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Automobile Security and Maintenance using an Embedded C Platform

Saritha I G¹, Sowmyashree M S²

¹Asst Professor Department of Telecommunication BMS Institute of Technology and Management Bangalore, India

Abstract: *In present days crime rate is increasing day by day and car thefts are on the rise. The vehicle thefts involving mostly cars, which account to nearly about, 1.65lakh was reported in India recently. Stealing a car has become very simple for the criminals as owners do not bother to take necessary precautions.*

So, the need of the hour is a better anti-theft-control-system the one that can be implemented by using several technologies like GPS system, GSM, GPRS systems.

The main goal of this project is to use GSM technology to intimate the owner of the vehicle about any unauthorized entry. This process is done by sending an SMS to the owner, and the advantage of this project is that the owner can send back the SMS with the necessary instructions to stop the vehicle instantly.

Keywords: *GSM, Anti-theft control system, SMS, GPS*

I. INTRODUCTION

As the level of technology increases on daily basis it becomes necessary to devise more means of curbing or reducing to nearly zero, the high rate of crime. Technology can be fashioned in a way to provide security of life and property. The case of car hijacking or theft has become so rampant to the extent of threat to almost everybody. Through the advent of technology, the security agencies has been assisted in tracking, finding or locating a stolen vehicle by the integration or incorporation of a hijack or theft security system such as GSM based security system into the car which can be programmed to immobilize the vehicle from moving hence forth until the GSM resets the electronic circuit. The relevance of this work is not far-fetched; it is obvious that this work can be exercised on automobiles. Day by day crime rate is increasing, so a better security system is very essential for vehicles. Over the past few years, automotive security threats have gone from theory to reality. Online videos show hackers remotely hitting the brakes on cars in ways that can endanger drivers and passengers. Hackers can exploit some of these vulnerabilities from an adjacent lane without forewarning to the driver. Other vulnerabilities are open to attack over the cellular network from halfway around the world and for large numbers of cars simultaneously.

The commercially available anti-theft vehicular systems are very expensive. Here, we make a modest attempt to design & develop a simple, low cost vehicle theft control scheme using an inbuilt microcontroller. In this proposed system if someone tries to steal a car or any vehicle, the microcontroller gets an interrupt through a switch which is connected to the system; then, the system orders the GSM modem to send an SMS. The vehicle owner receives the SMS from the GSM modem informing the owner about the theft. Immediately, the owner of the vehicle can send back an SMS to the GSM modem to stop the engine. The Global System for Mobile communications (GSM) is the most popular standard for mobile phones in the world. Over billion people use GSM service across the world. The usability of the GSM standard makes international roaming very common between mobile phone operators, enabling subscribers to use their phones in many parts of the world. We start off exploring the existing scenarios and later we move towards the proposed architecture, describing the various modules in detail and the working methodology. Finally we present the simulation results and the various component details. The concept of this paper has been implemented as a small prototype model.

A. Motivation

These day's vehicle robbery cases are higher than any other time, it has gotten to be fundamental to give a vehicle a superb security with the main solid hostile to burglary gadget. Vehicle focal locking framework guarantees the best ensure to secure your vehicle from various types of burglary cases.

It is a vehicle security gadget that offers fantastic insurance to your vehicle. However this framework couldn't demonstrate to give complete security and openness to the vehicle in the event of burglary. So a more created framework makes utilization of an inserted framework focused around GSM innovation.

The outlined and created framework is introduced in the vehicle. Whether one is holder of single vehicle or in excess of 1000, Vehicle Tracking System (VTS) is an answer for spot, track and secure your portable resources.[2] It is intended for exact and ongoing following and reporting of your vehicle(s), regardless of where it is placed. Combination of high-affectability GPS units in vehicle following frameworks has empowered these gadgets to working different varieties of situations, for example, characteristic ravines, urban gulches and much under substantial foliage, the length of system scope is solid. Right now GPS vehicle following guarantees their wellbeing as voyaging. This framework introduced for the four wheelers, Vehicle following generally utilized as a part of naval force administrators for war fleet administration capacities, directing, send off, ready for and security. The applications incorporate observing driving execution of a guardian with a teenager driver. Vehicle following frameworks acknowledged in shopper vehicles as a burglary avoidance and recovery gadget. In the event that the burglary recognized, the framework sends the SMS to the vehicle holder. After that vehicle manager sends the SMS to GSM modem appended to the controller, issue the important signs to stop the robbery.[1]

II. LITERATURE SURVEY

Next generation auto theft prevention and tracking system for land vehicles, 2014 “Bhavya A. R, Mohanamurali R. GSM and GPS technologies are used to monitor and track the vehicle. Inertial navigation sensor is used which contains 3-axis MEMS magnetometer accelerometer that inform vehicle position using dead reckoning method.

GPS fencing notifies the system when a vehicle is equipped with the tracking device crosses a virtual boundary. The notification includes time date and location that the virtual boundary was crossed.

Anti-theft vehicle security system with preventive action” K. A. Mamun, Z. Ashraf. Anti-theft vehicle security system (ATV2S) uses sensor network which employs GPS and GSM. When an unauthorized movement is detected owner of the vehicle is alerted by automatic phone alarm as warning signal. It also continuously monitors the location and reports it on demand.

Experimental security analysis of a modern automobile 2010”, Karl kosher, Shwetak Patel. Demonstrates how to adversely control a wide range of automotive functions and completely ignore drivers input this is done by using components such as ECM(engine control module), EBCM(electronic brake control module), TDM(theft deterrent module) etc.

Addresses the vulnerabilities to the modern cars by installing devices within the existing automobile ecosystem.

Enhanced modified model for safe driving using embedded automotive control systems” by C.Divya, Amarendra Jadda” Monitoring health condition of driver using sensors. We can avoid the accidents up to some extent, if the person met with any health issues the vehicle will get slow down/stopped.

III. EXISTING SYSTEM

Various anti-theft control systems have developed over the past few years. An integrated Info-Security Circuit Board that communicates with ECUs and sensors inside a vehicle through CAN bus, LIN bus, Flex Ray and MOST Bus communicates with other vehicles, road-side infrastructure and mobile phones with wireless interfaces.

The main drawback with the system is the data timeliness and network delays to realize reliable secure car communications. Other systems include an in vehicle anti-theft component that will not enable the functions of the appliances if it should find itself is illegally moved to another car. The limitation here is that it requires a secure processor and smart card chips to store in the Group Identification Number. There are many remote controlled security systems that disable an automobile and its key auto systems through remote control when it is stolen. This requires secure vehicle-vehicle communications. [2] A. the Available Control System in the Market Data such as global position, speed and velocity of the vehicle is transmitted over the cellular network to the users' confidential account. The user can get to know about the vehicle and can give command to the vehicle such as stopping the vehicle, door lock etc. through the PDA devices or mobile phones.

A. Disadvantages of the Existing System

The cellular network is not available in all places throughout the country such as forests deserts and uninhabited areas. The cost of this system is exorbitant and to implement this system it costs nearly half the cost of the car. We will work on a full-fledged two lock security system that completely eliminates the theft of automobiles taking into consideration the disadvantages of existing systems. [1]

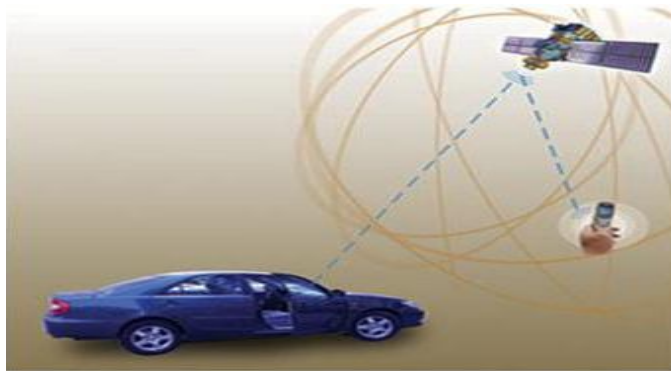


Fig1: Existing system

IV. PROPOSED SYSTEM

This proposed system mainly includes a power-supply block, a microcontroller, a GPS, a GSM modem, Max232, and several other components. The main intention of this project is to reduce vehicle thefts by finding the exact location by using a GPS modem. The GPS system navigates the location of the vehicle in terms of its longitude and latitude positions.

The microcontroller gets the information from the GPS modem through MAX232. The MAX232 is a serial communication interface between the microcontroller and GSM modem; it converts from TTL level to RS232 level. The GSM modem sends the SMS to a predefined mobile which stores the data in it. An LCD display displays the location information in terms of latitude and longitude values. The microcontroller is preprogrammed with the Keil software and therefore, continuously checks the GPS modem. The GSM modem interfaced to the microcontroller, receives the message that disables the ignition of the vehicle resulting in stopping the vehicle. This project uses a lamp (for indication purpose) to indicate the on/off condition of the engine. Thus, the owner of the vehicle can protect his car from being stolen from anywhere. Furthermore, this project can be enhanced by integrating a GPS system, which gives the exact location of the vehicle in terms of its longitude and latitude. Apart from protecting the vehicle, the location information can also be sent to the owner through an SMS.

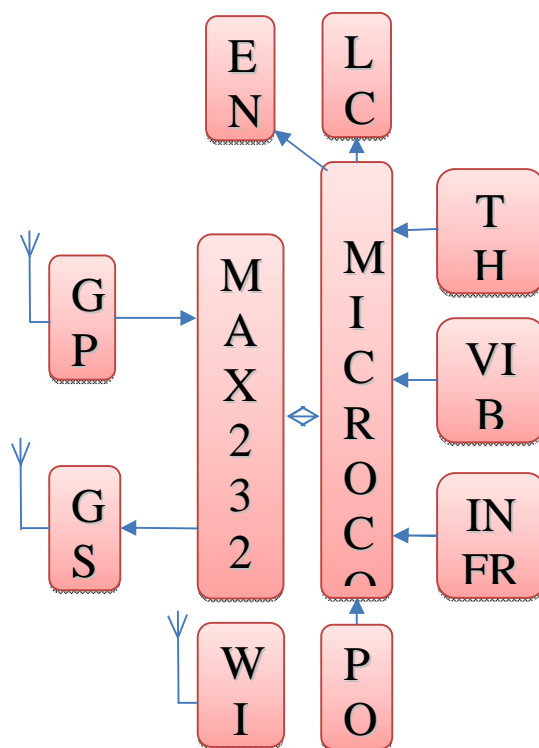


Fig 2: Block Diagram

A. System requirements

- 1) Microcontroller
- 2) MAX 232
- 3) GSM Module
- 4) Resistors & Capacitors
- 5) Voltage Regulator
- 6) GPS Modem
- 7) DB9 Connector
- 8) LCD Display.

B. Software Requirements

- 1) Keil Compiler
- 2) Embedded C

C. Proposed Methodology

We can control the car through sending SMS - when anyone opens the car door it will send sms automatically to the owner of the car that somebody is opening your car.

- 1) When any one starts the car it will send sms automatically to the owner of the car that somebody is starting your car
- 2) The owner of the car will send sms to the car to close the door and stop the car
- 3) When the temperature of the engine becomes high the display will show high temperature and produce automatic announcement
- 4) When the car battery goes less than 10 volt the display will show low battery and produce automatic announcement
- 5) When everything is ok it displays that all ok
- 6) Automatic announcement when anything fails
- 7) When the car meets with an accident it will send message with location to the friends / parents.
- 8) The car owner will monitor the car from his cell phone (all the activities)

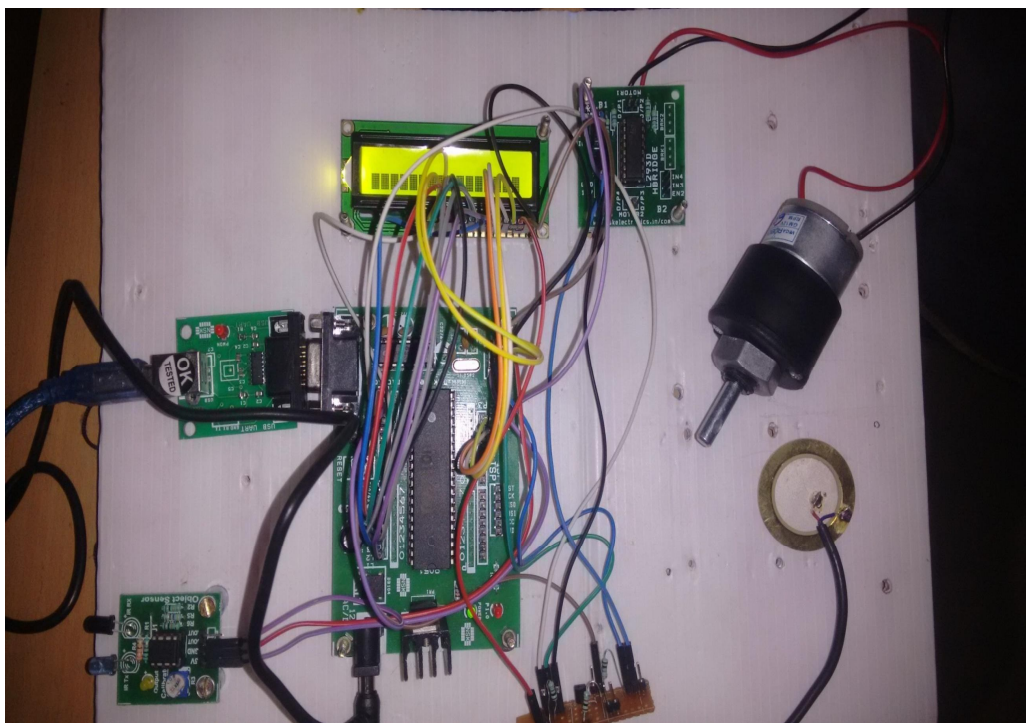


Fig 3: Transmitter section

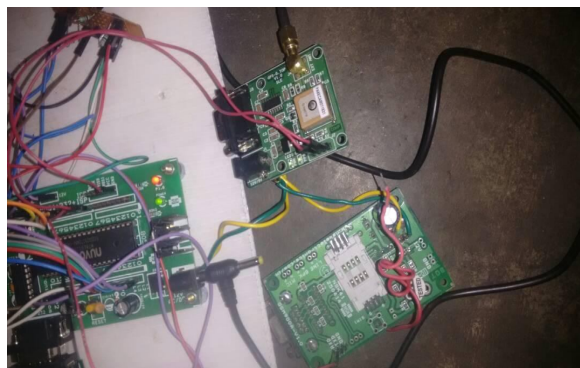


Fig 4: Receiver section



Fig 5: Display of results

D. Applications

Car Security system finds many applications in this modern world.

It can be used for trucks carrying valuable goods, to keep track of the status of delivery and location of the truck all the time individual, fleet owners. It can be implemented not only in automobiles but also in various other fields where security is required.

It can be implemented not only in automobiles but also in various other fields where security is required. It can be used for bank security and other safety critical applications by slightly changing the program and function according to the requirement.

E. Advantages

- 1) Use of GPS system for tracking the vehicles provides the exact location of the vehicle at any given instant of time in terms of latitude and longitude.
- 2) Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication.
- 3) We get the exact co-ordinates of location, so there is no chance of error.
- 4) This project is easy to install and easy to use.
- 5) Since a sim card is being used a large number of contacts can be stored.
- 6) Low cost is required for the implementation

F. Disadvantages

- 1) The range of GSM depends on sim card network. As long as simcard gets network coverage is possible, it will send SMS.
- 2) In case of GSM, SIM cards, individual authentication keys of the users are stored in the authentication centers. Any person with the rights and qualifications to access to authentication center can manipulate these to impersonate that mobile user.
- 3) Security algorithms used in GSM e.g. A3, A5, and A8 are all undisclosed algorithms. But researchers have proved that these algorithms cannot guarantee 100% security.
- 4) Privacy of a call and mystery of a subscriber are only assured on the air interface among the mobile station and the base station subsystem leading to likelihood of eavesdropping of voice data.

- 5) If you are using GPS on a battery operated device, there may be a battery failure and you may need a external power supply which is not always possible.
- 6) Sometimes the GPS signals are not accurate due to some obstacles to the signals such as buildings, trees and sometimes by extreme atmospheric conditions such as geomagnetic storms.

V. CONCLUSIONS & FUTURE SCOPES

We have proposed a novel method of vehicle tracking and locking system used to track the vehicle using GPS and GSM technology. This system locks the system when any unauthorized entry is made. When a theft is identified, the owner gets a SMS and the owner in return sends a sms to the microcontroller, then the microcontroller issues a control signals to stop the engine motor. After that all the doors gets locked. To open doors or to restart the engine authorized person needs to enter the passwords.

- A. Post-crash survivability is the chance that drivers and passengers survive a crash after it occurs.
- B. Presently only SMS feature is available, we can include the call feature for ease of operation.
- C. Using android application also we can stop the vehicle.
- D. Microphone could be interfaced to the gps/gsm system module so that during theft activity voice call could be established with the owner.

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