

Vehicle Tracking System for Reliable Vehicle Distribution

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Abstract— Vehicle Distribution is the major tasks done by transportation companies. To make it more reliable, tracking system is included in the vehicle. By using this tracking system, monitoring of assigned trip can be done. To increase the number of trips, reduce idle time, eliminate unauthorised halts and detours. To improve customer service with accurate cargo tracking to improve the process of vehicle distribution. This paper introduces the technology behind Vehicle Tracking System which uses GPS and GSM for easy maintenance of data related to vehicle which would benefit lot of people including end customers, commercial vehicle owners.

Keywords—Global Positioning System (GPS), GSM, Mobile Communication, Arduino, Microcontroller

I. INTRODUCTION

The GPS based “Vehicle Tracking and Transportation Management System” is one that makes use of the Global Positioning System (GPS) to determine the precise location of a vehicle to which it is attached. So, we sought to design a web-based GPS vehicle tracking system that enables administrators to view the present and past positions recorded of the target vehicle on Google Map so as to keep track on vehicle and ensure proper delivery of goods through a purpose designed website. The vehicle tracking and transport management system includes-

- A. Checking of availability of vehicle, depending on the customer requirements when a customer shows interest to get a vehicle for transportation of goods, firstly it is checked that whether vehicle is available for the transportation. If it is not available then customer is requested to wait.
- B. Assignment of trip, if vehicle is available if vehicle has completed its previous trip, then upon successful completion of the trip, next trip is allocated to it.
- C. Tracking of vehicle on successful assigning of trip when a trip is assigned to a vehicle, it is tracked using GPS. So as to get updates of where the vehicle actually is and to ensure that the vehicle has reached its proper destination without travelling aimlessly or unsystematically.
- D. Storing of all the details of the customer, trip allocated, etc. in database all the details are updated automatically on the website such as in time, out time and the current location of the vehicle. Other details such as trip allocated, to which vehicle trip is allocated, customer details, driver details, etc. will also be stored.
- E. For cross verification of the trips, all the trips will be assigned to pre-defined location where system is having geographical details of every location completion of trips and successful transportation of goods will be cross checked as all the trips are assigned to pre-define location. Here the system will have the geographical details of the destination. Before assigning any trip to vehicle, system will check for completion of previous trip after successful completion of trip and cross verification.

II. LITERATURE SURVEY

This tracking system permits the location of automobile and transmitting the position to owner through SMS. In the paper [1] tracking server consists of a Socket listener application running in the back-ground which listens at a particular port. This system composed of GPS receiver, Microcontroller and GSM modem. GPS receiver gets the information from satellites in the form of longitude and latitude. GPS satellite gives the exact position of the device which is situated in the car. This device connected to local GSM service provider via GSM network. This application is allow cost solution for automobile position and status.

In the paper [2] the system mentioned consists of an on board module which is mounted in the vehicle which is to be tracked. This system is helpful for public transport vehicles such as buses and taxis, it provides Tele monitoring and management system for the transportation of the taxis and buses within the city. This on-board module consists of Global Positioning System, a GSM modem and ARM processor. The navigation message which is broadcasted by the GPS position satellite is received and resolved by the GPS receiver of the vehicle terminal. This satellite computes the longitudes and latitudes of vehicle coordinates, then transform it into the short message form by using GSM communication controller and this message is sent to the monitoring centre through the GSM network.

In the paper [3] the vehicle tracking system ensure the safety of private and public vehicles while travelling. It has fleet management functions such as routing, dispatch, on-board information and security. By using this system police can follow the signal emitted by tracking system to locate stolen vehicle that works using GSM and GPS technology. A GPS receiver receives the signals from at least three satellites to calculate distance. GPS uses triangulation technique to compute longitude, latitude

and altitude position. We can locate the vehicle around the globe with micro controller GPS receiver and GSM modem.

The paper [4] system integrate the tracking system such as tracking device, web- based application and GPS navigator. This system useful to track and manage rental cars that are used by customer, using GPS tracking technology with GPS navigator. GPRS (General Packet Radio System) is ideally suitable for data transfer over an always online connection between central location and mobile device. GPS is used as a navigation and positioning tool in airplanes, boats, car, and almost outdoor recreational activities such as hiking, fishing, etc.

In the paper [5] the tracking system is built on a recently produced VTS (The Aram Locator) offering a SOC replacement of the microcontroller-based implementation. This is done by fetching the information like speed, time, distance, latitude and longitude. The two microcontrollers along with memory are incorporated into or better supported with a high-density PLD. This transforms the hard slow interface between them into a faster and reliable programmable interconnects, and therefore makes future updates simpler.

In the paper [6] GPS based vehicle tracking/navigation system is used. This is done by fetching the information of the vehicle like location, distance, etc. by using GPS and GSM. The information can be transformed with the following features: The information of the vehicle like location, etc. is obtained after every specified time interval defined by the user. Then this periodic information of location is transmitted to monitoring or tracking server. This transmit information is displayed on the display unit by using the Google earth to display vehicle location in the electronic Google maps.

III. WORKING OF GPS AND GSM

Global System for Mobile Communication (GSM) is the most popular wireless cellular communication technique, used for public communication. It uses a combination of Time Division Multiple Access (TDMA) and Frequency Division Multiple Access (FDMA). The Global Positioning System (GPS) is a network of about 30 satellites orbiting the Earth at an altitude of 20,000 km. Wherever you are on the planet, at least four GPS satellites are 'visible' at any time. Each one transmits information about its position and the current time at regular intervals. These signals, travelling at the speed of light, are intercepted by your GPS receiver, which calculates how far away each satellite is based on how long it took for the messages to arrive. Once it has information on how far away at least three satellites are, your GPS receiver can pinpoint your location using a process called trilateration. The working of GPS and GSM is shown in figure 1. Firstly, microcontroller, GPS and GSM are initialized. While tracking, we get the latitude and longitude of the current location from the GPS. Then, the latitude and longitude are send to receiver through microcontroller using GSM.

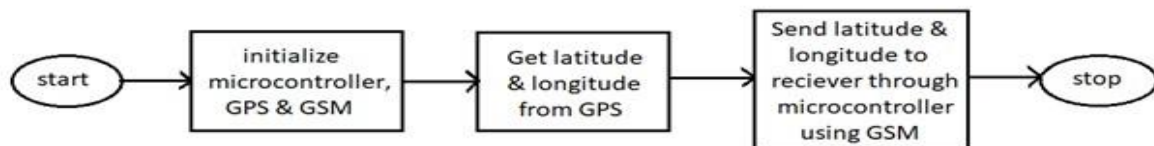


Fig 1. Working of GPS & GSM

Basic commands used in GSM

- AT+CMGF=1 <ENTER>: To check if your modem supports this text mode. If the modem responds with "OK" this mode is supported.
- AT+CPIN="0000" <ENTER>: If the modem contains a SIM card which is secured with a PIN code, we have to enter this pin code first.
- AT+CMGF=1 <ENTER>: In order to send a SMS, the modem has to be put in SMS text mode first.
- AT+CSMP=17, 167,0,16 <ENTER>: If the modem responds with "OK", the modem is ready to send (flash) text messages with a validity period of 1 day.
- AT+CMGS="+31638740161" <ENTER>: This command is used to send the SMS message. Replace the above phone number with your own cell phone number.

Circuit diagram of GSM modem

Steps to be followed for connection:

1. Insert the SIM card to GSM module and lock it.
2. Connect the adapter to GSM module and turn it ON!
3. Now wait for some time (say 1 minute) and see the blinking rate of 'status LED' or 'network LED' (GSM module will take some time to establish connection with mobile network)
4. Once the connection is established successfully, the status/network LED will blink continuously every 3 seconds. Try making a call to the mobile number of the sim card inside GSM module. If you hear a ring back, the gsm module has successfully established network connection.

Connecting GSM module with Arduino:

The communication between Arduino and GSM module is serial. So we are supposed to use serial pins of Arduino (Rx

and Tx). Connect the Tx pin of GSM module to Rx pin of Arduino and Rx pin of GSM module to Tx pin of Arduino. GSM Tx → Arduino Rx and GSM Rx → Arduino Tx. Now connect the ground pin of Arduino to ground pin of GSM module now load different programs to communicate with GSM module and make it work.

Message transfer in GSM

Connect a mobile phone or GSM/GPRS modem to a computer / PC. Then use the computer / PC and AT commands to instruct the mobile phone or GSM/GPRS modem to send SMS messages.

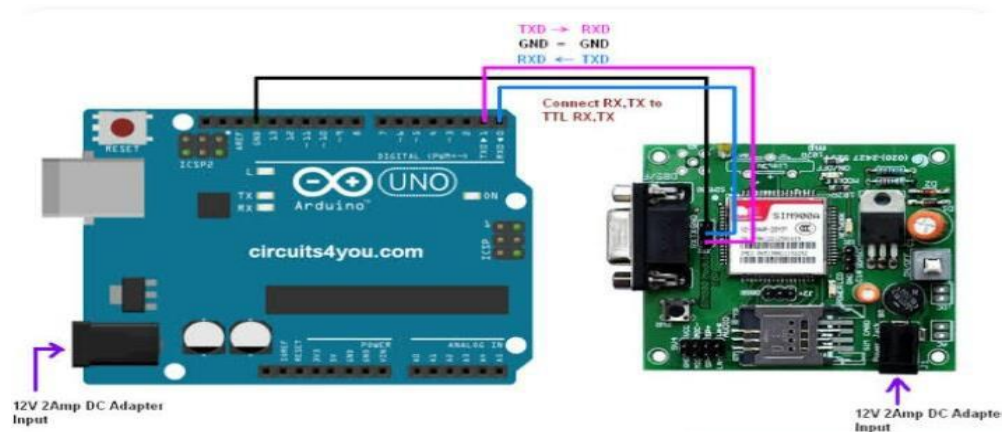


Fig 2. Interfacing of GSM Module with Arduino

IV. PROPOSED SYSTEM

The Flow of proposed system is shown in figure 3. Firstly it will be checked whether the vehicle is new or not. If it is a new vehicle then, that vehicle needs to be registered. Then according to the customer requirements, availability of vehicle is checked, if vehicle is available, trip is assigned to that vehicle and details are stored in database. After which tracking is done and proper transportation of goods is ensured. After which details get updated in the database. The Modules of the system are as follows:

- A. Registration & Enquiry: In this module, GUI is designed for easy interface between user and system and creation of database to store the details regarding vehicles.
- B. Tracking using GSM & GPS: GPS device is a small unit that receive signals from satellites and send other signals to antennas (GPRS) .This devise is a major part of the system and it will be installed into the vehicle which is responsible for capturing the information for the vehicle such as the Current location of vehicle. This device is also responsible for transmitting this information to the Tracking Server located anywhere in the world. Also, it has to install the unit in a hidden and safe place inside the vehicle.
- C. Tracking Window: As the traditional Mean-Shift tracking algorithm fix the size and orientation of tracking window, it cannot effectively track the target when the scale and orientation of tracking target has a distinct change. In response to this problem, the proposed algorithm which combines target contour and the principal components of the variance matrix with Mean-Shift tracking algorithm. It uses the target contour Information of the real-time to get the current size of the target and uses the principal components to compute the orientation of the tracking target. Experimental results show that the improved algorithm has a good adaptability when the scale and orientation of the target change.
- D. Database Updation: In this module trip completion in formation , vehicle information changes, etc. will be updated regularly.

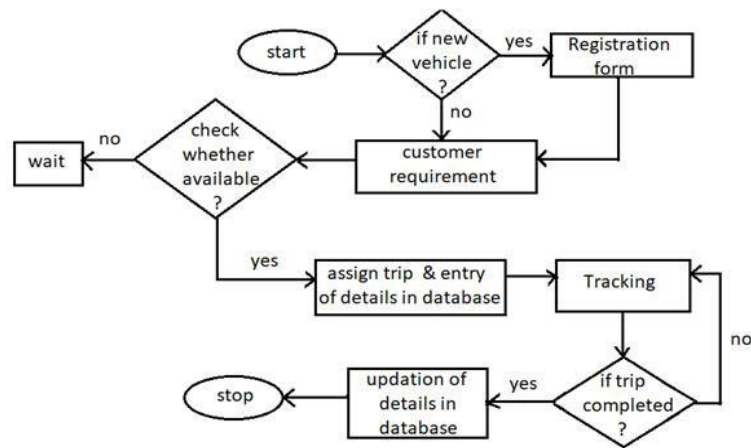


Fig 3. Flowchart for Vehicle Tracking

V. RESULT AND DISCUSSION

- Provide GPS/GPRS to the vehicle for tracking of every vehicle using web-based training software
- The system will track the current location which will be shown on Google map
- Computerization of vehicle trip distribution according to customer requirement depending on the availability of vehicle
- Monitoring of assigned trip so as to ensure proper delivery of the goods
- Storing of relevant details in database for proper maintenance and easy availability of the information to the administrator
- Save time and money by reducing cross checking of everyday trip

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