

Vehicle Tracking System for Commercial Vehicles

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Abstract: *A GPS tracking system is a common way of getting real-time vehicle location data. GPS technology is often employed in modern car tracking systems, however other forms of autonomous vehicle location technologies can also be used. A GPS tracking system comprised of hardware, open-source software, a web server, and an easy-to-manage user interface via a web server with Google Map was presented. The goal of this project is to develop and build a hand-held wireless GPS tracking device that can be tracked remotely via the Internet. There are three parts to this research. A mobile device with GPS and a wireless Internet connection is the first component. Our hardware project, which contains an LCD, GPS, GSM, Arduino Uno, and sensor linked to service, is the second portion.*

Keywords: google maps, GPS, location, tracking, traffic.

1. INTRODUCTION

The project "Vehicle Tracking System Using GPS and GSM Technology" was built to satisfy the tracking demands of today's vehicle fleet firms. It's a useful and adaptable piece of technology for everyone who needs to keep track of their valuables. An accident alert system's main purpose is to save people who are engaged in accidents. Upgraded automobile security systems are referred to as this. On the computer screen, data from a GPS receiver, such as position, speed, and time, will be shown.

To satisfy the demands of today's vehicle fleet firms, the "Vehicle Tracking System Using GPS and GSM Technology" project was established. It's a useful and adaptable piece of technology for everyone who needs to keep track of their valuables. On the computer screen, data from the GPS receiver, such as position, speed, and time, will be shown. Vehicle tracking systems enable the owner to keep track of and monitor his vehicle, as well as learn about its previous activity. This hardware is mounted on the car in such a way that no one inside or outside the vehicle can see it. The most current developments, such as GPS, have proven to be quite valuable in recent years.

When a car is stolen, the location data from the tracking system may be used to trace it down. Some car monitoring systems may even detect illegal vehicle movements and alert the owner. A built-in alcohol sensor is also included in this tracking gadget. The automobile also features a locking and unlocking system that allows the administrator to lock or unlock it as needed. To accurately locate and navigate the vehicle, the proposed technology is used. The exact location is displayed on Google Maps as latitude and longitude, as well as the exact Navigated track. This sensor delivers a notification to the administrator if a person is driving a car while under the influence of alcohol.

The system keeps track of a specific car's location and sends information to the user's phone and the microcontroller. The received data is used to locate the vehicle in the form of latitude and longitude.

1.1 Vehicle tracking features

The whole data of where the vehicle travelled, where it stopped, and how long it took at each stop may be saved by this tracking system. Businesses that rely on transportation networks will benefit the most from it. To detect fire, theft, and obstructions, additional sensors, such as smoke and alcohol sensors, can be added to the system.

1.2 Usage of tracking in India

The most prevalent users of tracking in India are transit networks, taxi businesses, and traffic operators. Taxi drivers utilise this to calculate the distance between their car and a specified place and send that information to call centres. They can estimate traffic by glancing at a map if this device is placed in every car.

2. LITERATURE SURVEY

2.1 Design of GPS based Vehicle tracking system

As the number of items classified grows, the tracking problem becomes more ambiguous, and inaccurate recognition results are more likely to contribute to error propagation. This paper presents a unified single object tracking technique that incorporates active target recognition. The suggested approach outperforms in many complicated tracking cases [1].

2.2 Vehicle tracking system using GPS and GSM

This article implements a GPS-based vehicle tracking/navigation system. This is performed by obtaining vehicle information such as position, distance, and other parameters via GPS and GSM[2]. The system was constructed using a frame differencing and dynamic template matching method. Data about a vehicle's position is supplied to a monitoring or tracking service on a regular basis. This information is presented on the display unit by displaying the vehicle's location in electronic Google Maps using Google Earth. The user chooses a time period after which the vehicle's information is gathered, such as its position [3].

2.3 Vehicle tracking and accident warning System using GPS and its implementation in FPGA

In this article, the position of the car is also computed using the Global Positioning System. The information from the GPS receiver is provided to the user in the form of SMS via GSM. Once the request has been received, a response will be sent to the user through SMS. All of the system's components under the car are controlled by an FPGA Spartan CPU. This sort of communication is sent to the vehicle's owner through the GSM modem. The accelerometer sensor is then utilised to identify any car mishaps or accidents and send out a signal [4].

2.4 GSM & GPS based tracking system

Vehicles may be tracked around the city using the Global Positioning System (GPS). Because it provides a telemonitoring and management system, this technology is excellent for public vehicles such as buses and taxis. To track the vehicle, the system described in this article includes a "onboard module" put in the vehicle.

The navigation message broadcast by the GPS position satellite is received and resolved by a GPS receiver in the vehicle terminal. This satellite determines vehicle locations' longitudes and latitudes, turns them into short messages using a GSM controller, and delivers them to the monitoring centre through the GSM network [6].

1.5 Problem Definition

Vehicle monitoring has advanced to a level that is significantly more sophisticated and user-friendly. On the other hand, the cost-effectiveness and ease of implementation have improved. The issue is maintaining high-quality servers to backup data for vehicle monitoring and tracking these vehicles through the Internet. Real-time automotive tracking through the Internet is beneficial to vehicle monitoring, but it does not result in lower investment and maintenance costs. The system does not use the Internet's GPRS and TCP/IP protocols for data transfer between devices and servers. As a result, the cost of the tracking system is reduced.

3. SYSTEM ANALYSIS

This proposed car tracking system makes use of cutting-edge technology. It excels at being cost-effective and accessible to its customers since the components used are publicly available and may be obtained without government limitations. A GPS and GSM-based vehicle tracking system. The position of the car is displayed on a Google map when the door is opened. Electrical display modules, such as LCD (Liquid Crystal Display) panels. They may be used to show information like as speed and route information, as well as make phone calls, in a variety of methods.

A 16x2 LCD is a simple module that may be found in a wide range of devices and circuits. For a variety of reasons, seven-segment LEDs are preferred over these modules. LCDs are affordable, easy to programme, and have no constraints on what may be displayed.

GPS consists of the following three segments.

1-Space segment (GPS satellites)

Many GPS satellites orbit the earth at a height of roughly 20,000 kilometres (four GPS satellites per orbit) and rotate at 12-hour intervals.

2-Control segment (Ground control stations)

Satellite orbits are monitored, controlled, and maintained by ground control stations to ensure that satellite orbit deviation and GPS timing remain within permissible ranges.

3-User segment (GPS receivers)

Satellite orbit is monitored, controlled, and maintained by ground control stations to guarantee that the satellites' departure from the orbit and GPS timing remain within acceptable limits. The receiver's position may be calculated using the distance between the GPS receiver and three satellites. The monitoring, control, and maintenance of satellite orbit is the responsibility of ground control stations.

The atomic clock aboard a satellite is used to create on-the-spot time information. However, because the anticipated distance between satellites and a GPS receiver is inaccurate, the position calculated using this method is erroneous. The position may be calculated using the distance between the fourth satellite and the receiver.

3.1 Pin description

LED- A wire connects pin 13 on the Arduino Uno to a built-in LED. The pin will turn on if you give it a high value, and it will turn off if you give it a low value.

Vin- The voltage applied to the Arduino Board as an input. It is not the same as the 5 volts supplied by a USB port. If a voltage is applied to the power jack, this pin can be accessed. The Arduino board receives electricity from this pin.

5V- The board may be powered through USB, the Vin pin on the board, or the DC power jack. The output regulated voltage is provided by the 5V pin. This circuit board has the ability to control voltage.

USB- Volta supports a voltage range of 5V to 20V, while Vin and Power Jack support 7v to 20v. The board should only be operated at 5 volts, not 3.3 volts, as this bypasses the pins' voltage regulation. An overvoltage of more than 5 volts can damage the board if the current exceeds its limit.

GND- On the board, there are several different sorts of pins that may be utilised for various reasons depending on how you wish to play the game. These are ground pins that are part of a 'ground pin' system, which implies they are connected to one another by a wire.

Reset- The Raspberry Pi features a built-in reset button that allows you to programmatically reset the board. This pin is incorporated into the board, and it allows you to restart the programme that is now executing. Instead of a physical reset button, the Raspberry Pi's development kit has a code-based reset mechanism.

IOREF- This pin is used to provide a voltage reference to the board. A shield reads the voltage across this pin and selects the proper power source.

PWM- PWM is supplied by pins 3,5,6,9,10, and 11. These pins are configured to emit an 8-bit PWM signal.

SPI- It's known as the Serial Peripheral Interface. Four pins 10 (SS), 11 (MOSI), 12 (MISO), and 13 (SCK) provide SPI communication with the aid of the SPI library..

AREF- It's referred to as Analog Reference. This pin provides a reference voltage to the analogue inputs.

TWI- It's known as a two-wire interface. Wire Library is used to access TWI communication. This is accomplished with A4 and A5 pins.

Serial Communication-Serial communication is accomplished using two pins: Pin 0 (Rx) and Pin 1 (Tx) (Tx).

The Rx pin is used to receive data, whereas the Tx pin is used to transfer data.

External Interrupts- Pins 2 and 3 are used to supply external interrupts. An interrupt is triggered when the value is set to LOW or when the value is changed.

4. METHODOLOGY

4.1 Working

In this Arduino-based car tracking system, the global positioning system (GPS) and global system for mobile communication (GSM) modules are employed. A GSM modem with a SIM card, identical to that of a conventional smartphone, is used for communication. In your car, the system may be placed or hidden in a suitable location.

You can simply track your stolen vehicle using a cell phone after installing this circuit. The technology keeps track of a specific car's position and sends information to the user's phone. The obtained data is utilised to locate the car on Google maps in the form of latitude and longitude.

The Global Positioning System (GPS) is used by the Vehicle Tracking System to detect the location of the observed or tracked vehicle. The coordinates and position data are subsequently sent to the monitoring centre by satellite or radio. The GSM module in this automobile tracking system delivers data from the GPS to the target mobile/laptop through mobile connection.

Vehicle tracking devices are becoming increasingly popular among high-end car owners. At the monitoring centre, various software is used to plot the car on a map. This allows car owners to track their vehicles in real time. The figure below shows how the various devices are linked.

4.2 Statement of the problem

The car-centric locking system offers the best security for your vehicle against all types of burglaries. It's a vehicle security gadget that also comes with good insurance. This technology could not demonstrate that it provided total security and openness to the vehicle in the case of a break-in. VTS (Vehicle Tracking System) is a solution for identifying, tracking, and safeguarding your mobile assets. The use of high-efficiency GPS units in vehicle following frameworks has allowed these devices to function in a variety of situations. This includes natural ravines, urban gulches, and areas that are heavily forested.

This framework was designed for four-wheelers, and naval force managers frequently utilise it to manage war fleets. The engine cannot be restarted after it has been turned on.

5. RESULTS & CONCLUSION

The technology allows us to see where a vehicle is at any time via a link in our phone's SIM card.

Message for Tracking:

Vehicle Tracking Alert:
Your Vehicle Current Location is:
[https://www.google.co.in/maps/@
2827.75478
,
07729.49499](https://www.google.co.in/maps/@2827.75478,07729.49499)

Figure 1. Link for Tracking

Message for sensing smoke and alcohol:

Vehicle Tracking Alert:
Your Vehicle Current Location is:
Latitude:2828.78891
Longitude:[07731.08676](#)
alcohol detected

Figure 2. Link for Alcohol detection

Vehicle tracking systems enhance fleet management, which leads to higher profits. With improved scheduling and planning, you can handle large project loads in a short amount of time. Vehicle tracking increases safety and security, as well as the medium for communication, performance monitoring, and productivity. The main purpose of the project is to employ a range of sensors to reduce the chances of things going wrong. Paramedics are called to the scene of each accident to enhance the chances of survival. This sort of proposal will assist accidents that occur around midnight.

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