Vehicle Tracking System Using GPS

Sathe Pooja[1]

[1]Disha Institute of Management & Technology, Raipur, Chhattisgarh, India

Abstract: *The paper describe a practical model for routing and tracking of mobile vehicles in a large area outdoor environment based on the Global positioning system (GPS) and Global system for mobile communication (GSM). The supporting device GPS continuously move with the car and will calculate the co-ordinates of each position and when required by the owner it can be communicated with the help of GSM modem which is installed in both Transmitter and receiver section. GSM modem is controlled by a 32 bit ARM7 LPC2148. The device will collect position to supervised center by the SMS (Short Message Service) or GPRS (General Package radio service) and which can be located in the Google Earth and so the current position of the car can be known.*

Keywords: ARM7 LPC2148, Google Earth, GPS, GSM, SMS

1. Introduction

In the present growing economy, the country also faces the uprising of crime rate. Car theft, which is the main concern for the conduct of this project, is one of the biggest crimes which is hard to eliminate. The latest trend of car theft involves the car being towed away, and also alarm signal capturing where the alarm disabler signal can be traced and duplicate by a thief with the device to capture the signal and use it to disable the alarm. There are many alternatives to prevent the car theft, common car alarm system which nearly all cars have the system installed, and also Global Positioning System (GPS) where the whereabouts of the car can be traced. The project and research is conducted for additional features in car alarm system. The device can be added to the present car alarm system without any major modification to it. Vehicle security system using SMS/GPRS is an advanced feature of the existing car security system.

The project describe a practical model for routing and tracking with mobile vehicles in a large area outdoor environment based on the Global Positioning system (GPS) and Global system for mobile communication(GSM). The supporting device GSM modem GM862, are controlled by a 32 bit microcontroller LPC2148 implemented a new version ARM cortex M3 core. The device will collect position to supervised center by the SMS (Short Message Service) or GPRS (General Package radio service) [1]. A hardware device mounted on the vehicle is connected to the engine. Once, the vehicle is being stolen, the information is being used by the vehicle owner for further processing. Sitting at a remote place, a particular number is dialed by owner to the hardware kit which is installed in the vehicle. By reading the signals received by the mobile, one can control the ignition of the engine; say to lock it or to stop the engine immediately. We can modify this concept such that the vehicle owner also can lock the vehicle from his mobile phone.

2. Problem Identification

It is targeted that this project will serve as good indication of how important it is to curb car theft in the country. Surveillance is specified to car alarm system and the means of sending the data to the owner of the vehicle using SMS when the alarm is triggered. Due to the inefficient conventional car security alarm system, the possibility of the car can be stolen is high. The main reason is that the alarm is limited to the audible distance. Somehow if there is another way of transmitting the alarm to the car owner that is not limited to the audible and line of sight, the system can be upgraded. SMS is a good choice of the communication to replace the conventional alarm, because it can be done and does not require much cost [8]. Although most of people know GPS can provide more security for the car but the main reason people does not apply it because the cost. Advance car security system is too expensive. Cost for the gadget is too high. Besides that, people also must pay for the service monthly.

2.1 Objective of the Study

1. The objective of the project is routing and tracking vehicle in a large area environment based on the Global Positioning System (GPS) and Global System for Mobile Communication (GSM).
2. To provide a solution to avoid car stolen in the lower cost than advance security car system (GPS).

2.1.1 Scope of Study

If car gets robbed it is difficult to keep track of it with this project we can able to track of the robbed car. This helps us to get complete surveillance of our vehicle [8].
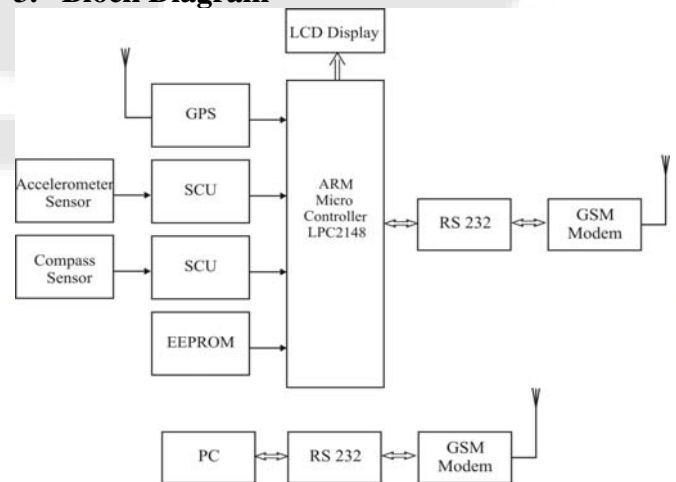
3. Block Diagram

Figure 1: Block Diagram

4. Methodology

The above block diagram explain the working of the system which can be designed from this research paper a ARM processor LPC2148 is used here for automation and controlling of the other supporting devices those are GPS, GSM, Accelerometer sensor compass sensor. Actually this paper gives the practical model of a vehicle tracking system which can do routing, tracking of moving vehicles in large area. It consists of two sections, first which will be inbuilt in the car which is having GPS in it and as the car moves the location of the car goes on changing continuously, the GPS find the location in terms of two co-ordinates that are Longitude and latitude. These co-ordinates are communicated to another section by GSM modem, as shown in the block diagram both the part consist of GSM for communication. This GSM is connected to the computer through RS232 which should have internet connection in it. So, that as soon as the co-ordinates are received, it can be located in the Google Earth. As shown in block diagram the two more sensors are used that are accelerometer sensor to sense weather the vehicle is moving or steady and a compass sensor for identifying the direction of moving vehicle

4.1 Software Required

Two software's were used; one for the Arm processor i.e. is Embedded C for interfacing and controlling of different devices and in another section Visual Basic software is used for interfacing of Google Earth. So that co-ordinates can be located in the Google map.

4.2 Terminology

4.2.1 Latitude & Longitude
Both are the angles that are uniquely defined on the sphere. Together the angle comprises the co-ordinate scheme that can locate or identify the geographic position on the planet. Latitude is defined with respect to the equatorial reference, the value becomes positive as it moves towards north and it becomes negative towards south. Longitude is measured with reference to prime meridian and is positive towards east and negative towards west.

4.2.2 Routing
Routing means a compass sensor is used to calculate the angle between the current direction of mobile vehicle and magnetic north direction [1].

4.2.3 Tracking
Tracking allows the base station to continuously track the vehicle without any interference of the driver or the method of continuously collecting the co-ordinates of moving vehicle that is getting from GPS receiver.

4.2.4 Vehicle Disabling
Vehicle can be disabled just by sending the SMS from the GSM modem of owner to the GSM modem which is in car. The form which is generated in Visual Basic in the computer is connected to the GSM. If the message is send to disable the vehicle than the vehicle can be disabled. This feature is not present with the any of the vehicle security system.

5. Practical Model

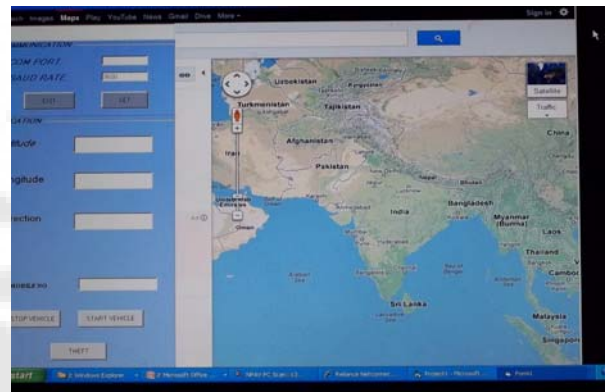**Figure 2:** Transmitter Section inbuilt in the vehicle

Figure 3: Receiver section with Owner

6. Result

The results on the user interface of supervised center will show the routing and tracking function of the system. The project is locating the position of the car. By designing this project the ignition of the project can be stopped or the speed can be locked so that the thief can be catch easily, this is one of the additional features of the project. There are some approaches affect the accuracy of the system such as the delay of sending and receiving data via GSM network, the multi path effects can make the position error on the GPS receiver, the weather and the assuming of the variation between True North Direction and Magnetic North Direction is zero etc.
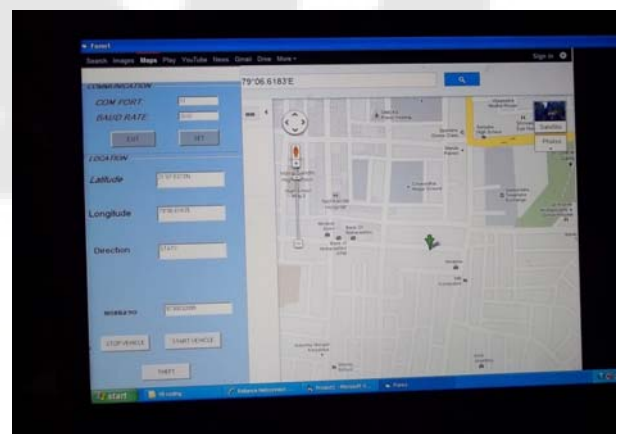

Figure 5.1: Google Map showing the location of the GPS

6.1 Discussion

A practical system for routing and tracking mobile vehicle is presented in the project. In some cases GPS may give us no answer, the wrong answer, or an answer with insufficient accuracy which was one of the main reasons for the limitations of GPS accuracy. The accuracy of system is affected by some factors such as weather, environment around the mobile vehicle, GPS receiver, compass sensor and the variation between True North Direction and Magnetic North Direction, etc. The future works include optimizing the hardware system, choosing a suitable GPS receiver and compass sensors and for more accuracy one can go for DGPS i.e. Differential Global Positioning System, by using DGPS accuracy can be increased up to 1-4 meters whereas in GPS it is 5-10meters.

7. Conclusion

Automobile theft and accidents in the transportation systems have caused significant loss of lives, waste of energy, and loss in productivity. To improve the safety, security and efficiency of the transportation systems and enable new mobile services and applications for the traveling public, the project have been developed, which apply rapidly emerging information technologies in vehicles and transportation infrastructures. It is one of the most challenging and critical issues for the industries. The practical model of this paper proved to be very efficient, cheaper, and reliable system for security.

7.1 Future perspective of Work

- Remote door locking system to capture the thief.
- Accident detection and generating message which will inform family members about the location of accident.
- The owner can switch on the digital camera recorder to record the face of the thief. This will help in identifying and capturing the thief.

References

[1] Thuong Le-Tien, Vu Phung, Vietnam "Routing and Tracking System for Mobile Vehicles in Large Area" IEEE 2010.
[2] Thuong Le-Tien, Vu Phung, Vietnam "Routing and Tracking System for Mobile Vehicles in Large Area" IEEE July 2009.
[3] Prawat Chaiprapa, Supaporn Kiattisin and Adisorn Leelasantitham "A Real-Time GPS Vehicle Tracking System Displayed on a Google-Map-Based Website. http://department.utcc.ac.th/research/images/stories/520 7003.pdf
[4] F. M. Franczyk, and J. D. Vanstone, "Vehicle warning system", Patent number: 7362239, Issue date: 22 Apr 2008.
[5] Guochang Xu, "GPS Theory, Algorithms and Applications" Springer, 2007.
[6] Silvan Mayer, Impact of GPRS on the Signaling of a GSM- based Network, Institute of Communication Networks and Computer Engineering, University of Stuttgart.
[7] Stéphane Piot, Security over GPRS, Master of Science
[8] Mohd Roshmanizam Bin Hamad Rodzi, "An Enhancement of Vehicle Security Alarm System via SMS, Bachelor of Science in Data Communication & Networking, MARA University of Technology, 2006
[9] Car Security and Tracking System with Position, Route, and Speed Calculation, EDP Topic VG06, 2011
[10] Will Jenkins ,Real-time vehicle performance monitoring with data integrity, Mississippi State University