

Vehicle Tracking and Security System

¹Mudasar Basha, ²P.Raja, ³A.V.Rakesh, ⁴Ch.Anvesh Reddy
¹Assistant Professor, ²Student, ³Student, ⁴Student
¹Department of ECE,
¹B V Raju Institute of Technology, Hyderabad, India

Abstract— It has an onboard GPS equipped autopilot system, which is capable of driving the vehicle from one point to another without human operator and also with a theft control system for an automobile, which is being used to prevent/control the theft of a vehicle. The developed system makes use of an embedded system based on GSM technology. The designed and developed system is installed in the vehicle. An interfacing mobile is also connected to the microcontroller, which is in turn, connected to the engine. Once, the vehicle is being stolen, alert SMS will be sent to the vehicle owner for further processing.

Index Terms— ATmega 168PB, IR sensor, GSM Module.

I. INTRODUCTION

It has an onboard GPS equipped autopilot system, which is capable of driving the vehicle from one point to another without human operator and also with a theft control system for an automobile, which is being used to prevent/control the theft of a vehicle. The developed system makes use of an embedded system based on GSM technology. The designed and developed system is installed in the vehicle. An interfacing mobile is also connected to the microcontroller, which is in turn, connected to the engine. Once, the vehicle is being stolen, alert SMS will be sent to the vehicle owner for further processing. By reading the SMS received by the mobile, one can control the ignition of the engine; say to lock it or to stop the engine immediately. Again it will come to the normal condition only after entering a secured password. The owner of the vehicle and the central processing system only know this secured password. When the vehicle is stolen, owner of vehicle may stop the vehicle by just sending a SMS "OFF" to the GSM modem and with the help of SIM tracking knows the location of vehicle and informs to the local police or stops it from further movement.

Vehicle Security System is based on GSM module. A proper study and implementation of this project can be used for various application. It is a classic example of wireless communications. The wireless communications industry is one of the fastest growing industries. Over the past few years, there has been an explosive increase in the theft of vehicles. With the help of study of GSM, theft intimation was very first invented in Spain and United Kingdom. According to the research, the highest rate of theft of vehicle was found in UK. The statistics has been found for theft intimation for vehicles. In 1987 Europe produced the very first agreed GSM Technical Specification in February). By 2005, GSM networks accounted for more than 75% of the worldwide cellular network market, serving 1.5 billion subscribers.

The main motivation of this project is the statistics that we observed in case of vehicle thefts and vehicle accidents. Auto theft is covered under the comprehensive section of an auto insurance policy. Theft coverage applies to the loss of the vehicles as well as parts of the car such as airbags. Comprehensive coverage, which is not mandatory, also pays for fire, vandalism and weather-related damage including damage from flooding and earthquakes. Premium rates for comprehensive insurance are affected by the risk of loss, meaning the likelihood that an insured car will be stolen or damaged, and also the car's value at the time of the loss. The dollar size of claims has been going up, reflecting the higher value of new cars on the road, the value of the cars that are targets for theft or are damaged and the cost of vehicle bodywork. Vehicle bodywork costs include replacing stolen components. Nationally, more than 75,000 airbags are stolen every year.

II. RELATED WORK

In 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. These results are compatible with GPS technologies.

In a vehicle tracking system is an electronic device, installed in a vehicle to enable the owner or a third party to track the vehicle's place. This paper proposed to design a vehicle tracking system that works using GPS and GSM technology. This system built based on embedded system, used for tracking and positioning of any vehicle by using Global Positioning System (GPS) and Global system for mobile communication (GSM). This design will continuously watch a moving Vehicle and report the status of the Vehicle on demand. In Face Detection System used to detect the face of the driver, and compare with the predefined face.

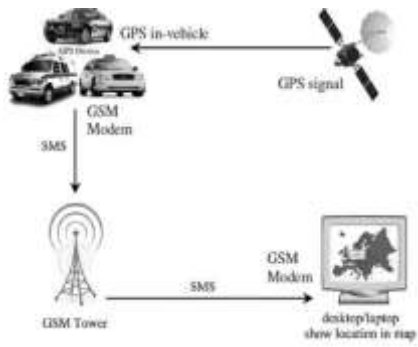
III. ANALYSIS & DESIGN

The project consists of GPS receiver and GSM modem with a micro controller. The whole system is attached to the vehicle. In the other end (main vehicle station) one GSM mobile phone is attached to the computer with VB application. So the GPS system will send the longitudinal and altitude values corresponding to the position of vehicle to GSM Modem.

Imagine the bus has left Bangalore at 6 o'clock in the morning. If the officer in charge for that vehicle wants to know where the vehicle is, he will come to the computer and click on the vehicle number on the VB program. The VB program will send an SMS to the vehicle number.

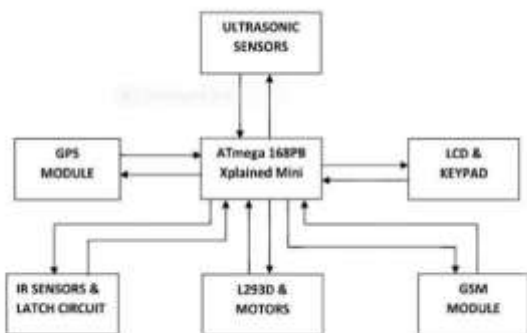
The SMS sent would come through the GSM service provider and then reach the vehicle, which is traveling, because the vehicle has a GSM device with sim card. This GSM modem will receive the SMS and send to the microcontroller in the vehicle. The microcontroller will receive this SMS and compare the password and the command. If everything matches then it will perform the request required by the office.

A place name is assigned for each longitude & latitude. The GSM receiver in the vehicle office receives these data & gives to the PC through serial port. The VB program in the PC checks this data with its database displays the details of the vehicle on the screen. The device is password controlled i.e. person who knows the device password only able to operate.



BLOCK DIAGRAM

The block diagram of the vehicle tracking system is shown below. The block diagram shows the overall view of the system. The blocks that are connected here are Microcontroller, LCD display, GPS, GSM, Power supply, IR sensor, DC Motors, RS 232, and MAX 232. In this proposed work, a novel method of vehicle tracking and locking system used to track the theft vehicle by using GPS and GSM technology. This system puts into sleeping mode while the vehicle handled by the owner or authorized person otherwise goes to active mode, the mode of operation changed by in person or remotely. If any interruption occurred in any side of the door, then the IR sensor senses the signals and SMS sends to the microcontroller. The controller issues the message about the place of the vehicle to the car owner or authorized person.



In this Project it is proposed to design an embedded system which is used for tracking and positioning of In this project 8051 microcontroller is used for interfacing to various hardware peripherals. The current of the Vehicle on demand.

For doing so an 8051 microcontroller is interfaced serially to a GSM Modem and GPS Receiver. A GSM modem is used to send the position (Latitude and Longitude) of the vehicle from a remote place. The GPS modem will continuously give the data i.e. the latitude and longitude indicating the position of the vehicle.

The GPS modem gives many parameters as the output, but only the NMEA data coming out is read and displayed on to the LCD. The same data is sent to the mobile at the other end from where the position of the vehicle is demanded. An EEPROM is used to store the data received by GPS receiver.

The hardware interfaces to microcontroller are LCD display, GSM modem and GPS Receiver. In order to interface GSM modem and GPS Receiver to the controller, a MUX is used.

The design uses RS-232 protocol for serial communication between the modems and the microcontroller.

A serial driver IC is used for converting TTL voltage levels to RS-232 voltage levels.

Different types or sensors such as infrared sensors and fire detector are used for detecting different types of problem encountered in the vehicle such as theft, accident, fire warning etc. In any of these cases messages will be automatically send to the intended receiver.

When a request by user is sent to the number at the modem, the system automatically sends a return reply to that particular mobile indicating the position of the vehicle in terms of latitude and longitude. A Program has been developed which is used to locate the exact position of the vehicle and also to navigated track of the moving vehicle on Google Map.

IMPLEMENTATION DETAILS

The Arduino IDE is a cross-platform application written in Java, and is derived from the IDE for the Processing programming language and the Wiring project. It is designed to introduce programming to artists and other newcomers unfamiliar with software development. It includes a code editor with features such as syntax highlighting, brace matching, and automatic indentation, and is also capable of compiling and uploading programs to the board with a single click. There is typically no need to edit make files or run programs on a command-line interface. Although building on command-line is possible if required with some third-party tools. The Arduino IDE comes with a C/C++ library called "Wiring" (from the project of the same name), which makes many common input/output operations much easier. Arduino programs are written in C/C++. Arduino is a computer hardware and software company, project, and user community that designs and manufactures microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world.

The project's products are distributed as open-source hardware and software, which are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form, or as do-it-yourself kits. Arduino board designs use a variety of microprocessors and microcontrollers.

IV. RESULTS

A. VEHICLE SECURITY



This is the working procedure of the
STEP : 1

Firstly, we have to initialize the GSM after connecting to Microcontroller.

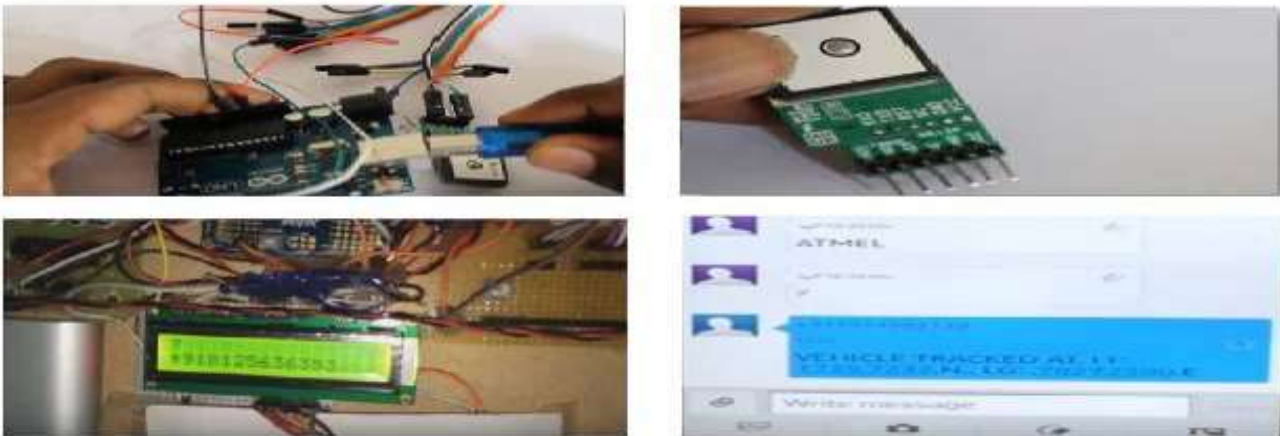
STEP : 2

Then it will ask to enter the key. This is the first step of Initialization.

We have to enter key then the microcontroller compares the key with predefined key. Then it sends the message that vehicle is authorized.

STEP : 3

Finally, we will get the message to our phone that "SOME ONE IS TRYING TO ACCESS THE VEHICLE. PLEASE AUTHENTICATE". This is the second step of authentication. We will authenticate using the predefined key then vehicle starts moving.

B. VEHICLE TRACKING

In our major project we are tracking the vehicle. This will be useful to know the location of vehicle. Thus, it will be handy to know the location of vehicle in the times of theft. We are using

GPS to track the Longitude and Latitude co-ordinates of Vehicle.

So, In this week we bought GPS module and started working with it using Arduino Microcontroller as we are familiar with it.

Later we also connected it to Atmega168pb and tracked the location of the vehicle by connecting it to LCD Display.

These tracking system can store the whole data where the vehicle had gone, where did it stop, how much time it take at every stop and can create whole data analysis. It is also used in buses and trains, to estimate how far are they, how much time it takes for them to come to a particular stop. These systems are used to data capture, data storage, data analysis and finally data transfer. By adding additional sensors such as temperature sensor and infrared sensors the system can be enabled to detect fire, theft and obstacles. In the last few decades, India has progressed at such an enormous rate that many companies have strongly established themselves here. These companies bring a huge amount of workforce with them. Arranging transportation to such a huge mass is a cumbersome task involving many intricacies. Generally, this transport is arranged through the local transport vendors on a yearly contract basis, recently happen mishaps such as burglary, rape cases etc. The development of satellite communication technology is easy to identify the vehicle locations. Vehicle tracking systems have brought this technology to the day-to-day life of the common person. Today GPS used in cars, ambulances, fleets and police vehicles are common sights on the roads of developed countries.

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

Level Auto Locator is a reliable and effective system for monitoring, tracing and the security of vehicles. It works on the principle of satellite positioning accuracy to within 5m. Level Auto Locator will ensure the immediate identification of the exact position worldwide. The vehicle is tracked in real time and can be traced through cooperation with Security Agencies and the Police. The system will allow you to stay up to date on the position of one or more vehicles. We also offer a variant of a hidden passive unit which is activated only when you find that your car has been stolen. Due to the fact that the offender does not know where to find the unit, it increases the chances of finding your vehicle.

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 inbuilt 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.

V. CONCLUSION

Vehicle security system is key requirement in large cities. Today vehicle thieving is increasing; with this system it can be controlled. The vehicle can be turned off only with a simple SMS. This setup can be made more interactive by adding a display to show some basic information about the vehicle and also add emergency numbers which can be used in case of emergency. The System can be further enhanced by providing the GPS support. It will make the system more effective as owner can also stop his vehicle from getting stolen and even trace it if the vehicle has travelled some miles before being stopped.

The concept of this project can be used in multiple domains. Health care: To detect the accidents by using the advance pressure sensors in the vehicle. The pressure sensors will enable the GSM based system and send the SMS to the user. The user may be any relative of the own the car.

GSM based our project circuit become more advance by adding false password detection system to prevent home safe from robbery. If any other person will try to access your digital safe by entering wrong password the user will get the SMS. By replying to the SMS the user can prevent the safe from robbery and can alert the surrounding people by activating buzzer. It can also be for Fire detection by using Temperature sensors to make advance Fire alarm and Fire detection systems. Home automation: It can also be use for activation of Air conditioner, controlling of switches or other house hold purposes.

The proposed algorithms have been successfully implemented and tested using a test vehicle. It has been found that the proposed environment-detection algorithm shows good performance in detecting the positions of obstacles, lanes, pedestrian crossing, and speed bumps. A low cost GPS guidance system has been designed and implanted, in which the functions of guidance, obstacle avoidance, and wireless communication for monitoring multicar are realized. An extended application of this paper would be the future parking lot (outdoor).

Vehicle tracking system makes better fleet management and which in turn brings large profits. Better scheduling or route planning can enable you handle larger jobs loads within a particular time. Vehicle tracking both in case of personal as well as business purpose improves safety and security, communication medium, performance monitoring and increases productivity. So in the coming year, it is going to play a major role in our day-to-day living.

The main motto of the project is to incorporate different types of sensors so that they help in decrease the chances of losing life in such accident which we can't stop from occurring. Whenever accident is alerted the paramedics are reached to the particular location to increase the chances of life. This device invention is much more useful for the accidents occurred in deserted places and midnights. This vehicle tracking and accident alert feature plays much more important role in day to day life in future.

In this mini project, we have proposed a novel method of vehicle security systems used to overcome the theft control by using GSM technology. This system puts into the sleeping mode vehicle handled by the owner or authorized persons; otherwise goes to active mode. The mode of operations changed by persons or remotely. When the theft identified, the responsible people send SMS to the micro controller, then issue the control signals to stop the engine motor. After that all the doors locked. To open the doors or to restart the engine authorized person needs to enter the passwords. In this method, easily the vehicle security is maintained.

FUTURESCOPE

We can use the EEPROM to store the previous Navigating positions up to 256 locations and we can navigate up to N number of locations by increasing its memory.

- We can reduce the size of the kit by using GPS+GSM on the same module.
- We can increase the accuracy up to 3m by increasing the cost of the GPS receivers.
- We can use our kit for detection of bomb by connecting to the bomb detector.

- With the help of high sensitivity vibration sensors we can detect the accident. Whenever vehicle unexpectedly had an accident on the road with help of vibration sensor we can detect the accident and we can send the location to the owner, hospital and police.
- We can use our kit to assist the traffic. By keeping the kits in the entire vehicles and by knowing the locations of all the vehicles.
- If anybody steals our car we can easily find our car around the globe. By keeping vehicle positioning vehicle on the vehicle.

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