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Vehicle Surveillance and Management System – A Survey.

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Abstract: *The usage of automobiles has increased on a large scale in today's world. Day by day, the production and sales of vehicles has increased. These vehicles are vulnerable and can thus be stolen. We propose a GPS based vehicle surveillance system which uses the services provided by mobile technologies. Organizations currently invest money in vehicle tracking systems to monitor them. The proposed system pinpoints the exact location of the vehicle at that time and sends it to the user, who can use a mobile application or can view it from a website. The system uses mobile GPS and sends the data to the server which is installed in the vehicle. The location information will be plotted on Google Maps.*

Keywords: *GPS, GSM, Google Maps, Android.*

I. INTRODUCTION

In today's world India has progressed extensively in the field of automobiles. Automobile companies have been emerging on a huge rate and are establishing themselves. Nowadays, almost every citizen has an automobile and the usage of automobiles have been increasing year after year. The increase of automobiles has lead to technologies like the Global Positioning System. With it's extensive use, there has been an increase in crime rates regarding car burglary, and there have been a lot of issues when it comes to finding specific locations or location awareness.

Vehicle tracking systems have thus been developed to abate these issues. The vehicle tracking system technology has created many wonders in the security of the vehicle. The mobile GPS hardware is placed on to the vehicle in such a manner that it is not visible to anyone who is inside or outside of the vehicle. Thus, it is used as an undercover unit which continuously or by any interrupt to the system, sends the location data to the monitoring unit. When the vehicle is stolen, the location data from tracking system can be used to find the location and can be informed to the user. A user can thus track the movements of the vehicle and can also be aware whether his/her vehicle has any unauthorized or unusual movements or not.

Tracking in India is mainly used by transport systems, taxi companies, traffic operators. Taxi companies use this to estimate how far the vehicle is from a particular area and send this information to call centers and they can inform the general public about the distance of the taxi location and time it takes to come to them. Another use is for traffic police if this system is located in every vehicle they can estimate the traffic by looking on the map and if any accident is detected then they can route the traffic in to another way. This is how tracking is useful because India is one of busy traffic countries and this system can control many of the traffic problems

Vehicles are currently playing an important role in all of our lives and thus management of vehicles is an important aspect. Law enforcers and the police have a difficulty in tracking vehicles during theft and thus it is a major challenge when it comes to providing evidence of the respective vehicle's movements. For example, if a vehicle has been used in a malicious activity by a suspect then checking of where the vehicle was at the time of the crime can provide sufficient evidence. As mentioned before, users can also obtain their vehicles whereabouts and can be aware. Global Positioning System plays an important role in this as it is the base of the vehicle tracking system. Computers can process thousands of instructions in seconds, saving precious time. Computers are also less prone to errors than human investigators, especially those who work long hours.

II. RELATED WORKS

Vehicle tracking systems are extensively used in operations like fleet management, anti-theft systems, vehicle accident analysis, route monitoring and they're also used to provide evidence for vehicles that are involved in thefts or crimes. They are also used in bus tracking systems which will be explained below.

A. Bus Tracking System

The tracking system provides students with the location information of a bus within a fixed route. The students are provided with the status of the bus. Real-time bus tracking systems are beneficial to college students who usually use busses for travel. This helps

the students to travel peacefully as they can relax or sleep during their travel. Students can also plan their schedule accordingly as they will be aware of where their respective school bus is.

B. Vehicle Tracking and Anti-Theft Tracking System

An anti-theft system is used to prevent or detect unauthorized access to one's vehicle. The system used Kalaman filters to improve positional errors to improve accuracy. When a vehicle's ignition is turned on, an SMS is sent to the user and is notified. This helps in improving the security of the vehicle.

C. Providing evidence

If an individual is framed or wrongly accused of a crime, he/she can provide evidence with their associated vehicle to show where the vehicle was present at the respective date and time thus providing a suitable alibi. On the other hand, this evidence can also be used against criminals to prove that their associated vehicle was at a specific place that the time of the crime.

III. PROPOSED SYSTEM

A. Transmitting Unit

The transmitting unit includes GPS and GSM technology which is preloaded in the smartphone. A mobile application is used for sending the data to the server which is displayed on the website and on another mobile application which act as the monitoring unit. At certain time intervals, the application which is loaded on the smartphone which is installed on the vehicle will send the data to the server. The application will continue working in the background and the vehicle position will be updated as it moves.

B. Monitoring Unit

The monitoring unit includes another mobile application and a website, where the transmitting unit's sent data will be used to pinpoint the location of the vehicle at that time on Google Maps. The server uses MySQL, a structured database and will be used to store the data. The latitude and longitude positions will be used to display the location on the map. The user can use the mobile application or the web application to view where the vehicle is at that time. The result which is generated will be stored on the database of the respective website. The application programming interface for the mobile application will be built using Java through Android Studio.

C. Connectivity

For sending a receiving the data, the system will require an internet connection for the application which will be loaded inside the phone used for tracking. For monitoring the vehicle, an internet connection is required as well in order to stay updated with the vehicle's location. Since the system will be implementing a real time tracking system, it will require an internet connection at all times.



Fig. 1 Vehicle Tracking System Layout. Ref: <http://currencyobserver.com>

D. Characteristics of GPS

A GPS receiver calculates its position by precisely timing the signals sent by the GPS satellites high above the Earth. Each satellite continually transmits message which include the time the message was transmitted, precise orbital information, the general system health and rough orbits of all GPS satellites. The receiver utilizes the messages it receives to determine the transit time of each message and computes the distances to each satellite. These distances along with the satellites' locations are used with the possible aid of trilateration to compute the position of the receiver. This position is then displayed, perhaps with a moving map display or latitude and longitude; elevation information may be included.

E. Applications

This system will be used for personal surveillance of the vehicle. The user can monitor his/her vehicle through their phone using the mobile application, or through their personal computer using the website. For example, if the user gives their vehicle for repairing purposes, then they can still monitor their vehicle in to stay aware of their vehicle's whereabouts. This gives the user a more personalized watch on their vehicle. Another example is that if a user gives their vehicle to another user for rent, then the user will be able to track their car at any time.

IV. CONCLUSION

The proposed system gives the facility to organizations and users to track and monitor their vehicles and to get their exact location at a certain time. The system allows the users and organizations to monitor their vehicle on Google Maps through a web application or a mobile application. The general result is that the system is reliable to monitor and show the positions of vehicles at any time.

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