

**VEHICLE THEFT AND AUTO ENGINE LOCKING SYSTEM USING IOT**

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**ABSTRACT**

With the advancement in technology and increasing traffic, road accidents and traffic hazard have increased, causing more chances of loss of life due to lack of timely help facilities. Nearly half of the people are losing their lives in these accidents. Among those, most of the people are youngsters of teenage and middle-aged. This project is an attempt towards solutions for timely accident notification, vehicle theft control. The project record the parameters of vehicle at regular intervals of time through a “Smart Device” installed in the vehicle and send these values onto the cloud, vehicle owner or a third party. Based on the information, appropriate algorithms are implemented to send alerts and initiate action. The system will facilitate the users a number of ways such as notification for immediate aid in cases of accident, tracking the vehicle in cases of theft and disabling the vehicle remotely. Internet of things (IOT) becoming a major technology in the modern life. Real-Time Systems are used for constant monitoring and effective security. Hence, we present an IOT enabled system to avoid vehicle thefts and accidents. Some of the special services can make a Life Saviour System in designing of the system by using IOT. We have presented an IOT enabled approach that provides emergency communication and location tracking services in a vehicle, which meets an unfortunate accident or any other emergency situation. Depending upon the type of emergency, it initiates communication and shares the critical information. Provision of interactive real-time multimedia communication (GSM), realtime location tracking (GPS) have also been integrated to the proposed system to monitor the exact condition in real-time basis. The system prototype has been designed with Arduino UNO.

Keywords- Arduino UNO, GPS, GSM, Accelerometer/ Vibration Sensor, Buzzer, IOT, Cloud, TWILIO

**INTRODUCTION:****PROBLEM STATEMENT**

In the present day vehicle tracking is becoming essential for the purpose of improving our life condition. Convenience and ease of using vehicle is what home vehicle tracking is offering. Vehicle tracking offers a futuristic way of life in which an individual gets to control his vehicle using a smart phone, from tracking a vehicle /detecting accidental place of a vehicle; it also offers an efficient use of technology. But to get or acquire such system installed will cost a lot of money and that reason of why vehicle tracking has not received much demand and attention, adding to that also the complexity of installing it and configuring it. Thus it is essential to make it cost effective and easy to configure, if this is granted to people then they will be willing to acquire it in the meantime of the automatic personal vehicles, school buses and taxis/cabs etc. In other words, a system modification for the vehicle tracking is required in order to lower the price of applying it to vehicles. Also this tracking project can be used to purpose of women safety as well as parents can be used to take care of their child/kid for the safety or missing purpose or to track their activities for their future. Even more realistically this project can be used to track airline baggage because as we know every year almost 13% airline baggage used to get missing by a worldwide survey.

### EXISTING SYSTEM

Existing system provides emergency communication and shares the critical information after the accident or the event and requires constant connectivity throughout its working. It has three main stations. Car data base system has the details about the car. Rescue centre data base system has the details about the Individual rescue centre have their own databases to store all the records of emergency messages coming from the emergency control room. In this database, all incoming messages coming from control room are stored with the relevant information about the emergency situations. The information can be viewed on the web page and details can be identified easily. The existing approach is totally dependent on mobile device, if for any reason, the mobile network is disrupted, the safety of the occupant cannot be guaranteed. Disadvantages:

- The System starts to operate only after the event.
- No protection of vehicle from theft.
- Requires constant internet connectivity throughout its working.

### PROPOSED SYSTEM

There is a need of real time monitoring and tracking the vehicle, also storing and updating its database of certain situations. In the urban areas, human help is somewhat difficult in providing the database of tracked vehicle. Proposed system provides emergency communication and shares the critical information. The proposed system involves Cloud computing technology in vehicular management to reduce the computational overhead. This allows the vehicle users to access various resources such as processors, storage, memory, applications etc stored in the cloud which is located centrally. This work uses two features of cloud PAAS and IAAS, used for storing data into the cloud, which is received from the hardware via Google documents. The proposed system records the parameters of vehicle (car in our case) at regular intervals of time, through a “smart device” installed in the vehicle and sends these values onto the cloud(for further processing), vehicle owner (when required) or a third party. The system is developed using the .Net framework, Ms Access and Azure cloud services and many more intermediary services. A mobile phone is also used for owner's interaction with the device installed in the vehicle, so that, when the owner wants to track the vehicle or start /stop the vehicle’s functionality, only he/she can do it. The proposed work develops a system which facilitates accident notification to the appropriate agencies like Police Stations, Hospitals and in tracing the vehicle in case of theft and controlling the air pollution. There has not been much work in this area using cloud services. The proposed system applies cloud services in finding solution to the mentioned scenarios. The main objectives of the proposed project system are:

1. To enable accident notification to appropriate agencies.
2. To provide a system for controlling the functionality of vehicle in case of theft.

This system can be enhanced into the advanced system which uses IoT concept to operate the vehicle remotely by anyone from anywhere in the world. It can be arranged in such a way that it can connect a call to the owner or it can send the information to the multiple persons.

### LITERATURE SURVEY OF PROPOSED APPROACH

In this Project, GPS based vehicle tracking/navigation system is implemented. 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 transmitted information is displayed on the display unit by using the goggle earth to display vehicle location in the electronic goggle maps. 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. In this Proposed Model, the system mentioned consists of an on-board module which is mounted in the vehicle which is to be tracked. 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 this Project, the location of the vehicle is also determined by using the Global Positioning System. The information from the GPS receiver is sent in the form of SMS to the user with the help of GSM. Once this SMS is received from the user, a response type of message is sent to the owner of the vehicle through the GSM modem. A sensor which is named as accelerometer sensor is then used to detect any kind of mishaps or accidents happened with the vehicle also it will trigger some kind of signal in case of any happenings. Unlike the microcontroller used in many system this system also uses a FPGA Spartan processor is used which manages all the parts responsible in system as according to the program done. This system uses Global Positioning System (GPS) which is used to receive the coordinates of latitude and longitude form the satellite during the critical information. We all know that tracking system is now-a-days a very important in modern world. This system can be used in the monitoring of soldiers, also in tracking the theft of the vehicle and in many more other applications. This system uses microcontroller, Global Positioning System (GPS) and Global System for Mobile Communication (GSM). This system uses only one GPS device and GSM enable a two way communication process. GSM modem is provide with a SIM card which uses the same and regular communication process as we are using in regular phone. This system uses to a RF transmitted; the RF transmitter is attached with the vehicle which consists of its own identification. The data which will be continuously transmitting to the RF receiver that is connected to the microcontroller. The GPS will receive the location of the vehicle and will transmit this data to the microcontroller. Supposedly the RF transmitter is not receiving the signal from the RF transmitter then the receiving unit triggers a signal to the microcontroller, and from this signal we can identify the theft. If it is identified that the vehicle is theft then it automatically sends location of the vehicle to its user as the owner of the vehicle receives the information in the form of SMS through the GSM modem. This system is much simpler and cost effective than the others. The vehicle is automatically stopped if a password like SMS sent by the user.

### **ARCHITECTURE OF THE PROPOSED SYSTEM**

In this project for opening of the door we first click on the button, after few seconds we get an OTP (random number) generated by ARDUINO through GSM Module to the phone number stored in the ARDUINO, we again text back the same random number. After, some time the OTP will be checked, if it's correct the door will be opened, in our project the servo motor rotates, if it's wrong the buzzer will ring indicating someone is opening or stealing the vehicle. For accident detection, The project records the parameters of vehicle (car in our case) at regular intervals of time, through a "smart device" installed in the vehicle and sends these values onto the cloud (for further processing), vehicle owner (when required) or a third party. The device is made up of various sensors, modules and microprocessor and is safely suitable for the vehicles as it does not interfere with the hardware or normal functioning of the vehicle. The following figure 3.1 describes the flow chart of the proposed system. (Cloud Enabled Vehicle Theft and Accident Detection System).

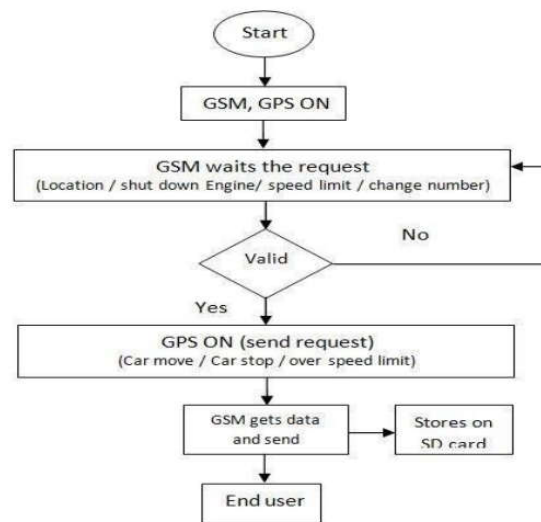


Fig 1: Flow Chart of the Proposed System

The following figure 1 describes the Block Diagram of the Proposed System.

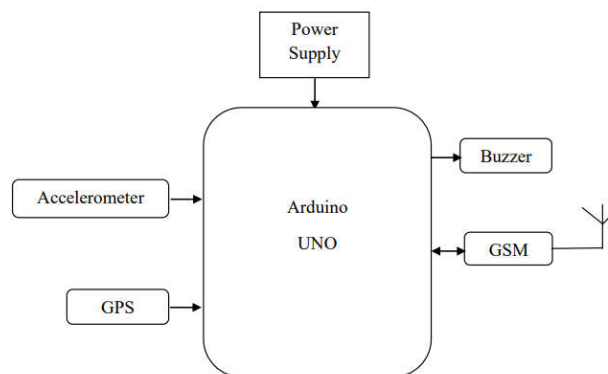


Fig 2: Block Diagram of the Proposed System

A mobile phone is also used for owner's interaction with the device installed in the vehicle, so that, when the owner wants to track the vehicle, only he/she can do it. In this work, we use the accelerometer to detect the position in different axis (to detect the toppling condition) of the car during accident. The output of the accelerometer acts as an input to the microcontroller present on the board. GPS module fitted onto device computes the latitude and longitude value for the vehicle. The GSM module present on the device will be used to send message to the secondary number provided by the owner at the time of purchase of the device, the phone number is being saved into device memory. The time, latitude and longitude values are recorded periodically. The sensor value is transmitted to the cloud in the event of occurrence of accident. A continuous application runs in the background that compares the sensor field for each vehicle recursively with some standard value. A deviation from the standard value retrieves address of location of last updated longitude and latitude using API. The occurrence of accident is being timely informed to nearby hospital and Police using TWILIO message service. With the GSM and GPS Module being installed in device, real time location of the car can be tracked out that will help police for the recovery of stolen car.

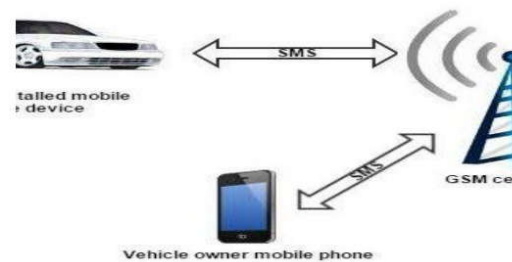
**Layout for Vehicle Theft:**

Fig 3: Proposed System Layout for Vehicle Theft

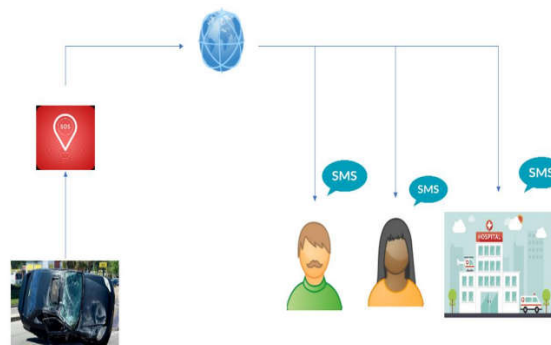
**Layout for Accident Detection:**

Fig 4: Proposed System Layout for Accident Detection

The proposed system involves Cloud computing technology in vehicular management to reduce the computational overhead. This allows the vehicle users to access various resources such as processors, storage, memory, applications etc. stored in the cloud which is located centrally. This work uses two features of cloud PaaS and SaaS, IaaS for storing data into the cloud, which is received from the hardware via Google documents. PaaS provides the environment for running the application (which would be containing the code for performing the task) for three scenarios named Accident detection and information alert, in case of vehicle theft and generating warning messages for vehicle pollution check. The proposed system records the parameters of vehicle (car in our case) at regular intervals of time, through a “smart device” installed in the vehicle and sends these values onto the cloud (for further processing), vehicle owner (when required) or a third party. The device is made up of various sensors, modules and microprocessor and is safely suitable for the vehicles as it does not interfere with the hardware or normal functioning of the vehicle.

**VEHICLE TRACKING BENEFITS**

**Prevent Vehicle Thefts:** Vehicle tracking systems reduce the expense associated with driving a vehicle to maintenance shops, they make transportation businesses safer. There are many benefits of a vehicle tracking system so you can track where your vehicles are in real time, which helps you find the vehicle that has left the yard and goes missing. These systems also help to keep your vehicle inventory up to date. This means you can know exactly which vehicle is in need of the most attention. In the transportation business, it is critical to ensure that your vehicles are safe from both external and internal threats. With the benefits of vehicle tracking systems, you can easily monitor your vehicles, track their movement, and send alerts when they deviate from their usual paths. Allow you to track vehicles in real-time as one of the most basic functions: Vehicle tracking systems can also help you track damage to your vehicles. It means you can know which vehicles require expensive repairs before their beyond economical repair. This will also help you spot and address problems at an early stage. This will minimize the financial impact of damage to your vehicles and your business as a whole.

GPS provides surveying and mapping data of the highest accuracy: A GPS tracking system is one of the most popular vehicle tracking systems. This type of vehicle tracking system can be installed in any type of vehicle. When the GPS device is installed in a vehicle, a tracking number can be generated and displayed. The tracking number identifies the vehicle and can be used to send an alert in case the vehicle is stolen or used in an illegal activity. Another popular vehicle tracking system is RADARS, which is the tracking system that resembles a helicopter. This type of vehicle tracking system can easily be installed and utilized within an operation that has a remote control. The dashboard of a remote control is located on the roof of the vehicle. This means that the remote control can only be used during good weather conditions.

Improved Communication between Electronics Devices: Vehicular communication systems are computer networks in which vehicles and roadside units are the communicating nodes, providing each other with information, such as safety warnings and traffic information. They can be effective in avoiding accidents and traffic congestion. Road and traffic safety can be improved if drivers have the ability to see further down the road and know if a collision has occurred, or if they are approaching a traffic jam. This can become possible if drivers and vehicles communicate with each other and with roadside base stations. If traffic information was provided to drivers, police, and other authorities, the roads would be safer and travelling on them would become more efficient.

### **ADVANTAGES**

Commercial fleet operators are by far the largest users of vehicle tracking systems. These systems are used for operational functions such as routing, security, dispatch and collecting on-board information. These are also used for fire detector in large vehicles like train, bus etc. because the vehicle like train contains large number of people and the sending alert of fire accident can save many lives. The applications for this project are in military, navigation, automobiles, aircrafts, fleet management, remote monitoring, remote control, security systems, tele services, etc.

- Fleet monitoring
- Vehicle scheduling
- Route monitoring
- Driver monitoring
- Accident analysis
- Geo-fencing geo-coding

These are just a few advantages of the project that has been introduced in this report. We can interface more number of sensors in order to serve multiple purposes. The microcontroller that has been used in this project have some in-built ADCs and hence the controller is capable of accepting analog inputs, which is the biggest advantage. Since all real world signals are analog in nature, by incorporating different sensors required purpose can be served

### **WORKING OF THE SYSTEM**

The sensors are used to detect the stimuli and microprocessor evaluates the response from sensors to perform action such as initiating message/data transfer. GPS technology is employed to gather the information of the speed and the location (latitude and longitude) of the vehicle. The GSM module is used to send messages to the vehicle owner/third party when required. The external interface to the Internet, SMS service is also provided by the device. The GSM module is used for interfacing the device with the cloud. API software is used for data logging on the cloud server. The processing of data is carried onto the cloud. The system is developed using the .Net framework, Ms Access and Azure cloud services and many more intermediary services. A mobile phone is also used for owner's interaction with the device installed in the vehicle, so that, when the owner wants to track the vehicle or start /stop the vehicle's functionality, only he/she can do it. In this proposed system model,

piezoelectric sensor is used in order to detect the vibrations during accident, and the accelerometer to detect the acceleration in different axis to detect the toppling condition of the car during accident. The combined output of the PIEZO- Sensor and the accelerometer acts as an input to the microcontroller present on the board. GPS module fitted onto device computes the latitude and longitude value for the vehicle.

In this project, Arduino will use for controlling whole the process with a GPS Receiver and GSM module. GPS Receiver is used for detecting coordinates of the embedded system, and GSM module is used for sending the coordinates to user by SMS. When we turn on embedded system first GPS module will collect the Latitude and Longitude of the embedded system and it will send the data to the Arduino and then Arduino will send the data to the GSM module and GSM module will send the SMS to the user. GPS module is used to track the location of the vehicle in the form of values such as latitude and longitude. These values are transmitted to the user using GSM modem through mobile network. The Sensor values can be monitored by anyone from anywhere in the world using things peak channel. The GSM module present on the device will be used to send message to the secondary number provided by the owner at the time of purchase of the device, the phone number is being saved into device memory. NIMBITS's Software is installed on the device and cloud to log data on the cloud in real time. The data consists of accelerometer value, gyro values. The time, latitude and longitude values are recorded periodically. The sensor value is transmitted to the cloud in the event of occurrence of accident. A continuous application runs in the background that compares the sensor field for each vehicle recursively with some standard value. A deviation from the standard value retrieves address of location of last updated longitude and latitude. The occurrence of accident is being timely informed to nearby hospital and Police using TWILIO message service.

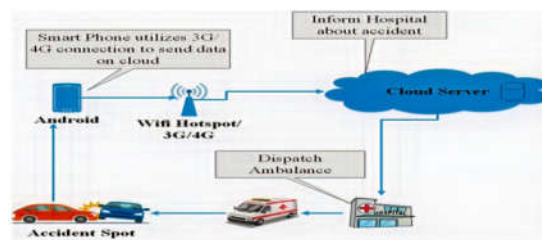


Fig 5 Layout of Accident Detection System

With the GSM and GPS module being installed in device, real time location of the car can be tracked out that will help police for the recovery of stolen car. The authenticated user can stop the car through a STOP message. The car will be restarted in turn by sending of message by owner rather manually. The car would not start manually if it had been stopped by message. When the car stops it would return its location in form of a message to the owner.

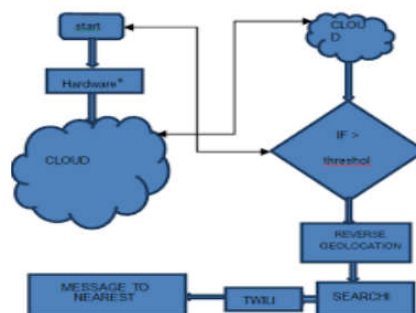


Fig 6 Layout of Vehicle Theft System

Figure 6 shows the initial screen of the proposed approach after the device is connected. The sensors are used to detect the stimuli and microprocessor evaluates the response from sensors to perform action such as initiating message / data transfer. The external interface to the Internet, Wi-Fi module and SMS service is also provided by the device. GPS technology is employed to gather the information of the speed and the location (latitude and

longitude) of the vehicle. The GSM module is used to send messages to the vehicle owner/third party when required. The accelerometer is used to record the acceleration of the vehicle in various planes. This is indicative of abnormal driving. Google API software is used for data logging on the cloud server. The processing of data is carried onto the cloud. This system can be enhanced into the advanced system which uses IoT concept to operate the vehicle remotely by anyone from anywhere in the world. It can be arranged in such a way that it can connect a call to the owner or it can send the information to the multiple persons.

**HARDWARE IMPLEMENTATION OF PROPOSED APPROACH**

The hardware implementation of the proposed system is shown in the following figures 6

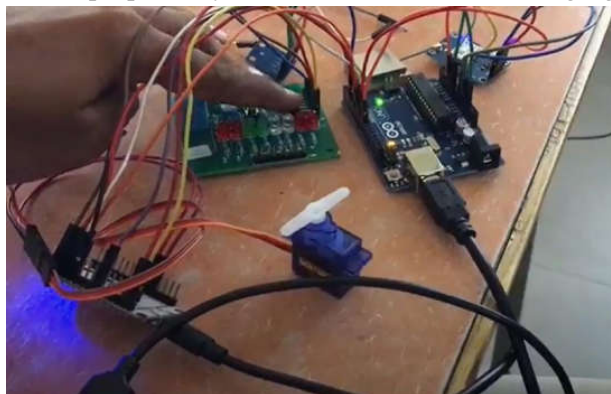


Fig 7: Hardware Implementation of the Proposed Approach

**RESULTS**

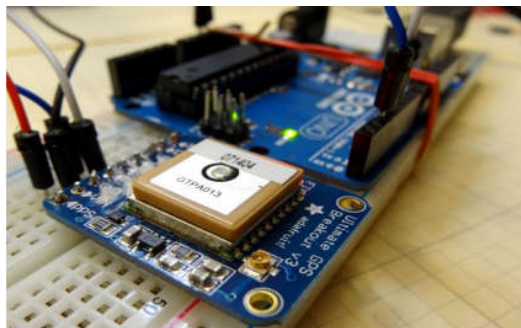


Fig 8: Hardware Set Up of the Proposed Approach

**GPS Interfacing with MCU**

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COM3 (Arduino/Genuine Uno)
FullExample.ino
An extensive example of many interesting TinyGPS++ features
Testing TinyGPS++ library v. 1.0.2
by Mikal Hart

Sats HDOP Latitude Longitude Fix Date Time Dat
(deg) (deg) Age
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4 2.5 10.997309 76.958564 279 05/03/2018 11:36:14 394
4 2.5 10.997311 76.958564 285 05/03/2018 11:36:15 402
4 2.5 10.997313 76.958564 289 05/03/2018 11:36:16 405
4 2.5 10.997315 76.958572 299 05/03/2018 11:36:17 415
4 2.5 10.997316 76.958572 309 05/03/2018 11:36:18 426
4 2.5 10.997318 76.958572 319 05/03/2018 11:36:19 435
4 2.5 10.997319 76.958572 328 05/03/2018 11:36:20 445
4 2.5 10.997321 76.958572 337 05/03/2018 11:36:21 452
    
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Fig 9: Output of the Source Code



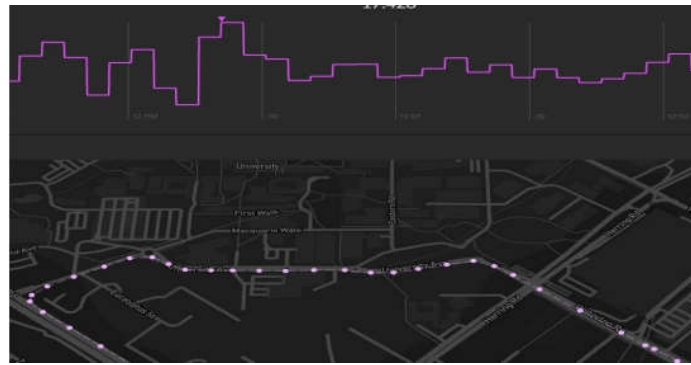


Fig 10 GPS Tracking by using Latitude and Longitude

## CONCLUSION

In this project, the proposed system uses the IaaS and SaaS features of cloud computing along accident detection and information alert, real time vehicle tracking. The interface between the vehicle and cloud is the internet and that between user and cloud is SMS service.

## FUTURE SCOPE

The proposed approach implements to control the vehicle theft by using GPS and GSM. Real time data logging and analysis will be implemented that allows the system to monitor traffic situations in various regions. Various safety warnings can be issued to the owner of car if car crosses certain defined speed limits. The real-time alarms can also be set for the unauthorised vehicle movements and other exceptions using a series of geographic zones together with the time-based rules for vehicle in/out.

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6. GPS tracking devices for your car gizmodo [www.gizmodo.in/indiamodo/](http://www.gizmodo.in/indiamodo/) [7] Tracking System [www.tracking-system.com](http://www.tracking-system.com). Aijaz A, Bochow B, Dötzer F, Festag A, Gerlach M, Kroh R, et al. Attacks on inter vehicle communication systems-an analysis; 2006