IJCTA, 9(39), 2016, pp. 219-224

Development of Antitheft Module with Real-Time Tracking and Engine Locking System for Vehicle

Sumit Shinde* Sravani Vemulapalli* and Dayananda Nayak*

Abstract : In today's world the use and necessity of vehicle is increasing rapidly. Safety to these vehicles is extremely essential for vehicles which not only helps to stop economical loss of user but also helps to reduce the crime rate. Most of the time vehicles are being parked in public places and it is not always possible to monitor these vehicles manually. In this work we have a solution to not only to prevent the theft but also backup security to recover stolen vehicles. This system is based on stopping and starting the fuel pump from working when sending a code to the cell chip in the control unit located in the vehicle and other applications to recover the stolen vehicle User gets notified when car starts moving from still position and user is able to track the car and lock fuel injection and run different security applications. The successful implementation in the system's hardware and software components contribute in controlling the vehicle gradually during theft.

Keywords : GSM-GPS, Latitude-longitude, ECU, Navigation.

1. INTRODUCTION

Vehicle Security is most essential to prevent it from theft. Nowadays GPS and GPS is now most commonly used technique for various applications. This technology can be used effectively for the vehicle tracking and monitoring its position globally. This would be a versatile tool to prevent the theft of a vehicle. It has been reported that vehicle theft is increasing day by day. Unfortunately most of the vehicles do not have GPS system with it. So here to provide a low cost solution to this is also a challenge. This research work focuses the effective and optimized solution to prevent the vehicle theft. This research work has been carried out in two parts, first part is to track the vehicle position that has been stolen and send a notification to the owner. In second part we have focused to control the vehicle ECU via GSM. Mainly the vehicle should be locked electronically that means user should be able to lock the engine and stop the ignition. Here along with Engine locking few more features have been added such as door-locking, activation horn of a vehicle to attract the people surrounding to prevent vehicle theft more effectively. To prevent the misuse of this application every command has been given a password protection. User can set the instruction passcode as per the choice and these can be reset again as per user choice.

Vehicle Engine

Vehicle engine where the combustion of fuel occurs and the mechanical power is produced. And here engine can be ignited and its partially controlled by the ECU. Controlling factors are mainly as to maintain fuel to air ratio for combustion. So this fuel control valve is controlled by the one of the ECU. This ECU is now interfaced with ECU directly.

* Manipal Institute of Technology, Manipal University, India *E-Mail: sravani.vemulapalli@gmail.com*

ECU (Electronic Control Unit)

ECU acts as a computer for any vehicle. Depending on the number of ECUs present in vehicle its functionality can be accessed. More the ECU more is the electronic control and more the electronic control more is the convenience in vehicle functionality control. In most of the vehicles ECUs communicates with other ECU through CAN protocol. ECU gives vehicle smart control and gives ease of controlling the various parts of the Vehicle. ECUs plays important role in vehicle diagnostics as well. In short ECUs are like electronic brain for Vehicle.

Fuel Pump

Fuel pump is responsilble here to supply exact amount of fuel to engine and this has direct control via key of vehicle.

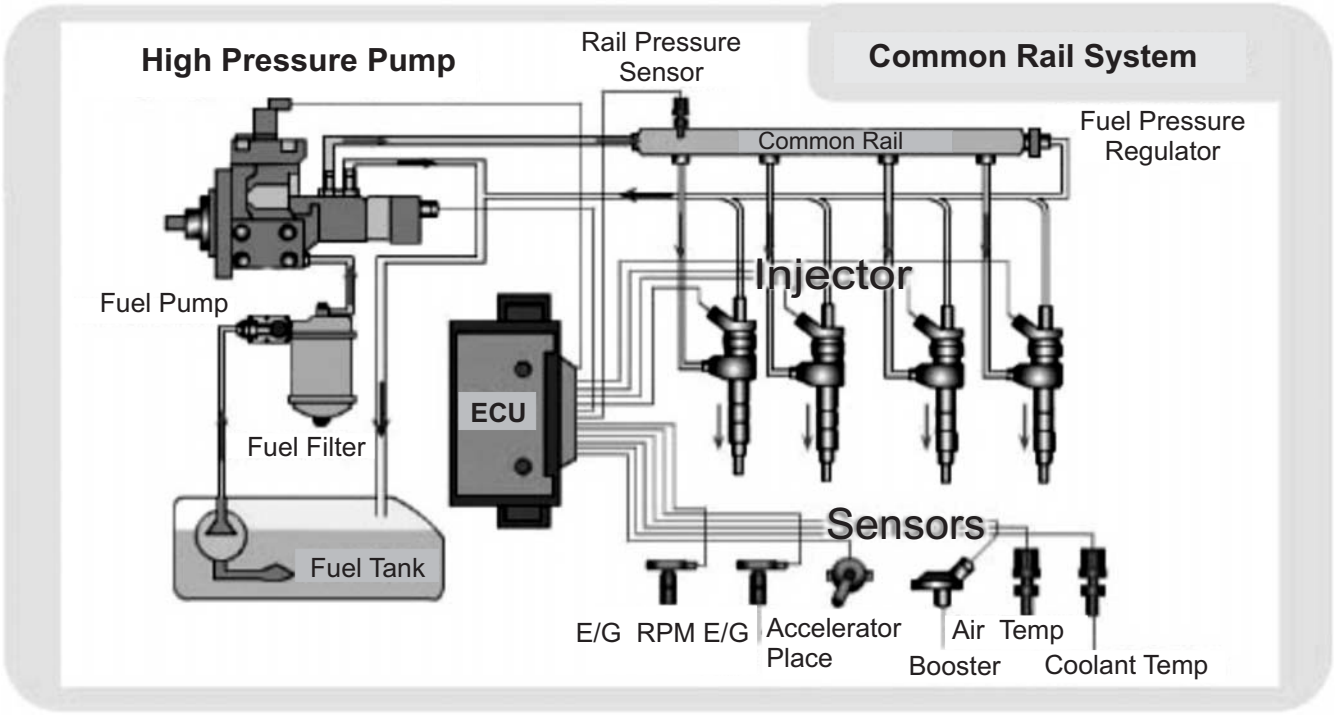


Figure 1: Fuel pump, fuel is drawn into the pump through an inlet tube and mesh filter

2. PROPOSED ALGORITHM WITH PASSCODE PROTECTION

We start the designing process of the system, using microcontroller as a control unit. It's more suitable, because it does not need a separate programmer device, which mean easier and faster in programming, this makes it superior to the Atmega328 microcontroller. The work principle of this system is when a text message "P9Z#000#0" is sent from any mobile number to the number of the GSM modem, the message is received by this modem, and later on, it will be sent to the Arduino which deals with the signal for the purpose of stopping the fuel pump from work through the relay, therefore stopping the fuel delivery to the injectors.

In addition, modem will start getting coordinates in degrees ,minutes, seconds and convert it to decimal degrees and will put the coordinates in a google maps link that will be sent as a text message along with conformation "Car Stopped" will be sent to the registered number to ensure process . This process takes only ten seconds from the moment of sending the message until the pump is stopped and about 30 to 60 sec to get google maps link. After the pump is stopped from work, the vehicle becomes slow because the fuel cannot reach the injectors, after a while, the pump will be stopped. Similarly windscreen paint, hidden camera, Alarm can be started by sending passcode "P9Z#011#1" and user will conformation text of the respected functions

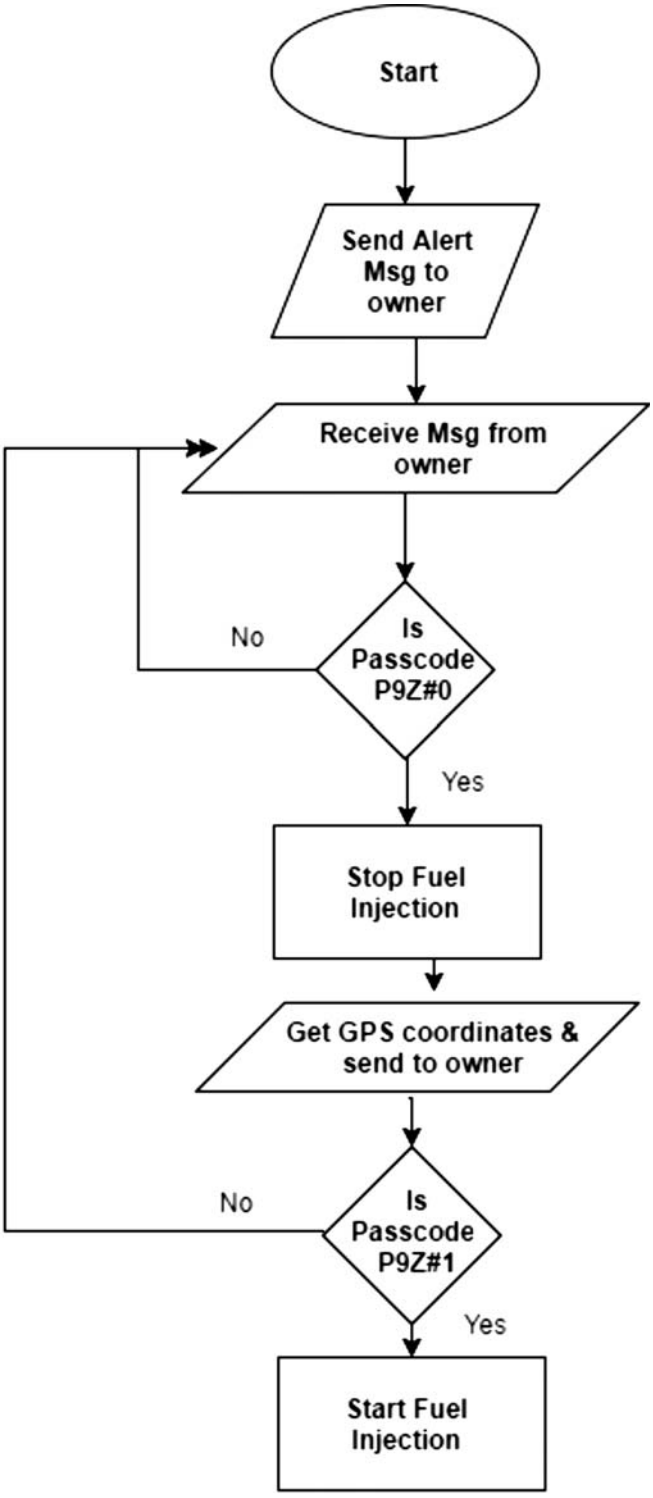


Figure 2: Flow Chart of the Proposed System

When we want to switch on the pump again, we should send text message “P9Z #1” to the same number. Consequently, the pump works again, and a message “Car Started” will be sent to registered number to ensure process. The driver has the ability to control the speed of the vehicle now.

3. BLOCK DIAGRAM OF PROPOSED ELECTRONIC HARDWARE SYSTEM

The flow chart of the proposed system can appear in figure 3 . Here various vehicle parts are controlled via GSM commands. For extra security to capture the surrounding a hidden camera is also proposed in the system.

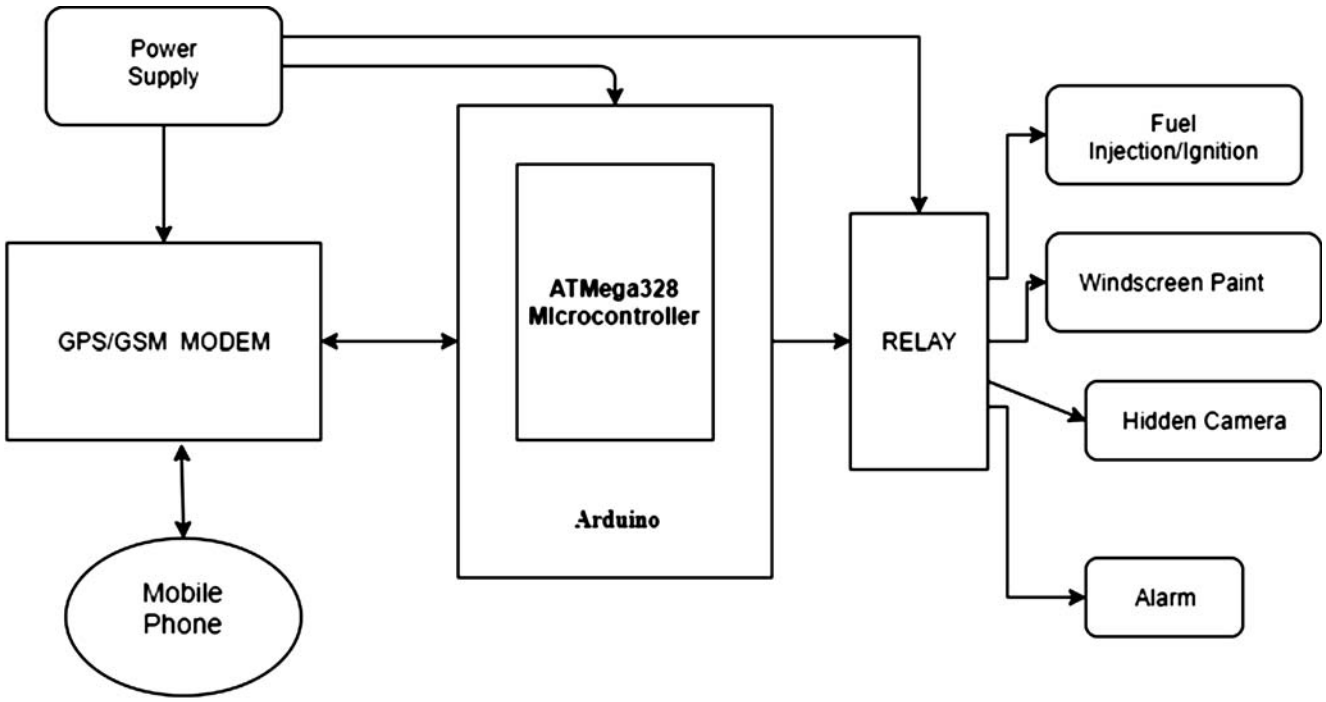


Figure 3: Block diagram of the proposed electronic hardware system

GSM, Arduino and relay. In addition, there are electric resistances, capacitors, and oscillator, most of which are located in the Arduino unit. There is no need to use a transistor in the final circuit because the type of relay used is low power relay, so we don't need to the transistor's function of amplifying signals or its mechanical control function.

4. EXPERIMENTAL RESULTS

Initially when the modem is turned on, it sends a conformation text message to the registered mobile as "CAR security is now Active !!" as shown in figure 4.This indicates that modem is constantly watching your car movement and will send message when car changes its *x, y, z* coordinates.

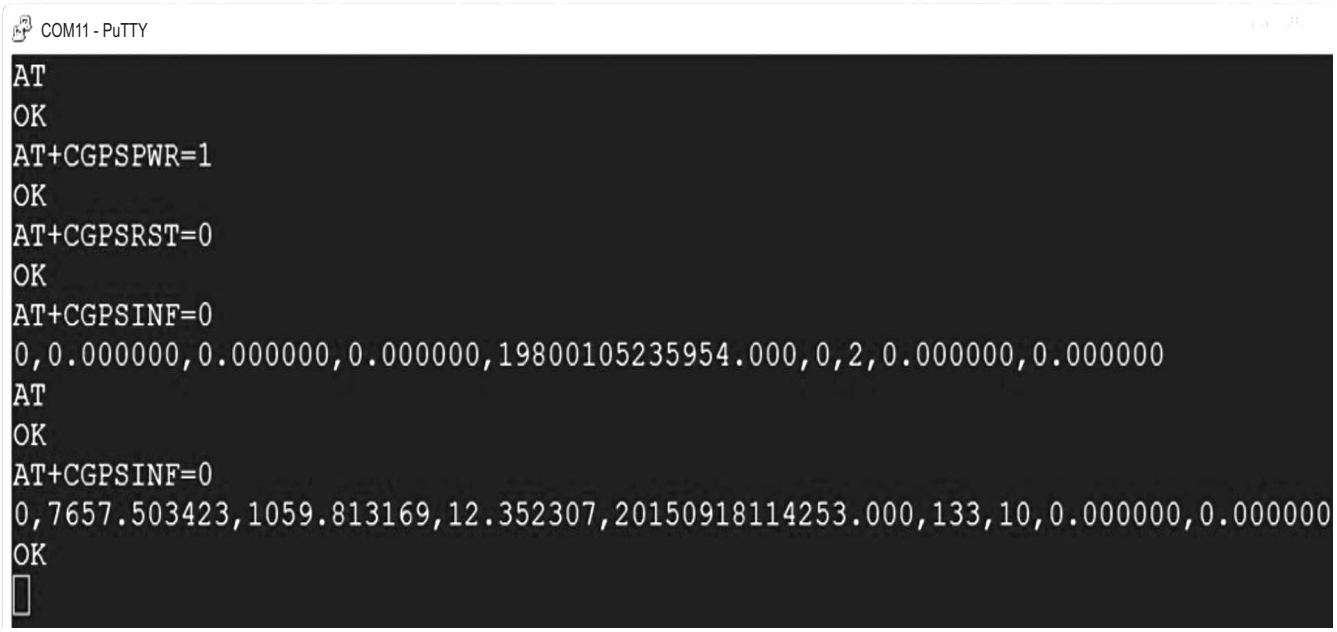


Figure 4: Testing of GPS module to get the GPS coordinates in DD.MM.ssssss N/E, S/W

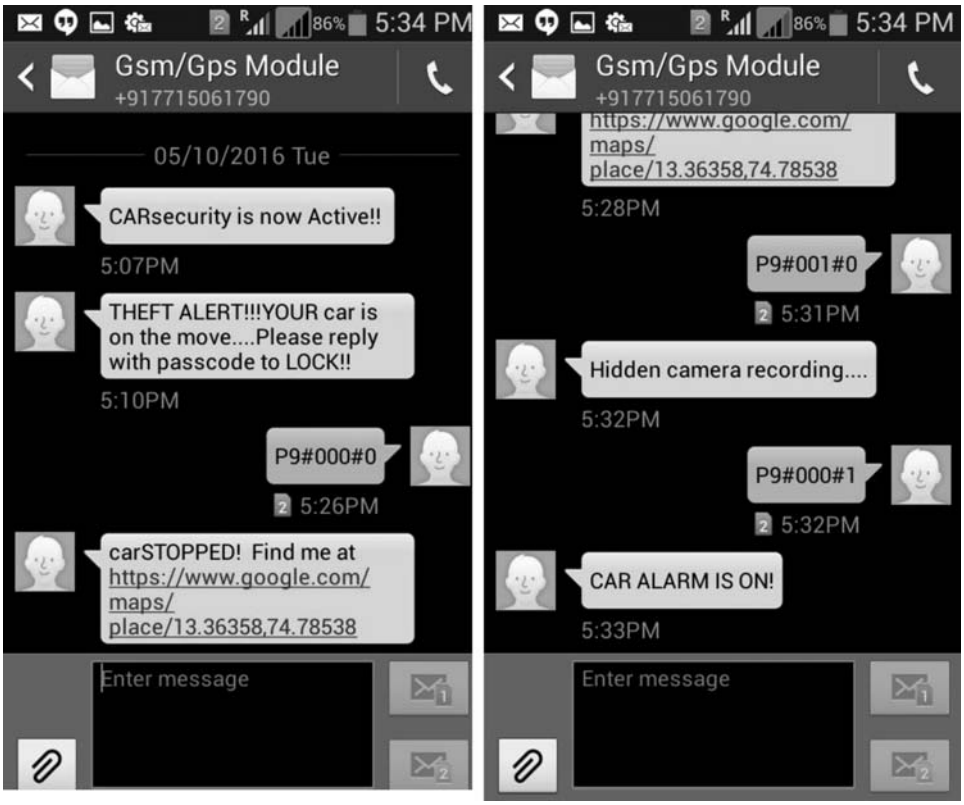
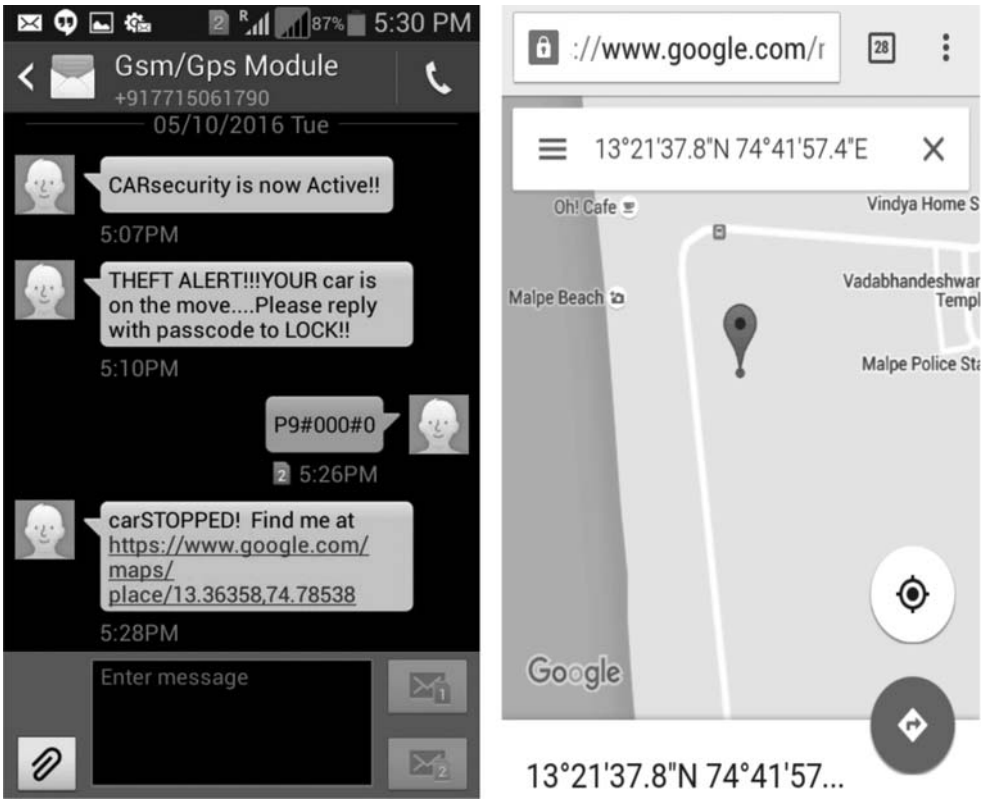


Figure 5: Screenshot of Text message received to the user

As soon as the accelerometer value exceeds certain limit value, GSM modem it sends an alert message to lock the car's injection, replying with passcode to the registered mobile number as shown in fig 5.



(*a*) (*b*)

Figure 6: (*a*) Screenshot of mobile showing communication with Module and calculated GPS link (*b*) Screenshot showing Gps google maps link as a text message

User then replies to modem with a passcode to turn ON the Alarm, Windscreen paint and hidden camera to start recording. Once the owner reaches the car's location with the help of google maps, user can turn the Fuel pump relay on and turn off Alarm, Windscreen paint and hidden camera.

When text message sent as P9#000#C0D , it sends you current GPS location of the car and this location will be sent as a google maps link any number of times user wishes to know to location of the vehicle. When user reaches to the car, fuel ignition can be started again by sending passcode as P9#100#0 which also turns off other anti-theft applications which were currently running. Also wrong passcode does not affect the car applications for security levels. User whenever leaves the vehicle should switch ON the module to track and lock the vehicle.

5. CONCLUSION

In this report we have shown an idea or so call it a modern version that helps at a great extent to stop the theft of vehicles by your own, without depending on the other sources which is greatly required in today's world. It is really an efficient and easy way to protect the safety of your vehicles to a great extent. The hardware used is also small and requiring less space, thus making it a useful tool to keep hidden from the intruders inside your vehicle. As the power required operating the hardware is less it is much more efficient to make it run for a very long time. It can also be used to ensure the safety of other threat detected things, which is not possible to stop physically being present there. Thus overall it's a very efficient and safe way to secure your vehicle when you are not around it. It has been enhanced to locate the stolen vehicle by adding GPS tracker. It is also flexible enough to be used by any microcontroller based on the requirement. The successful implementation in the system's hardware and software components contribute in controlling the vehicle gradually during theft. The flexibility of the system helps locking and tracking of vehicle safely, and minimizes any damage.

Stopping the vehicle refueling (cut off fuel, changing pump voltage) is the optimum solution to control the vehicle, as it ensures a gradual stop after a short period of time that is equivalent of decreasing the speed of the vehicle for a distance which does not exceed 1 km.

6. REFERENCES

1. Chen, H., Chiang, Y. Chang, F.and H. Wang, H. (2010). Toward Real-Time Precise Point Positioning: Differential GPS Based on IGS Ultra Rapid Product SICE Annual Conference, The Grand Hotel, Taipei, Taiwan August 18-21.
2. Asaad M. J. Al-Hindawi and Ibraheem Talib, "Experimentally Evaluation of GPS/GSM Based System Design", Journal of Electronic Systems Volume 2 Number 2 June 2012
3. Kunal Maurya , Mandeep Singh and Neelu Jain, "Real Time Vehicle Tracking System using GSM and GPS Technology-An Anti-theft Tracking System," International Journal of Electronics and Computer Science Engineering. ISSN 2277- 1956/V1N3-1103-1107
4. Ganesh, G.S.P. ; Balaji, B. and Varadhan, T.A.S.' "Anti-theft tracking system for automobiles (AutoGSM)" Anti-Counterfeiting, Security and Identification (ASID), 2011 IEEE International Conference, June 2011, pg.no17 – 19, 24-26
5. R.Ramani, S.Valarmathy, N.SuthanthiraVanitha, S.Selvaraju, M.Thiruppathi and R.Thangam,"Vehicle Tracking and Locking System Based on GSM and GPS", IJISA, vol.5, 2013 no.9, pg.no86-93
6. Chen Peijiang and Jiang Xuehua, "Design and Implementation of Remote monitoring system based on GSM," vol.42,2008, pg.no167-175