Abstract:
In this technical world where technology is growing up day by day and scientific researches are presenting a new era of discoveries, we need security in all the areas. As theft activities are increasing around, we have need of more security in Automobiles/Vehicles. Today automobile industry is a major industry of the world and the vehicles need to be secured otherwise they will be packed gifts for the criminals given by our own hands. The main aim of this paper is to use wireless technology to intimate the owner of the vehicle about each and every unauthorized attempt of entry to his/her vehicle. The auto-generated Short Message Service by system is used to give information to the owner’s cell phone. And one more advantage of this project is that a back Short Message Service can be send by vehicle’s owner which will disable the ignition of the vehicle system and vehicle will be stopped. If system is active and if any unauthorized person tries to start the vehicle, the microcontroller used in system gets an interrupt through a switch which is connected to the security system. Instantly microcontroller commands the Global System for Mobile modem to send an auto-generated message. The owner receives the Short Message Service alert in the form of some written text which is predefined in the system. If he is not sure about the jumper, owner can send a back message to the Global System for Mobile modem to ‘stop’. The Global System for Mobile modem which is interfaced to the microcontroller receives the message, according to the output of Global System for Mobile modem, micro controller disables the ignition, and it will result in stopping of the vehicle. Advancement to this system is that we can transmit auto-generated Multimedia Message Service instead of Short Message Service by using smart phone.

Keywords: Microcontroller (MCU), Attention (AT) command, Short Message Service (SMS), Global System for Mobile (GSM), Liquid Crystal Display LCD.
1. Introduction

With the huge development and applications of many embedded technology, vehicle security systems design and analyses are constantly improving using many techniques such as communication technique, embedded system and so on, have been integrated. At the same time, the amount of accident of vehicle’s theft still remains high. So, one practicable vehicle security system should be efficient, robust and reliable.

This paper explains an effective and advanced system to detect vehicle thefts and implementation of vehicle’s security, tracking and monitoring by using GSM. Due to a tremendous rise in crime rates and as many as car is stolen yearly in the world for the past number of years, this system of vehicle monitoring and tracking system provides the effective and excellent method.

Some of the reasons due to which we are not able to protect the vehicles are listed below:

- Due to long range (distance) we are not able to hear the siren.
- Alarms can be made to disabled by theft.
- Many cars have alarms with similar sound.
- Alarm sound is mitigated in crowded areas.

This system work with GSM technology, which will generate a predefined message, when the intruder tries to get unauthorized access of the vehicle. With the help of GSM which is being one of the most popular and unique in a way that many of the systems can be made to work with it because of its used mean of mobile communication makes it viable, worldwide and implemented.

This System, on intrusion, triggers the status of the vehicle to the owner via SMS and continues to do so if any intrusion occurs. One of the distinguished features is that the system allows the owner to prompt an action via back SMS from any far off place from vehicle either gear locking or cause an engine to seize. If any disturbance occurs in the stationary state of the vehicle it activates microcontroller to cause an action which will help to alert the owner and seize the vehicle. A set of predefined messages are stored to prompt a particular action through which the owner will know the actual status of his vehicle via SMS i.e. it is secure or not.

All processes are controlled by “AT328” controller central module including making the car to stop, sending SMS, display on LED, communicating with subsystems, controlling of motor driver IC and motor.

![Block Diagram](image)

**Fig.1. Block Diagram**

Fig1. Show the block diagram representation of the vehicle security system. The central module is microcontroller. It controls GSM module and Motor through motor driver IC L132 and LCD. A jumper switch is used in the circuit. If jumper switch is connected in system then driver can move according to his requirement else if someone tries to steal the car, the microcontroller gets an interrupt through a switch mechanism connected to the system and commands the GSM modem to send a message. The owner receives the SMS that his car is trying to steal and also he can then send an SMS to the GSM modem to ‘stop the engine’ in case he have not put out the jumper switch.

The GSM modem interfaced to the microcontroller, receives that message, the output of which activates a mechanism that will help to disables the ignition of the vehicle resulting in seize the vehicle. The project uses a LCD to display the engine ON/OFF condition. Thus, owner of the vehicle from anywhere can switch off ignition of his car. This project can be further enhanced by integrating a GPS system, which will give exact position of the vehicle in terms of its latitude and longitude that will help out more efficiently in security.
Further this data can be sent to the owner via SMS who can enter this value on Google maps to get the exact location of his vehicle.

2. Working of System:
This security system works in two modes only: First in which the system is active, if unauthorized person tries to turn on the vehicle by keys or remote then alert text message will be sent to the registered user in system and vehicle will be in OFF condition. But in second mode, the person can turn on the vehicle without any alert as described in fig.2.

The brain (main component) of this system is microcontroller ATMEGA 328 which is responsible for all monitoring and generating the inputs and outputs respectively as per the program. The programming to this system is done using Arduino software in C logics. The outputs of the microcontroller in this system are proper displayed on LCD of SMS arrival status and configuration etc. Proper LCD display is ensured through programming and the LCD interface design. If the intruder is detected pre-defined auto-generated SMS will be sent to the authorized registered mobile through the GSM modem that has been configured to send the SMS. Authorized mobile number to receive SMS (at remote location), all the configuration commands of GSM modem (AT commands), and controlling is done through the used microcontroller programming means microcontroller controls all this process as per the program. The interface between microcontroller and the GSM is through UART (Universal Asynchronous Receiver Transmitter) communication which is serial communication protocol.

3. Hardware Specification
3.1 Microcontroller
It is microcontroller based security system. Microcontroller is brain of this security system. This microcontroller has burned with the program. The microcontroller we have used is ATMEGA 328. ATMEGA 328 microcontroller is selected because it has some advantages as:

- Small size
- Low power consumption
- Highly flexible
- Cost-effective.

Its configurations:

- 32K bytes of in-system reprogrammable flash memory.
- 256 bytes of internal RAM
- 23 general purpose I/O lines
- Three 16 bit timers/counters
- 6-channel 10-bit A/D converter
- 8 interrupt sources
3.2 Motor
The used motor in this security system is DC brushless motor can be taken from anywhere. It has 30rpm but you can take of any rating. It has the rating of DC-12V, 0.48A the brushless DC motor is used to eliminate the problems of the brushed DC motor. We have used motor only to show vehicle. In this motor, the mechanical rotating switch assembly is replaced by an external electronic switch which is synchronized to the rotor's position. Brushless motors are typically 85–90% efficient. The DC motor is connected through motor driver to pin (P3.6) at port 3 of microcontroller.

3.3 GSM Modem
As we have used wireless technology. GSM modem is from the company SIEMENS TCS (CE 0682). A wireless link is provided between the owner’s cell phone and MCU by GSM module. CE 0682 offers advance GSM connectivity with automated GSM connection establishment. And for only SMS transfer this GSM modem is effective without wasting more money. External microcontroller can use AT commands to communicate with Nokia 12i and simple remote I/O applications can easily be controlled via text messages.

3.4 Liquid Crystal Display
Liquid Crystal Display (LCD) screen is an electronic display module. It has wide range of applications in new era. LCDs are economical, easily programmable than LED and there is no limitation to display special & even custom characters. LCD is preferred over seven segments and multi segment LEDs. The used LCD is 16x2 LCD.16x2 means -it can display 16 characters per line, it has 2 lines. Used LCD has two registers

a. Command register
b. Data register

The Command instructions given to the LCD will be stored in command register and the data to be displayed on the LCD will be stored in data register. Minimum connection circuit for LCD is as shown in fig. 4.
4. Result and discussion:
The system has developed practically and it is also verified up to our knowledge. This is complete view of this system as shown in fig.5.

And this system can be put in vehicle to fully utilize.

There are some system details in two modes.

a. When system is disabling then LCD will display as shown in fig.6 (a). And in this case vehicle can be ON or OFF both by using ignition switch.

b. When system is active then LCD will display as shown in fig.6 (b). And car cannot be started. IF someone tries to start then alert message will be sent to the owner. And LCD will display as shown in fig.6 (c) and fig.6 (d) respectively.
5. Conclusion
The GSM module provides the important functions required by intelligent vehicle security systems, so that vehicle theft can be less and they are also protected from the access by any unauthorized person. Thus if an unauthorized person tries to steal the vehicle, the microcontroller stops the car automatically if the system is active. GSM module will intimate the owner about the theft attempt. And for advancement we will need more components like smart phones (multimedia) and smart/feasible wireless technology for transmitting MMS instead of SMS.

6. References