

# Advanced Vehicle Security System with Theft Control and Accident Notification using GSM and GPS Module

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**Abstract:** This proposed work is an attempt to design and develop a smart anti-theft system that uses GPS and GSM system to prevent theft and to determine the exact location of vehicle. The system contains GPS module, GSM modem, Infrared sensors, DTMF decoder IC MT8870DE, 8051 microcontroller, relay switch, vibration sensor, paint spray and high voltage mesh. GSM system is also installed in the vehicle for sending the information to the owner of the vehicle 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 or owner GSM mobile. The owner can lock or unlock his/her vehicle with the help of SMS. This complete system is designed taking in consideration the low range vehicles to provide them extreme security.

**Keywords:** Global Positioning System (GPS), Global System for Mobile Communications (GSM), microcontroller 8051, tracking.

## I. OBJECTIVE

To minimize the risk involved in vehicle stealing and providing accident notification to reduce the loss of lives.

## II. 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. 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.

**GPS Module:** Stands for "Global Positioning System." GPS is a satellite navigation system used to determine the ground position of an object. The Global Positioning System (GPS) is a space based radio-navigation system

consisting of a constellation of satellites and a network of ground stations used for monitoring and control. GPS is operated and maintained by the Department of Defense (DOD). It is the receiver that collects data from the satellites and computes its location anywhere in the world based on information it gets from the satellites.

**GSM Module:** A **GSM modem** is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages. In most parts of the world, GSM modems are a cost effective solution for receiving SMS messages, because the sender is paying for the message delivery.

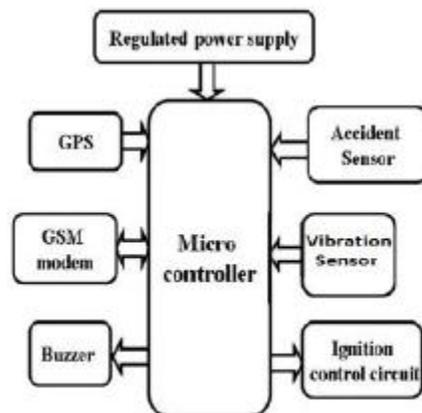


Fig-1: Block diagram of Advanced Vehicle Security System

### III. BRIEF REVIEW

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 user or owner will send the message to GSM modem or mobile which is joined with motor ignition through transfer or relay to switch off the engine. 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. In every one hour the GSM modem or mobile will inform the owner by messaging its location in the form of latitude, longitude and speed information. The owner or user can control or stop the vehicle by simply sending the message stop to GSM modem or mobile connected to circuitry board. After receiving that message ignition system will turn off.

#### IV. HARDWAREDESCRIPTION

##### A. GSM Model:

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.

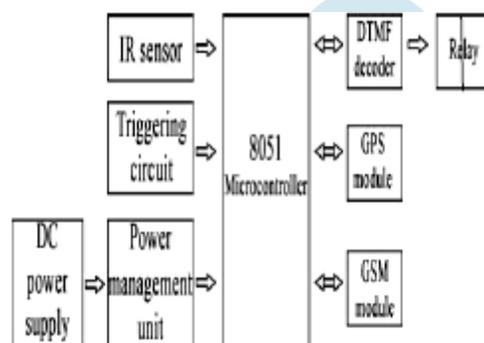


Fig. 2. Anti-theft system architecture.

The second part 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 provided by IC MT8870DE. This circuit detects the dial tone from a telephone line and decodes the keypad pressed on the remote telephone. The dial tone we heard when we pick up the phone set is called Dual Tone Multi-Frequency, DTMF in short. The name was given because the tone that we heard over the phone is actually made up of two distinct frequency tones, hence the name dual tone. The DTMF tone is a form of one-way communication between the dialer and the telephone exchange.

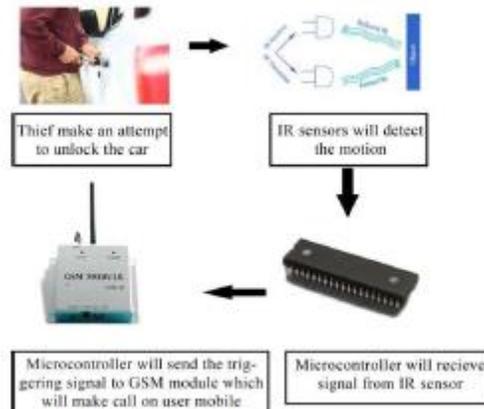
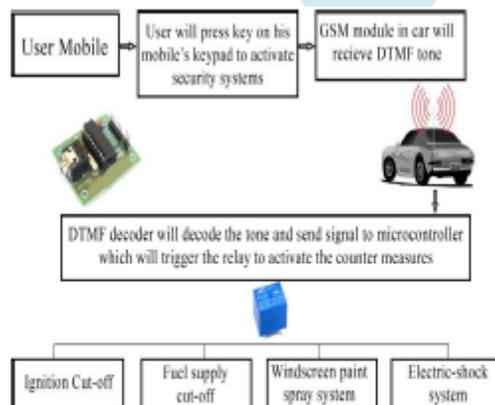


Fig. 3. Block diagram for detecting thief movement.

A complete communication consists of the tone generator and the tone decoder. Here we are use the IC MT8870DE, the main component to decode the input dial tone to 5 digital outputs. These digital bits can be interface to a computer or microcontroller for further application. There is particular range of frequency (Fig. 4) for each keypad number 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. There are four relays in the circuit each one of them controlling the preventive system like engine ignition cut-off. 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. 4. Block diagram for switching different systems using DTMF decoder circuit using relay.**

The mechanism of security system is presented through a block diagram in Fig.3. Whenever someone attempts to unlock the vehicle, the security components installed in the vehicle sends a signal to the owner of the vehicle via GSM modem or GSM mobile. The owner then tries to establish connectivity with the security system in the vehicle through calling a predefined number. Once the connectivity is established, the owner can choose one of the four actions like engine ignition cut-off, fuel supply cut-off, windscreen paint system and electric shock system as per his judgment in order to prevent the vehicle from theft. 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 cut-off, 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 gets activated so that thief can't drive the vehicle. The complete working model comprises of GPS and GSM system as shown in Fig. 4. Fig. 5. shows the complete circuit layout for decoding DTMF tone through which relays are controlled that further controls the preventive systems like engine ignition cut-off, fuel supply cut-off, windscreen paint spray system

and electric shock system. The circuit diagram for detecting the motion of thief is shown in Fig. 5. The main components used in the circuit are microcontroller 8051 and infrared sensors.



Fig. 5. GPS and GSM system for vehicle.

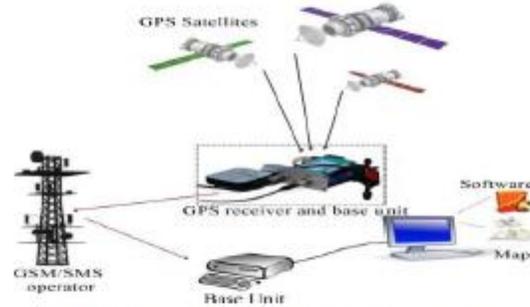


Fig. 6. Block diagram of GPS tracking system.

**FLOW CHART TO TRACK THE VEHICLE TO DETECT THE THIEF:**

- Step 1: Start the process
- Step 2: Set counter =3.
- Step 3: Enter code from keypad.
- Step 4: Check code with previously stored code.
- Step 5: Is it same? If "YES" then goto step8.If "NO" then goto step 6.
- Step 6: Decrease counter.
- Step 7: Is counter=0? If "YES" then inform to police And owner. If "NO" then goto Step 3.
- Step 8: Send text message to owner for car access.
- Step 9: Check all parameters of sensor.
- Step 10: Is any parameter beyond range? If "YES" then go to Step 11. If "NO" the message will not be send to owner.
- Step 11: Buzzer is "ON" .
- Step 12: Check the buzzer is stopped within 1 minute.  
If "YES" message will not be send to owner. If "NO" goto Step 13.
- Step 13: Send message o police station & owner.
- Step 14: Stop.

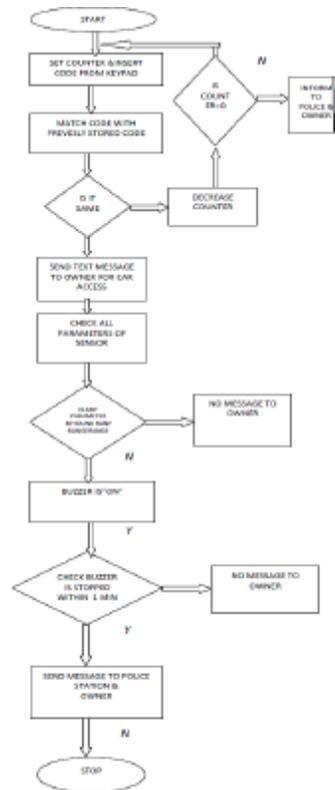


Fig.7. Flow chart to track the position of vehicle

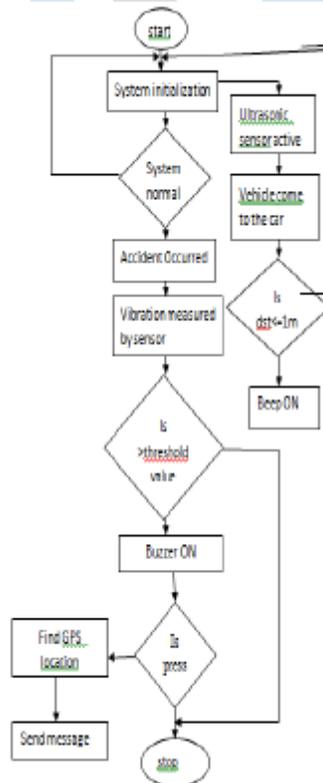


Fig.8. Flow chart to track the accident

The Flow Chart of the system is shown in the figure 8. It shows the system is initialized on power ON. When the system is detected to be abnormal, it is confirmed that the accident has occurred. The vibration/acceleration of the vehicle is detected to confirm the cause of the accident. As soon as the accident is detected the buzzer (alarm) is ON. The switch is scanned first; if it is a minor accident then the switch is ON so that messaging is terminated. If it is a major accident, the switch remains OFF and the message is sent automatically to the rescue team after the location is detected by the GPS.

## V. CONCLUSION

By a brief study of all the research paper, we can come to the conclusion that this project is indeed helpful to the common people. Road accidents are common in India as well as in whole over the world. Usually accident occurs in areas which are far away from the emergency centers. So the risk of deaths increases. So with the help of this system/project the risk of deaths can be decreased to a large extent.

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