DESIGN OF AUTOMATIC VEHICLE LOCATION AND TRACKING USING GPS, ITS TECHNIQUES AND APPLICATIONS
C. Sakthi¹ T. Saveetha²
Department of computer science
Mangayarkarasi college of arts and science for women, Paravai, Madurai.

ABSTRACT
Recently, automatic vehicle location (AVL) has become more widely used, affordable and popular than ever before. Tracking systems were first developed for the shipping industry because they wanted to determine where each vehicle was at any given time. The system includes a GPS/GPRS module to location acquisition and message transmission, MMC to temporary store location information, and an 8-bit AVR microcontroller. This tracking system form you the location and route travelled by vehicle, and that information can be observed from any other remote location. The GPS will provide information about the location of the vehicle. After receiving the location data from the web server, the data is monitored by a personal computer. After processing the data, the location of the vehicle can be viewed on the map.

Keywords – Navigator; coordinates; vehicle tracker; cellular phones; smart phone android application.

I. INTRODUCTION:
Automatic vehicle location (AVL) is a system that enables companies to trace and coordinate the movements of their fleet of vehicles. In this urban life transportation is very common. A lot of mishappenings occur on the road everyday. Therefore the need of security and monitoring is developed. To resolve such problems, a system is developed using GPS and GSM technologies and an application is introduced in this research work.

Various problems that we face:
1. In critical condition (when vehicle is stolen), one is confused what to do
2. If one has something expensive and he wants to check it regularly
3. To find the shortest path available Onceagain , this level of monitoring can reduce fuel and maintenance costs and reduce potential liabilities. The use of GPS tracking technology can save significant amounts of money on commercial vehicle insurance. It has been reported by the GPS Innovation Alliance that the economic benefits of using GPS within a commercial environment are estimated to be over $67.6 billion per year in the United States.
Related view:
Several types of vehicle tracking devices exist. Typically, they are classified as "passive" and "active". The user can know the location of the stolen vehicle with the android app. The hardware and software of the GPS and GSM network were developed. The proposed GPS/GSM based System has the two parts, first is a mobile unit and another is controlling station. The system processes, interfaces, connections, data transmission and reception of data among the mobile unit and control stations are working successfully. But these results were compatible with GPS technologies. A vehicle tracking system collects the fleet data from the vehicle and tells us about the location. Present-day vehicle tracking systems use GPS technology to trace the vehicle.

![Vehicle tracking structure]

**FIGURE 1: Vehicle tracking structure**

2. Antecedent function:

2.1 : Vehicle tracking system

Vehicle tracking system is the technology used to determine the location of a vehicle using different methods like GPS and other radio navigation systems operating through satellites and ground based stations. By following triangulation or trilateration methods the tracking system enables to calculate easy and accurate location of the vehicle. Vehicle information like location details, speed, distance traveled etc. can be viewed on a digital mapping with the help of a software via Internet. Even data can be stored and downloaded to a computer from the GPS unit at a base station and that can later be used for analysis. This system is an important tool for tracking each vehicle at a given period of time and now it is becoming increasingly popular for people having expensive cars and hence as a theft prevention and retrieval device.

2.2 : GPS Technology

The Global Positioning System (GPS) is a spacebased satellite navigation system that provides location and time information in all weather, anywhere on or near the Earth, where there is an unobstructed line of sight to four or more GPS satellites. It is maintained by the United States government and is freely accessible to anyone with a GPS receiver. GPS was created and realized by the U.S. Department of Defense (DOD) and was originally run with 24 satellites. It became fully operational in 1994. A GPS receiver calculates its position by precisely timing the signals sent by GPS satellites high above the Earth. Each satellite continually transmits messages that include the time the message was transmitted. Satellite position at time of message transmission. These distances and satellites locations are used to compute the location of
the receiver using the navigation equations. This location is then displayed, perhaps with a moving map display or latitude and longitude; elevation information may be included. Many GPS units show derived information such as direction and speed, calculated from position changes.

2.3 GPS Receiver:

In-Vehicle unit uses GPS receiver to capture the current location and vehicle speed. Location and speed data provided by GPS is not in human understandable format. This raw data needs to be processed to convert it into useful information that can be displayed by a beacon on the map. CPU is required to process this raw data. SiRF Star III single-chip GPS receiver is used which comes integrated with GM862- GPS which is GSM/GPRS modem used for data transmission. GPS receiver can also provide information of altitude, time of GPS fix, status of GPS fix, and number of satellite used to compute current location information along with location and speed. GPS fix means last reported location. For tracking purpose only location and speed data is required for transmission. Other data provided by GPS receiver is used to determine the validity of location information.

3. PROBLEM DEFINITION

3.1 EXISTING SYSTEM:

In the previous system security lock and alarm is implemented in a car. If a burglar can break open the lock, then it becomes easy for the burglar to steal the car. And in old security system if the car is stolen then it is out of the owner control. User doesn’t have any awareness about the current location of the vehicle.

3.2 PROPOSED SYSTEM:

The RF transmitter is attached with the vehicle which has its own identification. This data will be continuously transmitted to the RF receiver connected to the microcontroller. This GPS will be location the position of vehicle and transmit that data to the microcontroller. Suppose the RF receiver not receiving signal from the transmitting unit, receiver unit send the signal to the microcontroller, from that we can identify the theft. If the vehicle is theft it automatically sends location of the vehicle to its owner as a SMS through GSM modem. To achieve automatic Vehicle Location system that can transmit the location information in real time. Active systems are developed. Real time vehicular tracking system incorporates a hardware device installed in the vehicle (In-Vehicle Unit) and a remote Tracking server. The information is transmitted to Tracking server using GSM/GPRS modem on GSM network by using SMS or using direct TCP/IP connection with Tracking server through GPRS. Tracking server also has GSM/GPRS modem that receives vehicle location information via GSM network and stores this information in database. This information is available to authorized users of the system via website over the internet.
3.3 MODULE
System
The system consists of modern hardware and software components enabling one to track their vehicle online or offline. Any vehicle tracking system consists of mainly three parts mobile vehicle unit, fixed based station and, database and software system.

1. Vehicle Unit: It is the hardware component attached to the vehicle having either a GPS/GSM modem. The unit is configured around a primary modem that functions with the tracking software by receiving signals from GPS satellites or radio station points with the help of antenna. The controller modem converts the data and sends the vehicle location data to the server.

2. Fixed Based Station: Consists of a wireless network to receive and forward the data to the data center. Base stations are equipped with tracking software and geographic map useful for determining the vehicle location. Maps of every city and landmarks are available in the based station that has an in-built Web Server.

3. Database and Software: The position information or the coordinates of each visiting points are stored in a database, which later can be viewed in a display screen using digital maps. However, the users have to connect themselves to the web server with the respective vehicle ID stored in the database and only then s/he can view the location of vehicle traveled.

4. METHODOLOGY

4.1 System Model
A mobile client installed on the smartphone constantly communicates with the central server with its location details which is being used to locate the device on Google map in real time.

4.2 Diagram Description
The vehicle tracking mobile application client will be installed in either the android or iPhone client so as soon as the engine starts the system installed in the vehicle sends a confirmation message to the server using the sim in the GSM modem. In this research, we build a GPS tracker with integrated Google maps. The imbedded GPS chip outputs in the mobile client will transmit the position information of the car which is transferred over GPRS link to a mobile operator and the maps updated at the same frequency, a real time GPS tracking effect is achieved. Since the positional information is retrieved every second and the maps updated at the same frequency, a real time GPS tracking effect is achieved. Since the positional information is retrieved every second and the maps updated at the same frequency, a real time GPS tracking effect is achieved.

5 Applications and Advantages

5.1 Applications
1. Stolen vehicle recovery.
2. Field service management.
3. It is used for food delivery and car rental companies.

5.2 Advantages
1. It provides more security than other system.
2. From the remote place we can access the system.
3. By this we can position the vehicle in exact place.

5.3 FLOW DIAGRAM:

6. CONCLUSION

Tracking system is becoming increasingly important in large cities and it is more secured than other systems. It is completely integrated so that once it is implemented in all vehicles, then it is possible to track anytime from anywhere. The project is all about controlling theft of a vehicle. The system is about making vehicle more secure by the use of GPS, GSM technology and a web application. The simulation is done by PROTEUS software. It can also be beneficial for:
1. Parents to look after their children.
2. To track animals in jungles
3. Delivery services
4. Cops department and fire services

This project can be further enhanced by the use of camera and by developing a mobile based application to get the real time view of the vehicle instead to check it on PC, which would be more convenient for the user to track the target. The system is very effective in areas where there is wide mobile network coverage; ease of use is another factor, the client application is a mobile based application, which enables user to log check track where and when ever internet access is available. The web designed to be user friendly, interactive, secure, and reliable.
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