured)
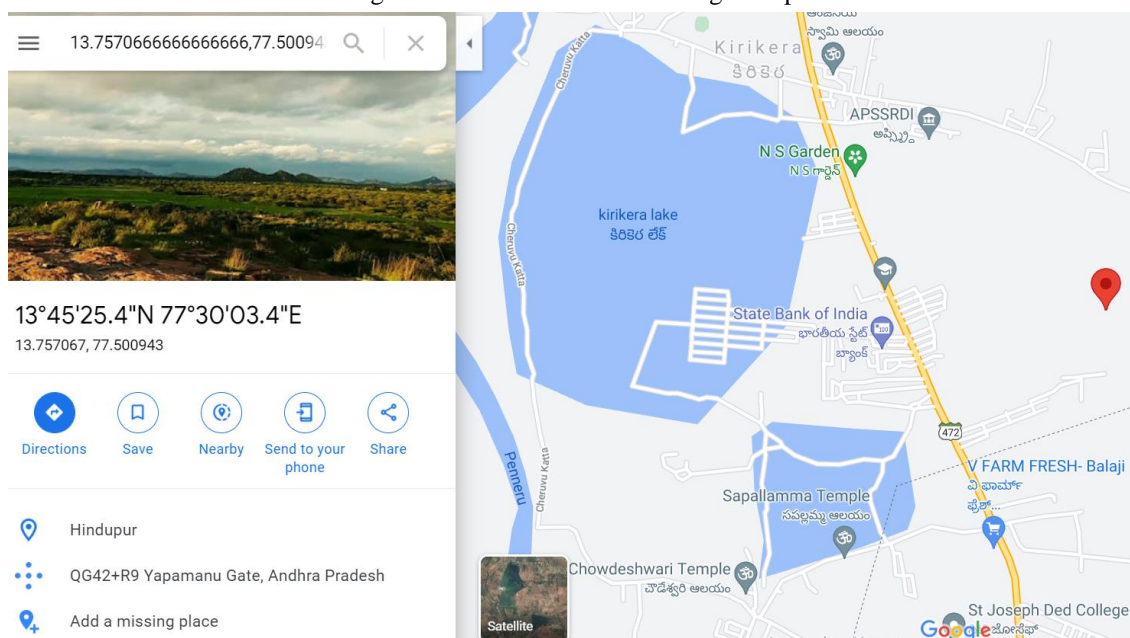
Fig. 12 - Location Plotted on Google Map

4. Result

In this project, we introduced cloud-based vehicle tracking and alert system. This application mainly makes use of GPS, GSM, Raspberry Pi, Thingspeak cloud. With this application, a solution has been provided for tracking and monitoring public transportation vehicles. The Data related to the location of the vehicle and time along with the Date, MQ-3 sensor's value, the image captured by the Raspberry Pi camera are going to be uploaded to the thingspeak cloud, The position will be transmitted to the phone number via SMS. and as well as though an email. The Monitoring unit will access the database from the server to check the vehicle location. The location information present on the database will be plotted using Google maps on a monitoring device.

5. Conclusion and Future Work

Tracking systems nowadays the most important system for the person, which is the key reason why vehicle tracking systems are becoming increasingly prevalent, not just in metropolitan areas but also in small towns. This device is fully automated, allowing the user to conveniently monitor their vehicle at any time and from any place. People have discovered a practical way to keep an eye on their car without having to be in near proximity to it. This system keeps a tight grip on robberies and helps to prevent them to some degree. Basically, the GPS and GSM are used to track the vehicle, and the distance completed by it. In this paper. The user is able to access the position of their vehicle

every 5 min by receiving an SMS in terms of latitude and longitude by the use of GSM, and also can get the exact location from an email message that has a website of the live location. Vibration sensors will be used to identify traffic accidents automatically in the future. This sensor will first detect the incidents, after which the GSM module will report the vehicle's latitude and longitude position to the nearest ambulance.

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