



## An Advance and Robust Security System for Vehicle Security System

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### **Abstract—**

*This proposed work is an attempt to design an advance vehicle security system that uses GPS and GSM system to prevent theft and to determine the exact location of vehicle. Today theft is happening on the parking or in some insecure place. The safety of the vehicle is exceptionally essential. The advance vehicle security system is designed using GPS and GSM technology. The system contains GPS module, GSM modem, Infrared sensors, DTMF tone decoder, 8051 microcontroller, relay switch, paint spray and high voltage mesh. GPS system track the current location of vehicle, there are two types of tracking used one is online tracking and other is offline tracking. GSM system is also installed in the vehicle for sending the information to the user because GPS system can only receive the vehicle location information from satellites. In case of accident this system automatically sends the message for help to ones relatives. The preventive measures like engine ignition cutoff, Fuel supply cutoff, electric shock system (installed on steering wheel) and paint spray system are installed in the vehicle which is controlled using user GSM Mobile. This complete system is designed taking in consideration the low range vehicles to provide them extreme security.*

**Index Terms** — Global Positioning System (GPS); Global System for Mobile Communications (GSM); Microcontroller 8051; Tracking

### **INTRODUCTION**

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. 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 work in 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 vehicle following framework found in clients vehicle as a burglary counteractive action and salvage gadget. Vehicle manager or Police take after the sign emitted by the following framework to place a victimized vehicle in parallel the stolen vehicle motor rate going to diminished and pushed to off. In the



wake of exchanging on the motor, engine can't restart without consent of watchword. 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. The main aim of the present research is to design and develop an advance and robust security system for vehicles that can prevent theft and provide information on accidents. The system being developed through the present work uses GPS and GSM system and can be made affordable so that it can be used in low cost vehicles even in two wheelers.

## A BRIEF REVIEW

In many previous research works, the authors have given some analytical view of the circuit used in the various projects; while in some other global positioning system (GPS) is commonly used as global navigation satellite system is used to locate the vehicles and also to stop the vehicle if stolen. The location information is sent in the form of message containing latitude, longitude and speed information to the owner of the vehicle or location can also be traced using internet through Google maps. A number of developments have taken place in anti-theft systems for vehicles and some of the relevant ones are as follows.

The utilization of ARM 7 microcontroller, GSM and GPS module together with an accelerometer and temperature sensor is carried out by Joshi and Mahajan [1]. The GPS and GSM

module is being utilized for following the area of vehicle. The extra part is being included is the accelerometer which essentially contains the MEMS sensor offering a low pass filter and is fundamentally utilized for Shake Detection, Orientation Detection, and Tap Detection. The utilization of temperature sensor is additionally being carried out with a specific end goal to acquire the vehicle engine temperature which changes over the estimation of temperature into electrical signal. Pethakar et al [2]. paper on RFID, GPS and GSM based Vehicle Tracking and Employee Security System consolidate the establishment of an electronic gadget in a vehicle, with reason planned machine programming to empower the organization to track the vehicle's area. At the point when the vehicle picks the worker; he/she needs to swap the RFID card.

The micro controller matches the RFID card no. with its database records and sends the representative's id, taxi id & the taxicab position co-ordinates to the organization unit by means of GSM module. The GSM Modem will get the message through GSM in the organization unit. On the off chance that worker ends up/herself in an issue, he/she will press the catch. Microcontroller will distinguish the activity and sends a sign to the GSM which will arrange with to the organization unit and police. The configuration and advancement of a burglary control framework for an automobile, which is being utilized to anticipate/control the robbery of a vehicle has been developed by Wankhade and Dahad [3].

The created framework makes utilization of an implanted framework focused around Global System for Mobile correspondence (GSM) engineering. The planned and created framework is introduced in the vehicle. An interfacing portable is additionally associated with the microcontroller, which is thusly, joined with the engine. Once, the vehicle is being stolen, the data is being utilized by the vehicle owner or user for further handling. The data is passed onto the focal handling protection framework which is as the



SMS, the microcontroller unit peruses the SMS and sends it to the Global Positioning System (GPS) module and utilizing the triangulation system, GPS module sustains the precise area as latitude and longitude to the owner or user mobile. Khan et al. [4] paper on GPS and GSM based following framework depicts the configuration of following or tracking unit that uses the worldwide situating framework (GPS) to focus the exact area of an article, individual or other resource for which it is appended and utilizing GSM modem this data can be transmit to remote client. This framework contains single-board inserted framework that is furnished with GPS and GSM modems alongside ARM processor that is introduced in the vehicle. Amid item movement, its area can be accounted for by SMS message. The motivation behind this framework is to outline and incorporate another framework which is coordinated with GPS- GSM to give emulating peculiarity like Location data, Real time following utilizing SMS, track transport driver action and Communication is prompt therefore we can get running report rapidly.

Kumar R. et al. [5] paper on bike vehicle security framework portrays the outline and improvement of bike vehicle security framework, which is being utilized to ensure or keep the burglary. A percentage of the essential gimmicks underpinned by this framework are alarming holder by SMS about the robbery endeavour, permitting client to control the framework remotely by SMS, following the area of vehicle utilizing GPS innovation, Remote Keyless System, servo engine worked bolting framework (handle lock, fuel lock and back wheel lock) and side stand indicator. Redundancy is maintained to make the system reliable even in the worst case scenario, but due to cost constraints a trade-off between cost and redundancy was necessary. The system is designed to be compatible with almost all the brands of vehicle.

Hu Jian-ming et al. [6] describe a vehicle against robbery framework utilizing GSM and GPS module. The framework is created utilizing

fast blended sort single-chip C8051f120 and stolen auto is discovered by the utilization of vibration sensor. The framework stays in contact with auto holder through the GSM module, for the safety and reliability of car. Fleischer et al. [7] portrays improvement and organization of GPS (Global Positioning System)/GSM (Global System for Mobile Communications) based Vehicle Tracking and Alert System. This framework permits between city transport organizations to track their vehicles progressively and gives security from outfitted burglary and mishap events.

Le-Tien et al. [8] describes a framework focused around the Global Positioning System (GPS) and Global System for Mobile Communication (GSM). It portrays the pragmatic model for directing and following with mobile vehicle in an extensive zone open air environment .The framework incorporates the Compass sensor-Yas529 of Yamaha Company and Accelerator sensor-Kxsc72050 of Koinix Company to secure moving heading of a vehicle. The framework will obtain positions of the vehicle by means of GPS receiver and after that sends the information to regulated centre by the SMS (Short Message Services) or GPRS (General Package Radio Service) administration. The administered focus embodies an improvement pack that backings GSM methods Wmp100 of the Wavecom Company. At last, the position of the portable vehicle will be shown on Google Map. Nagaraja et al. [9] paper describes the outline and improvement of a GSM based vehicle robbery control framework for a car.

The created framework makes utilization of an inserted framework focused around GSM innovation. An interfacing mobile or GSM modem is associated with the microcontroller, which in term is joined with the engine through relay. In the event that the vehicle is stolen, the data is sent to the owner that somebody has stolen his vehicle. After that the manager will send the message to GSM modem or mobile which is joined with motor ignition through relay to switch

off the engine. Rashed et al. [10] paper describes a GPS based tracking system that keeps track of the location of a vehicle and its speed based on a mobile phone text messaging system. The system is able to provide real-time text alerts for speed and location. The present location can be locked and the system will alert the owner if the vehicle is moved from its present locked location.

## A. GSM Model:-

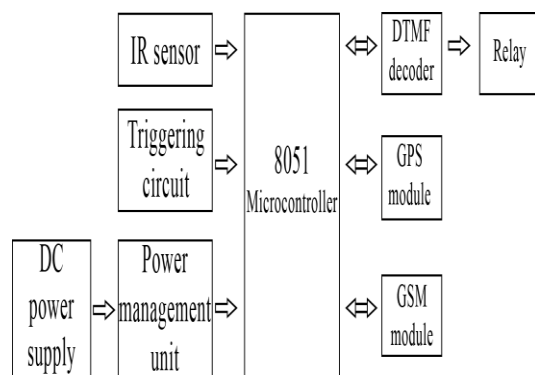


Fig. 1. System Architecture

The advance vehicle security system (Fig.1) consist of GSM modem, GPS module, 8051 microcontroller, infrared sensors, relay, paint spray and high voltage mesh. The hardware design is split into two parts- GSM and GPS. The main circuit is divided into two circuits one is for detecting the motion of thief using infrared sensors and other is for DTMF tone decoding for switching on/off the relay. The block diagram (Fig. 2), when thief tries to unlock the car, the infrared sensors placed near the car door will sense the motion or movement and will sent the signal to 8051 microcontroller. The microcontroller which is connected to triggering circuit will send the triggering signal to relay. The relay is connected to GSM mobile through earphone. The microcontroller will send triggering signal three times to GSM mobile and call will be made to user informing him or her that someone is trying to unlock the vehicle.

The second part (Fig. 3) is for controlling or switching different systems like engine

ignition, fuel supply, electric shock mesh and windscreen paint spray using relay. The relay is controlled using GSM mobile and DTMF tone decoder. DTMF tone detection and decoding is done by IC MT8870DE. This IC MT8870DE recognizes the dial tone from a phone line and decodes the tone pressed from the mobile keypad. The dial tone which comes out from the telephone set or mobile phone is Dual Tone Multi-Frequency. The name was given in light of the fact that the tone that we heard via telephone is really making up of two different frequency tones, subsequently the name dual tone. The DTMF tone is a form of one way communication between the dialer and the telephone exchange. A complete system comprises of the tone generator and the tone decoder. Here we are utilizing the IC MT8870DE, the principle part to decode the input dial tone to 5 digital outputs. These output bits can be interfaced to a PC or micro-controller for further application. For each keypad number pressed there is particular range of frequency which will be decoded by DTMF decoder circuit. Depending upon the system like ignition cut-off, fuel supply cut-off, windscreen paint spray and electric shock mesh, the number of relays controlling them will be added. Here we are using four relays. The microcontroller is programmed in such a way that each keypad number will be controlling relay which will further control these systems. The owner will send the DTMF tone to the GSM mobile placed in the car. The DTMF tone will be decoded using IC MT8870DE which will be controlling relays to activate security system. For example number 1 on the mobile keypad is assigned for engine ignition cut-off, on pressing 1 number on the keypad of your mobile phone, the DTMF decoder will decode the keypad tone frequency and microcontroller will switch the relay on-off depending upon the program burn in the microcontroller.

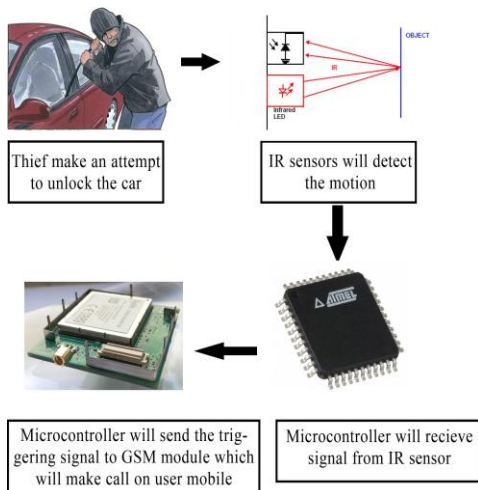


Fig. 2. Block diagram for detecting thief movement.

As we can see from this block diagram (Fig. 3), after receiving the information that someone tries to unlock the car user makes a call to GSM mobile placed in the vehicle attached to security system. After the call is established between the user and GSM mobile placed in the car, user sends the signal by pressing the keypad number from his mobile.

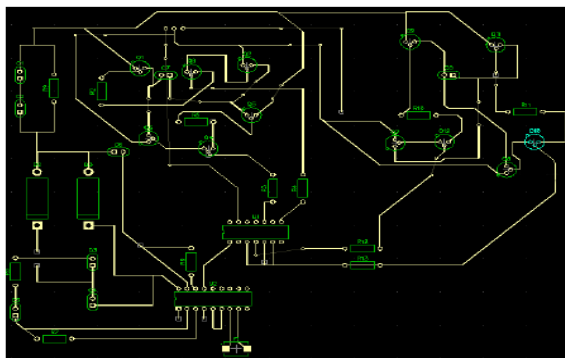


Fig. 5. DTMF tone decoding circuit layout using dip trace

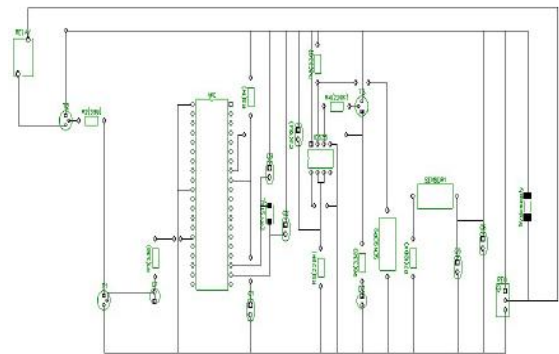
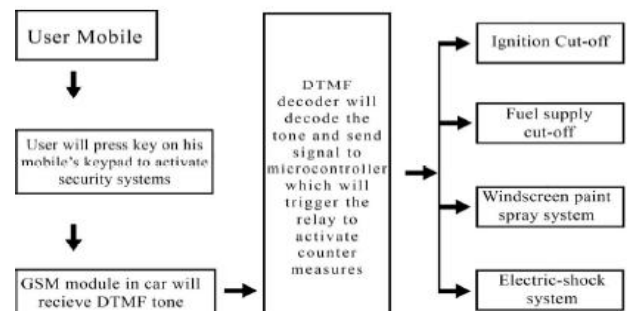


Fig. 6. Circuit diagram for triggering GSM mobile placed in the vehicle.

Each keypad number is assigned for controlling different system. On pressing 1 from user mobile engine ignition will cut-off, on pressing 2 fuel supply system will cutoff, on pressing 3 electric shock system provided on steering wheel will get activated which will give shock to thief and on pressing 4 windscreen paint spray system get activated so that thief can't drive the vehicle.



## B. GPS Model:-

The Global Positioning System (GPS) is a space-based satellite route framework that gives area and time data in all climate conditions, anyplace on or close to the Earth where there is an unhampered observable pathway to four or more GPS satellites. The framework gives basic abilities to military, common and business clients as far and wide as possible. It is kept up by the United States government and is uninhibitedly open to anybody with a GPS receiver. A GPS framework (Fig. 7) computes its position by accurately timing the signal sent by GPS satellites

high over the Earth. Every satellite consistently transmits messages that include: the time the message was transmitted and satellite position at time of message transmission. The GPS framework or receiver uses the messages it gets to calculate the transit time of every message and computes the separation to every satellite utilizing the velocity of light. Each of these separations and satellites' location characterize a sphere. The receiver is on the surface of each of these spheres when the separations and the satellites locations are right. These separations and satellites locations are utilized to compute the location of the receiver utilizing the navigation mathematical statements. This location is then displayed using online web application through Google maps or through offline tracking using GSM. Numerous GPS units show derived information such as direction and speed, calculated from position changes. In typical GPS operation, four or more satellites must be visible to acquire an exact result.

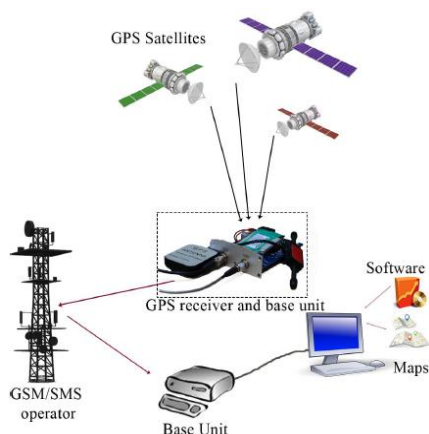


Fig. 7. Block diagram of GPS tracking system.

A GPS tracking framework is a gadget that uses the Global Positioning System to focus the exact location of a vehicle, individual, or other asset to which it is connected and to record the position of the asset at regular intervals. The recorded area information can be stored within the tracking framework, or it might be transmitted to a central location data base, or to web associated pc, utilizing a cellular (GPRS or SMS), radio, or

satellite modem inserted in the framework. This permits the asset's location to be shown against a map backdrop either in real time or when analyzing the track later, using GPS tracking software.

## CONCLUSION

Tracking framework or system is getting to be progressively vital in expansive urban areas and it is more secured than different frameworks. It has continuous ability, rises with a specific end goal to fortify the relations among individuals, vehicle and street by assembling present day data advances or technologies and ready to structures a real time accurate, compelling exhaustive transportation framework. Updating this setup is simple which makes it open to future a prerequisite which likewise makes it more efficient. The proposed work is cost-effective, reliable and has the function of preventing theft and providing accurate tracking system. The advance vehicle security system is one of the essential systems that homogenize both GPS and GSM systems. It is fundamental because of the huge numbers of uses of both GSM and GPS frameworks and the wide use of them by a great many individuals all through the world. This framework intended for clients in area development and transport business, provides real-time information such as location, speed and expected arrival time of the user is moving vehicles in a concise and easy-to-read format. This framework might likewise valuable for correspondence process among the two focuses.

## REFERENCES

- [1] M.S. Joshi and Deepali V. Mahajan, "Arm 7 Based Theft Control, Accident Detection and Vehicle Positioning System", International Journal of Innovative Technology and Exploring Engineering, vol. 4, no. 2, July 2014.
- [2] Ms.S.S.Pethakar, Prof. N. Srivastava, Ms.S.D.Suryawanshi, "RFID, GPS and GSM



Based Vehicle Tracing and Employee Security System ”, International Journal of Advanced Research in Computer Science and Electronics Engineering, vol. 1, no. 10, Dec 2012.

[3] Pravada P. Wankhade and Prof. S.O. Dahad , “Real Time Vehicle Locking and Tracking System using GSM and GPS Technology-An Anti-theft System”, International Journal of Technology And Engineering System, vol. 2, no.3, Jan –March 2011.

[4] Abid khan and Ravi Mishra, “GPS – GSM Based Tracking System”, International Journal of Engineering Trends and Technology, vol. 3, no. 2, 2012.

[5] Prashantkumar R., Sagar V. C., Santosh S., Siddharth Nambiar , “Two Wheeler Vehicle Security System”, International Journal of Engineering Sciences & Emerging Technologies, vol. 6, no. 3, Dec 2013, pp: 324- 334.

[6] Hu Jian-ming, Li Jie and Li Guang-Hui , “Automobile Anti-theft System Based on GSM and GPS Module”, Fifth International Conference on Intelligent Networks and Intelligent Systems, 2012.

[7] Fleischer, P.B.; Nelson, Atso Yao; Sowah Ribert Adjete, Bremang, Appah, “ Design and Development of GPS/GSM Based Vehicle Tracking and Alert System for Commercial Inter-City Buses”, Adaptive Science and Technology, IEEE 4th International Conference , Oct 2012 .

[8] Thuong T. Le-Tien, V. Phung-The, “Routing and Tracking System for Mobile Vehicles in Large Area”, Fifth IEEE International Symposium on Electronic Design, Test & Applications, pp. 297-300, 2010.

[9] Nagaraja, B. G.; Rayappa, R.; Mahesh, M.; Patil, C.M.; Manjunath, T. C., "Design and Development of a GSM Based Vehicle Theft Control System", Advanced Computer Control, 2009. ICACC '09. International Conference on, vol., no., pp.148, 152, 22-24 Jan 2009.

[10] M. A. Al Rashed, Ousmane Abdoulaye Oumar, Damanjit Singh, “A real time GSM/GPS based tracking system based on GSM mobile phone”, IEEE Journal on Signals and Telecommunication, vol. 3, no.1, March 2014, pp. 33-39.