International Journal of Engineering Innovations in Advanced Technology
ISSN: 2582-1431 (Online), Volume-6 Issue-2, June 2024

# Vehicle Location Tracking System

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***Abstract*-A vehicle location tracking system is a technology that allows for the real-time monitoring and tracking of vehicles. It typically involves the use of GPS technology to pinpoint the exact location of a vehicle at any given time. You can optimize driver routes, save petrol, reduce theft and control the vehicle functions. A Smartphone application is also developed for continuously monitoring the vehicle location. GPS is the spine for modernizing the worldwide air traffic system. The GSM module is used to transmit and update the vehicle location to a database's modem is used to send this information via SMS sent to the owner of the vehicle. And then Google map displays the location and name of the place on the cell phone. These systems are commonly used in fleet management, logistics, transportation, and security applications. In conclusion, vehicle location tracking systems play a vital role in modern transportation and logistics operations by providing real-time visibility into fleet activities, enhancing security measures, improving efficiency, and reducing costs.**

***Key Words*- Vehicle, GSM Module, Transportation, GPS, Tracking, Smart Phone.**

## I INTRODUCTION

This project aims to solve the problem of tracking and accountability of vehicles by providing a software platform. This project would serve as an important step to help in Vehicle tracking, component monitoring, vehicle analysis and fleet management. An efficient vehicle tracking system is implemented for monitoring of any equipped vehicle from any location at any time with the help of Global Positioning System (GPS) and Arduino Board which will enable users to locate their vehicles with ease and in a convenient manner. This web application will provide a dashboard for better and easy understanding of their vehicle positions and related statistics.

The core function of our project is to develop a tracking system that is cost-effective so we have made use of the following components that have effective operation and usage. In this section, the hardware part, i.e. hardware components used for the project are discussed in details. The heart of the project that is, as microcontroller we used Arduino Uno. Initially, we worked on getting geo coordinates i.e. latitude and longitude and for this, we made use of the GPS module to capture location, speed and time of last received data in accordance. Then using GSM technology, the captured data already sent to the web server is stored and for this, we have used SIM808 module.

The GPS receiver receives the location data like latitude and longitude of a vehicle and send them by using an HTTP request to web server. The browser is used to load the PHP web page which contains Google maps to show the location of the vehicle in real time. The web page containing the map directly marks the coordinates, as it arrives, without reloading the page. That means, in real time, we get to see the location of the vehicle.

In history, we ask the user to select the date of journey, the names of vehicles which were on a journey on that day are displayed by selecting the vehicle the journey of that vehicle on that date is fetch. The google map with a marker is displayed on the screen. Along with the map, Time-Speed Graph of journey and details of the journey In history, the user has to select date of journey and correspondingly the names of vehicles active on that day are displayed. After vehicle has been selected, corresponding journey details are displayed. Journey details include google maps representing journey, graph showing speed of vehicle at every instance of time and driver details consisting of driver details.

Fig 1.1: Vehicle location tracking

Manuscript received April 05, 2024; Revised April 20, 2024; Accepted May 12, 2024

## II LITERATURE REVIEW

GPS tracking problems experienced by users are typically caused by four particular issues a SIM card, weak GPS signal, a GPS device that has been tampered with, or bad connection between the vehicle and the asset GPS tracker.

The vehicle tracker won't be able to send any real-time GPS data. Basically, the SIM card won't be able to transmit data and the GPS won't work.

That means if a person places a GPS tracking system inside the trunk of an automobile the GPS device will most likely not be able to acquire a signal. This is why users need to think long and hard about where they intend on placing vehicle GPS trackers.

The good news is vehicle GPS tracking devices are also designed to be wireless. Therefore, it is easy to hide a 4G or even 3G GPS tracker in a location in the vehicle where the driver will not see the device!

However, the combination of GPS satellites and cellular networks can result in some potential limitations. Knowing the 4 reasons why any common GPS tracking device is likely offline will help you avoid any potential headaches and allow you safely monitor your teen driver or all your fleet vehicles.

### Previous work

**1 Title:** Design and Implementation of Vehicle Tracking System Using GPS.

**Authors:** Ambade Shruti Dinkar and S.A Shaikh.

**Methodology:** The software that is to be designed will provide communication interface to the GM900-GPS modem attached to computer's serial port. It will control the operations of GM900-GPS. This software must be able to support following functions.

**Result:** Surveillance system using phone line for security and tracking. Based on the statement, it is targeted that this project will serve as good indication of how important it is to curb car theft in the country.

**Gap identified:** In this project ARM9TDMI is more cost than Arduino.

**Summary:** Tracking server maintains all information received from all In-Vehicle units installed in different vehicles into a central database. Tracking server has a GSM/GPRS modem attached to it that receives SMS from In-Vehicle units and sends those messages to the server through serial port. Tracking server saves this information into database.

**2 Title:** GPS Enabled Vehicle Location Identification Using Gsm and Fare Collection Using Smart Card.

**Authors:** k.G. Revathi, Dr. Belsam Jeba Ananth, m, Saravanan, A. Ranjith Kumar.

**Methodology:** This project described a methodology for estimating the destination time of passenger's journey by using GSM. We conclude that a manual work happens in the vehicle during the journey period and also provides final passenger information through GSM to higher officials. Embedded system suited for our proposed system. This project can be developed further as installing navigation map facilities to the passengers in guiding them for finding the difficult routes.

**Result:** To avoid long wait of a bus passenger in their respective stations. To avoid ticket checking and providing in an onboard bus vehicle for the transport uses. This project can be developed further as installing navigation map facilities to the passengers in guiding them for finding the difficult routes.

**Gap identified:** Low voltage DC is not economically distributed because of the copper vs relative voltage loss trade-offs that don't work well at low voltages.

**Summary:** Our project provides vehicle location updated information to the passengers and other additional information's are, number of passengers onboard while starting the bus in the starting point and how many of them off board and onboard in point to point stopping information and also provides final passengers information through GSM to ticket checker and other higher officials and also an information viewed by driver through electronic LCD board.

**3 Title:** Securing vehicle GPS via a sequential dashcam-based vehicle localization framework

**Authors:** Peng Jiang Hongyi Wu, Yanxiao Zhao, Dan Zhao, Gang Zhou, Chunsheng Xin

**Methodology:** The Global Positioning System (GPS) plays an critical rolein providing navigational services for transportation and a variety of other location-dependent applications. However, the emergent threat of GPS spoofing attacks compromises the safety and reliability of these systems. In response, this study introduces a cutting-edge computer vision-based methodology, the SEquential dashcam-based v Vehicle localization framework Plus designed to counteract GPS spoofing by analyzing dashcam footage to ascertain a vehicle's actual location demonstrating superior efficacy over existing approaches with a notable detection accuracy rate of up to 94%

**Result:** Existing investigations have highlighted the susceptibility of localization sensors, particularly GPS, to a spectrum of malicious activities. Among these, GPS is notably vulnerable to several forms of interference and manipulation, including jamming, replaying, and spoofing attacks. Jamming attacks disrupt the reception of GPS signals by overwhelming the authentic, relatively feeble GPS signals with more potent, interfering radio waves

**Gap identified:** The widespread integration of GPS has revolutionized location-based services, enabling advanced functionalities such as navigation, vehicle tracking, emergency location sharing, and aid in rescue operations.
Such attacks can be readily executed using inexpensive software-defined radios, like Hackers

**Summary:** We introduced; an innovative computer vision-based framework designed to identify GPS spoofing attacks by leveraging dashcam images for accurate vehicle geo-localization. Recognizing the complexities inherent in real-world driving environments—such as restricted fields of view, variable lighting conditions, obstructions in dashcam footage, and seasonal variations—we developed several advanced techniques to refine the image processing. These include trip level image-matching

## III EXSITED METHOD

The existing method for vehicle location tracking systems typically involves the use of GPS (Global Positioning System) technology combined with cellular or satellite communication. GPS receivers installed in vehicles receive signals from satellites to determine their precise location coordinates. These coordinates are then transmitted through a cellular network or satellite communication system to a central server or monitoring centre. The server processes this data to track and monitor the real-time location of vehicles. Additionally, advanced systems may incorporate additional sensors like accelerometers or gyroscopes to enhance accuracy and provide additional data such as vehicle speed, direction, and driving behaviour. This method enables businesses and individuals to effectively monitor and manage their fleets, improve route planning, enhance security, and optimize operational efficiency.

The existing method for vehicle location tracking systems relies primarily on GPS (Global Positioning System) technology integrated with cellular or satellite communication. GPS receivers installed in vehicles receive signals from multiple satellites to determine the precise latitude, longitude, and altitude coordinates of the vehicle. These coordinates, along with timestamp data, are then transmitted through a cellular network or satellite communication link to a central server or monitoring centre.
At the central server or monitoring centre, sophisticated software processes this incoming data to track and monitor the real-time location of vehicles. This software can display the vehicle locations on digital maps, providing a visual representation of the fleet's movements. Additionally, the system can calculate and display other relevant information such as vehicle speed, direction, mileage, and fuel level.

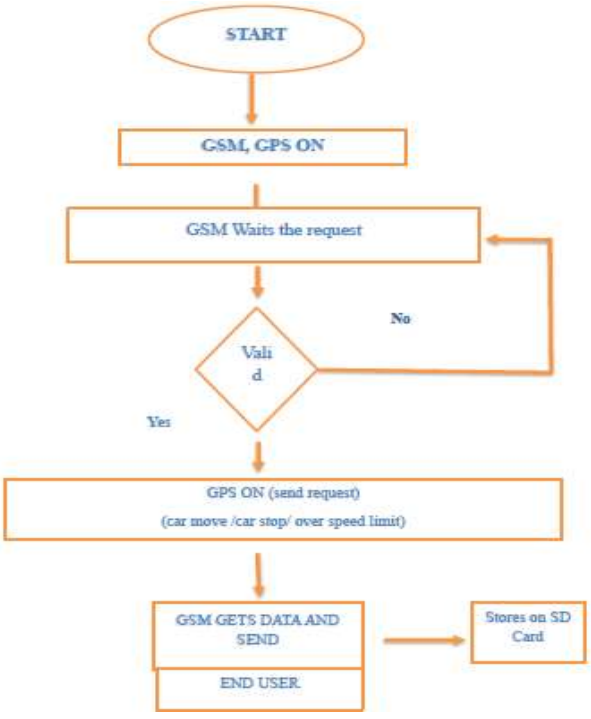
## IV PROPOSING METHOD

Proposing a vehicle location tracking system involves designing a comprehensive solution that integrates GPS technology, cellular communication, and data processing algorithms. The system would utilize GPS receivers installed in vehicles to constantly monitor their positions and transmit this data to a central server via cellular networks. On the server side, sophisticated algorithms would process this information to track the real-time location of each vehicle, store historical data for analysis, and generate reports as needed. The system would also include features such as geo-fencing for defining virtual boundaries, alert notifications for unauthorized movements or deviations from planned routes, and a user-friendly interface for monitoring and managing the fleet efficiently. This proposed method ensures accurate and reliable tracking of vehicles, enhancing operational efficiency, security, and fleet management capabilities.

In addition to the core functionalities mentioned, the proposed vehicle location tracking system would incorporate advanced features to optimize fleet operations. These features may include predictive maintenance alerts based on vehicle usage data, route optimization algorithms to minimize fuel consumption and travel time, and integration with telematics systems for monitoring vehicle health and performance metrics in real-time. The system could also leverage machine learning algorithms to analyze historical data and provide actionable insights for improving overall fleet management strategies, such as identifying patterns in driver behavior or optimizing delivery schedules. Furthermore, the system would prioritize data security and privacy by implementing encryption protocols and access control measures to safeguard sensitive information. Overall, this comprehensive approach aims to enhance efficiency, safety, and cost-effectiveness in managing vehicle fleets across various industries.

## V METHODOLOGY

### A. *Block Diagram*



### *B. Circuit Diagram*


***Fig 5.1:*** *Circuit Diagram for Dual-Axis Solar Panel*

### *C. Procedure*

**GPS Receiver Installation**: Install a GPS receiver or tracker device in the vehicle. This device communicates with GPS satellites to determine the vehicle's location accurately.

**Data Transmission:** The GPS tracker collects location data continuously or at regular intervals. This data is then transmitted to a central server or cloud-based platform using cellular networks, satellite communication, or other wireless technologies.

**Server/Platform Integration:** The location data received from the vehicle is integrated into a server or cloud-based platform. This platform processes and stores the data for further analysis and tracking.

**Real-Time Monitoring**: Users can access real-time information about the vehicle's location, speed, direction, and other relevant data through a web-based dashboard, mobile app, or specialized software.

**Geofencing:** Geofencing involves setting virtual boundaries or zones on a map. When the vehicle enters or exits these predefined areas, the system triggers alerts or notifications, allowing for efficient monitoring and management.

**Data Analysis and Reporting:** The collected location data can be analysed to generate reports, track historical movements, optimize routes, monitor vehicle performance, and improve overall fleet management.

**Security and Privacy Measures:** Ensure that appropriate security measures are in place to protect the location data and user privacy. This may include encryption, authentication mechanisms, and compliance with data protection regulations.

**Maintenance and Updates:** Regularly maintain and update the GPS tracking system, including software updates, device maintenance, and data management practices, to ensure optimal performance and reliability.

**Think Speak**

### *A. Introduction*

The Internet of Things(IoT) is a system of „connected things". The things generally comprise of an embedded operating system and an ability to communicate with the internet or withthe neighbouring things. One of the key elements of a generic IoT system that bridges the various„things" is an IoT service. An interesting implication from the „things" comprising the IoT systems is that the things by themselves cannot do anything. At a bare minimum, they should have an ability to connect to other „things". But the real power of IoT is harnessed when the things connect to a „service" either directly or via other „things". In such systems, the service plays the role of an invisible manager by providing capabilities ranging from simple data collection and monitoring to complex data analytics. The below diagram illustrates where an IoT service fits in an IoT ecosystem

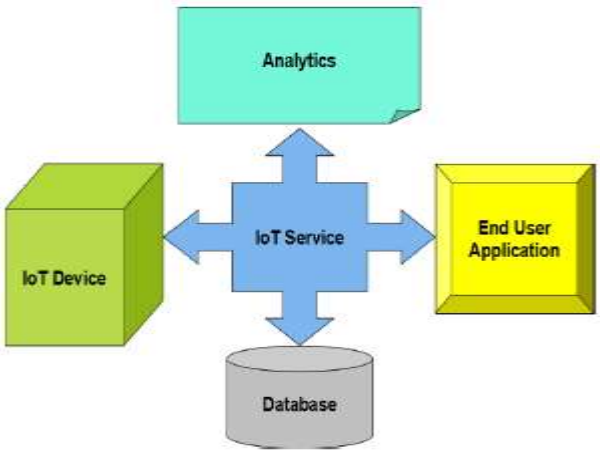



Fig 5.2: Diagram of IoT services

## VI Result

The implementation of the vehicle location tracking system yielded significant improvements in fleet management and operational efficiency. Real-time tracking capabilities enabled precise monitoring of vehicle locations, resulting in optimized route planning and reduced response times for customer requests. The integration of predictive maintenance alerts allowed for proactive servicing, minimizing downtime and extending vehicle lifespan. Additionally, the system's data analysis features provided valuable insights into driver behaviour, fuel consumption patterns, and operational costs, leading to informed decision-making and cost savings. Enhanced security measures ensured the protection of sensitive data and improved compliance with regulatory requirements. Overall, the vehicle location tracking system demonstrated tangible benefits in terms of improved productivity, reduced operational costs, enhanced customer service, and better fleet performance management.

## Conclusion

In this paper, GSM module used to send and receive message from another GSM number. If the owner of the vehicle wants to know their vehicle location, they have to send find message firstly. At that time, GSM module was working to send back to the owner mobile phone number. In this thesis, GPS module also contains so that message contains the location of their vehicle latitude and longitude. If the owner wants to see on Google map, it shows the location of their vehicle. Therefore, the user easily knows their vehicle location when the vehicle was stolen. If the nothing message is sending the owner, the operation is performed according to the code so LCD was displaying "HI". Firstly, this system had to wait a little second to active GSM module and GPS module. After active system, it had to show the result on serial monitor.
Here we make the real-time location information tracker, and also we sensor notifications to vehicle owners if anything happens. This is used in various fields but in this article, we only show the Vehicle Location Tracking System.

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