

**Real Time Vehicle Tracking and Traffic Analysis**

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**Abstract**

Now-a-days stealing vehicle and selling its parts have become a massive trend for thieves. Whenever we go to any unknown places we are always concerned about the vehicle. Anytime at anyplace vehicle might get stolen, for this it is necessary to use an efficient system to track our vehicle. The system would help us to monitor vehicle movements for any location at anytime. By making use of GPS and GSM in system, users get a convenient way and ease to locate their vehicles. Its user friendly GUI provides a display of vehicle position on map with its status such as Ignition ON/OFF, Door Open/Close, etc. Replay track provides status of vehicle travelled a month ago. It basically tracks the vehicle and stores the data about vehicle location where it travelled and provides it to user if he/she requires the details of vehicle for previous month. Along with this traffic surveillance system is an urgent need to survive traffic jams that we experience daily. Deadlock and starvation which are caused due to emergency events like accidents, natural disasters etc, are handled using this system. If we already know the traffic, it helps us to manage and control some emergency events if any. Video provides a count of vehicles which plays a vital role for finding the deadlocks. It helps detecting the object and track their motion to identify their characteristic. This system provides us vehicle tracking for securing our vehicle and traffic analysis to manage events at emergency.

**Keywords:** GPS, GSM, AVL, IGN.

**1. Introduction**

The need for real-time vehicle tracking system using GPS in India is on rise. With the increase in vehicle numbers, problems related to vehicle theft, accidents, traffic congestion are coming into picture. Vehicle tracking and vehicle detection are one of the important factors which helps to provide solution in order to reduce effects of such problems. GPS navigation system is widely used in vehicle today, it provides location information in the form of latitude and longitude along with other satellite information. where detection of vehicles offers significant benefits in terms of

security, safety management and traffic control. The focus of this paper is on implementation of vehicle operational system which presents a collaborative fusion methodology related to vehicle tracking and vehicle detection. This vehicle operational system provide the web based tracking application software and also a mobile based android application that enables anywhere and anytime real time vehicle tracking and traffic detection services for vehicle owners. This system allows end user that is vehicle owners to track their vehicles at any time, speed attributes of vehicle, fuel status ,engine ON/OFF status, bold stop or idle time ,geo-fencing boundaries notification alerts, replay track and various types of reports generated with the help of different parameters . For tracking purpose our system use broad variety of new technologies and communication system including the Internet or the World Wide Web , Data Mining, Global Positioning System (GPS). General Packet Radio Service (GPRS) and Global System for Mobile Communication (GSM).Along with tracing path for vehicle [1] [9], our system provide traffic detection system. Using video processing and blob detection algorithm user enable to know exact count of vehicles, traffic density, traffic jam areas or high alert regions based on number of vehicles.[14][16].

## **2. Problem Statement**

- Showing the current status of vehicle.
- Reduction of Management Costs.
- Convenient and Quick Service to the Vehicle Owners.
- Tracing the Complete Path on the Map travelled by the vehicle in particular span of time.

## **3. Literature Survey**

Real-time tracking is field of research for many researchers. Recently the various anti-theft modules like steering wheel locked equipment, network tracking system and traditional electronic alarm are developed along with client identification and real time performance monitoring. The paper presented by-

El-Medany, W.; Al-Omary et al[4] gives a real time tracking system that shows accurate localizations of the tracked vehicle along with low cost. GM862 cellular quad band module is used for implementation. A monitoring server and a GUI on a website is also developed using Microsoft SQL Server 2003 and ASP.net to show the proper location of a vehicle on a that map. The paper also provides information related to the vehicle status such as speed, mileage, etc.

Hu Jian-ming; Li Jie; Li Guang-Hui [10]:By using GSM and GPS module they describes an automobile anti-theft system. The system is developed using high speed mixed type single-chip C8051F120 and By making the use of vibration sensors stolen automobiles are detected. The system remains in contact with automobile owner through the GSM module.

Fleischer, P.B.:[12] Nelson et al describes development and deployment of GPS (Global Positioning System)/GSM (Global System for Mobile Communications) based Vehicle Tracking and Alert System. This system allows inter-city transport companies to track their vehicles in real-time and provides security from armed robbery and accident occurrences.

Le-Tien, T.; Vu Phung [6]: They describe a system which is based on the Global Positioning System (GPS) and Global System for Mobile Communication (GSM). It gives the practical model for routing and tracking with mobile vehicle in a large area outdoor environment. To acquire moving direction of a vehicle the system makes use of Compass sensor-YAS529 of Yamaha Company and Accelerator sensor-KXSC72050 of Koinix Company. The system will get the positions of the vehicles via GPS receiver and then sends the data to supervised centre by the SMS (Short Message Services) or GPRS (General Package Radio Service) service. The supervised centre comprises of a development kit that supports GSM techniques-WMP100 of the Wavecom Company then position of the mobile vehicle will be displayed on Google Map.

G. Salvi[16]:In this paper they represent a system to trace and count mobile vehicles in traffic regions. They used virtual loop-based method for detecting and counting moving vehicles. Long term tests on traffic congestion shows that the proposed system in this paper reliable to estimate real-time traffic flow rate.

Dan Yang<sup>1</sup>, Yantao Chen<sup>1</sup>, Richen Liu<sup>2</sup>: [14] for detecting vehicles in video, this paper introduced a method called as background subtraction. The model was based on the framework of the probability density function of kernel. This method can capture the moving vehicles rapidly and accurately from the video.

Meru A.V\*, Mujawar I.I : [17] for moving vehicles detection background subtraction method gives us accurate result. It also evaluated the better segmentation for moving vehicles and produces good output within a microseconds. After detecting the vehicles, counting is accurately done by using the Gaussian mixture model and BLOB analysis method. BLOB analysis creates the accurate bounding boxes to each of vehicles on four way traffic road. The road which having more traffic gives the first priority to that particular road. We control the traffic by maximizing or minimizing the time period of that particular road.

In this system user will able to track vehicle using GPS, also able to check vehicle details on live tracking page – carrier, last seen, Door, Battery, Temp, GPS, Speed, Latitude, Longitude, Address, Time. Address, Speed, KM Travelled, Ignition etc. Using GPS kit parameters system will detect approximate traffic of that area and able to show details on the map.

#### **4. Drawbacks Of Existing System**

##### **4.1 ARM7 GPS and GSM**

- The main limitation of the code is that the real time implementation, this can't be enforced with this a lot of time potency in any of the important time applications. This limitation is especially because of the time interval.
- If there's noise within the edge detected image, we won't extremely track the vehicle. what's meant by noise is that if some humans are approaching to the automobile then the sting detected image can have the sides of that human or animal or tree, then the program can try and match those edges with the automobile model. The program may treat this match as a hit however extremely it'll be off the track. Paste your text here and click on "Next" to look at this text redactor do it's issue.

- Also if distance between the vehicle positions within the two consecutive frames is just too much then this tracking program cannot discover the vehicle within the second frame and can attempt to track it within the succeeding frame.

#### **4.2 RFID Tags:**

- Are expensive as compared to others.
- Not easy to understand and complex in nature.

#### **4.3 Loop Detectors**

- They are Magnetic in nature and also have Inductive types
- Cost effective.
- Failure rate is high on poor road surfaces.

#### **4.4 Edge Detection:**

This technique of following the dots supported their previous positions, and analytic them using edge detection and a flood fill includes a variety of drawbacks.

3.4.1 User format - this algorithmic rule only tracks the dots, there's no provision for locating them at intervals a scene.

3.4.2 Flood fill - edge detection does not continuously turn out never-ending boundary. A flood fill on an incomplete boundary turns the complete image background to the foreground color. Likewise for cases where the anticipated centre point lies outside of the dot entirely. This precludes any centre computation.

3.4.3 Location prediction - as mentioned on top of, it's necessary to spot a degree among every dot for the following frame. this is often expected from the present frames computed centre coordinates. The prediction algorithm used is kind of simple: repeat the interpretation between the previous 2 frames. To account for changes in direction, and camera zoom would increase the complexness of the motion prediction significantly.

### **5. Proposed System**

The objective of the proposed system is to reduce the cost of tracking system by making the use of updated technologies which are affordable to common people. The proposed system uses TELTONIKA FM 1100. It contains GPS and GSM connectivity. The main services provided by our system fall under different categories namely:

#### **5.1 Maps**

Google maps is a free service provided by google, to show the last updated position of all the user's vehicle. Static google map are received by the mobile application as an image that represents the current location of the selected vehicle. In addition to that the specific reports are also get generated. Another important thing is maps are used to draw the geofences as circles that covers the area chosen by administrator user and the coordination of these circles are stored in databases.

#### **5.2 Alerts**

SMS notification will get back to the user's cell phone when one of these event occurs:

Door open/close  
Engine ON/OFF  
Over-speed  
Vehicle stops/moves  
Location changed alerts  
KM-travelled  
Battery notification

### **5.3 Reports**

Reports are generated to examine the history of the particular vehicle over the selected period of time. following are the types of reports generated by the system:

#### **5.3.1 Standard report**

A periodic report is sent from the device in user defined time interval that establishes standard GPS data containing location (latitude, longitude) speed, etc. All the user has to do to get this report is to select a time interval to show the information which is stored in database at that period of time.

#### **5.3.2 Bold stop**

This report shows each time the users vehicle stopped for more than a time threshold defined by system administrator and the location where that vehicle has been stopped.

#### **5.3.3 Speeding report**

It filter outs the standard report by providing the speeding value and only showing the records of higher speed than the defined one. So it becomes much easier to filter out the time with location where his/her vehicle was over-speeding. All the user needs to do with this report is, to specify the speed limit value to show at which limit his/her vehicle was exceeds the speed limit.

#### **5.3.4 Idle report**

It specifies, the ignition is on but vehicle is not moving for particular period of time.

### **5.4 Traffic detection**

Proposed system includes computer vision system to count the number of vehicle on road. System involves analyzing a sequence of road images which represents flow of traffic for given period and place. In this approach, it analyze traffic videos using modules like background subtraction, blob detection, blob tracking, vehicle counting. The proposed system wind ups with three main parts namely the server, client and the tracking device. The following figure displays the overall architecture of the system:



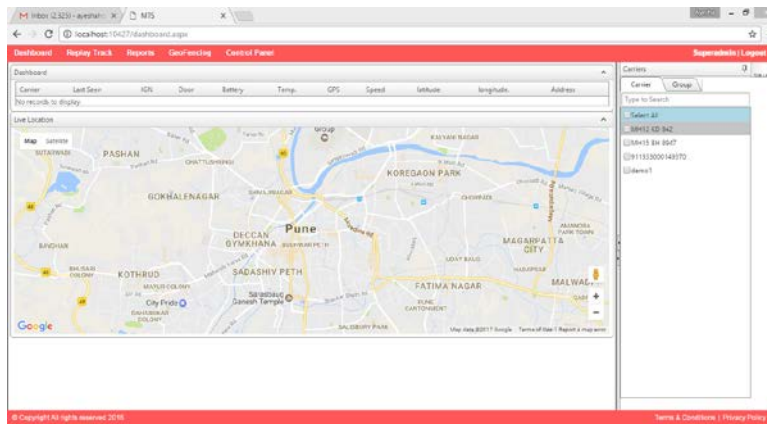


Figure 2: Web Application

- a) Authentication is an important factor for such systems. User needs to be signed in, they are supposed to provide their username and password.
- b) Integrated Google maps will show all vehicles on accurate locations as they were stored in database as per last received report.
- c) Generated report will display the tracking information such as speed, bold stop, idle time, KM travelled, geo-fencing area, etc
- d) Various alerts provided by the system are over-speeding, geo-fencing, stop alerts, battery notifications, fuel notifications, door open/close, etc.
- e) Geo-fencing services: Vehicle has geo-fence area. So if, any of the vehicle enters into that particular area alert notification will be sent. User is able to mark multiple geo-fences.

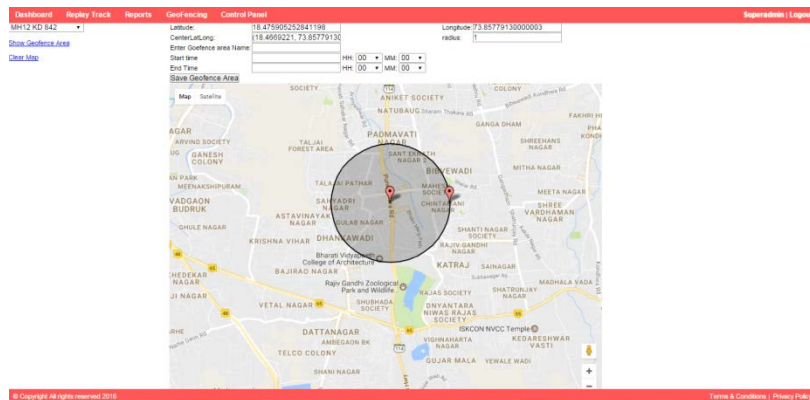


Figure 3: Geo-fence Area

- a) Count the number of vehicles: The system implements real time road traffic analyser in order to reduce waiting time on road traffic by counting the number of vehicles with the help of blob algorithm. Main objective is to count and register the flow to achieve an automatic, bidirectional counting. Proposed system includes baseline the moving vehicle is counted when it passes the baseline and frame will be recorded.
- b) Settings enables user to handle their own information regarding account.



- Mobile Application:

It is an another important part which makes system powerful by placing an access to anywhere, anytime. If the user doesn't have internet access they can simply use their smart phone and able to track their vehicle, they can also see the traffic areas.

It provides the following services to the user:

- a) Sign in/sign up
- b) Alerts : Similar to web portal/application that is used to customize the alerts of each vehicle.
- c) Setting :User is able to manage account information as similar to web application.

## 6. Conclusion

In this paper, we have mentioned the remedies to tackle problem of vehicle theft using GPS Kit. This Kit would help us to find the exact location of our vehicle with parameters such as Speed, Time, Latitude, Longitude, IGN ON/OFF. Use of video camera for analysis of traffic is made as it accepts huge amount of data with hardly any expense. For traffic analysis with the help of video camera Blob detection technique is used to count number of vehicles on road in particular time and place. Due to this on road traffic would be easily detected and vehicle would be more secure.

## 7. Future Scope

The scope of this paper is when you combine the power of vehicle tracking with the valuable data of performance metrics, you can really see how a GPS Vehicle Tracking system can benefit your business fleet.Improved version of system would easily analyze the type of vehicle like four wheeler and two wheeler, also it would provide alternative routes to user in a emergency events.

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