

# GPS AND GSM based Highway Monitoring and Control

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**Abstract**— In developed India information technology and electronics engineering are on fast track. Now a day's digital electronics has become a very important part of new developed technologies. Today practically it is impossible to avoid interaction with digital equipments. The world has gone digital technology and so India has also. Development of GSM technology has made business and industry more easy and profitable. This system must be provides monitoring and controlling system for inter-cities transportation vehicle such as autos and buses. The digital electronics and GSM technologies will create the digital environment and digital homes and also make digital INDIA. This system uses GPS and GSM technologies. As thus GPS technologies having high range of frequencies, the user can get the information as fast. The paper includes the hardware part which include of GPS, GSM, Atmega microcontroller 89C51, level converter MAX 232, 16x2 LCD and software part. As the you send SMS through GSM as a status, the GSM will trigger and on the signal to the micro-controller circuit and it will identify the location using GPS and send a particular text message via GSM to the receiving members i.e. friend, family etc.

**Key words:** GPS Modem, GSM Modem, Microcontroller, MAX 232

## I. INTRODUCTION

In last few years INDIA has developed at such a high performance that many companies have strongly verified themselves here. The development of satellite communication technology is easy to find out the vehicle location. GPS used in cars, ambulances, fleets and police vehicles are common sides on the roads of developed countries. All new technology support tracking of theft vehicle station. This system has Global Positioning System (GPS) which can receive the coordinates from the satellites calculate other type of information. Tracking system is very important in developed digital world. The system is microcontroller based that composed of a global positioning system (GPS) and global system for mobile communication (GSM). This project used only one GPS device and a two way communication process is executed using a GSM modem. GSM modem, provided with a SIM card uses the same communication process as we are using in regular phone.

In short if theft vehicle is identified the system send SMS to the vehicle owner. After that vehicle owner sends the SMS to the microcontroller. The system is not limited to find the location of the target but also calculates the distance travelled between two stations. The use of this system is to design an integrate a new system which is integrated GPS and GSM to provide following feature: a)Position information, b)Real time tracking using SMS, C)Track car driver activity.

## II. LITERATURE REVIEW

In today's modern and digital lifestyle a lot of research done on vehicle tracking system along with some characterization such as car locking system, face detection of driver, network tracking and electronic alarm. This paper describes antitheft system using GSM and GPS modem also continuous monitoring of desired vehicle. GSM operates in frequency range of 900 MHz to 1.9MHz. The related electronic device is installed in a vehicle to enable the owner for tracking of vehicle place.

Hu Jian-ming; Li Jie; Li Guang-Hui describes an automobile anti-theft system using GSM and GPS module. The system is developed using high speed mixed type single-chip C8051F120 and stolen automobile is detected by the use of vibration sensor. The system remains in contact with automobile owner through the GSM module, for the safety and reliability of automobile.

Fleischer, P.B.; Nelson et al describes development and deployment of GPS (Global Positioning System)/GSM (Global System for Mobile Communications) based Vehicle Tracking and Alert System. This system allows inter-city transport companies to track their vehicles in real-time and provides security from armed robbery and accident occurrences.

Chen Peijiang, Jiang Xuehua, "Design and Implementation of Remote monitoring system based on GSM," vol.42, pp.167-175. 2008. In the remote monitoring system based on SMS and GSM was implemented. Based on the total design of the system, the hardware and software designed. In this paper, the GSM network is a medium for transmitting the remote signal. This includes two parts that are the monitoring center and the remote monitoring station. The monitoring centers consist of a computer and communication module of GSM. The software-monitoring center and the remote monitoring station implemented by using VB. The result of this demonstration shows that the system can watch and control the remote communication between the monitoring center and the remote monitoring station.

Prof. Zing Xu et al, it is discusses a vehicle to vehicle Location-Based Broadcast communication protocol, in which each vehicle generates emergency messages at a constant rate. Message forwarding can help warning message reach vehicles beyond the radio transmission range. The authors propose a multi-hop broadcast protocol based on slot reservation MAC. Motion properties of vehicles are used to help with message relay. Two protocols to reduce the amount of forwarding messages were proposed

### III. BLOCK DIAGRAM

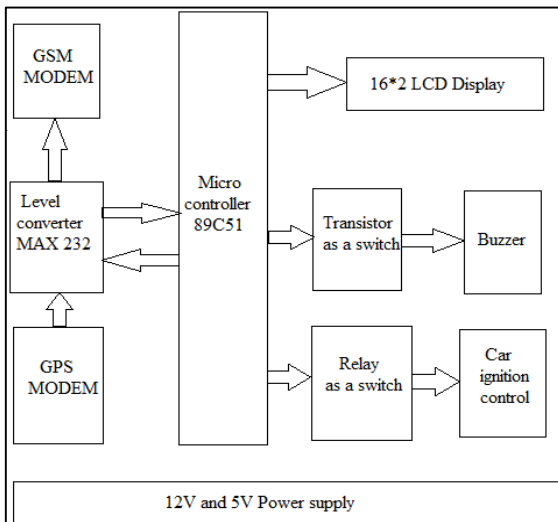


Fig. 1: Block diagram of GPS and GSM based highway monitoring and control.

#### A. Hardware Specification

- 1) Microcontroller AT 89C51
- 2) LCD Display
- 3) Transistor as a switch
- 4) Buzzer
- 5) Power supply
- 6) Level converter
- 7) GSM Modem
- 8) GPS Modem
- 9) Ignition control

#### B. Working Principle

The system includes GSM modem that continuously tracks the vehicle location in the form of latitude and longitude. The data is send over to a microcontroller interfaced to a GSM modem. The microcontroller act as the controlling head of the system. It receives the data from GPS modem and constantly send SMS through the GSM modem from time to time as per the interval limit set by user.

### IV. SYSTEM ARCHITECTURE

#### A. GPS Modem



Fig. 2: GPS

The Global Positioning System (GPS) is a worldwide, satellite-based, radio navigation system. That will give you the exact location of vehicles, no matter where they are, what time it is, or what the weather is like. A total of 24 satellites orbit the Earth, monitored continuously by earth stations. The satellites transmit signals that can be detected by GPS receivers located in your vehicles and used to determine their position with great accuracy.

#### 1) How does work?

Each GPS satellite transmits radio signals that enable the GPS receivers in your vehicle to count the satellite's location, as well as the distance between satellite and your vehicles. The receivers then use these measurements to calculate where your vehicles are located on Earth and calculations latitude and longitude. A receiver needs signals from three GPS satellites to exact your vehicle's position.

#### B. GSM Modem

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data by a fixed telephone line while a wireless modem sends and receives data by radio waves. Like a GSM mobile phone, GSM modem use a SIM card from a wireless network. A GSM modem can be an external unit or a PCMCIA card (i.e. PC Card). An external GSM modem is connected to a PC by a serial cable, a USB cable, Bluetooth or Infrared. Like a GSM mobile phone, GSM modem use a SIM card from a wireless network. PC's use AT commands to control a GSM modems. You can use a GSM modem just like a have compatible modem. GSM modems support an expand set of AT commands. These expanded AT commands are defined in the GSM standards.



Fig. 3: GSM

#### C. Micro-controller 89C51

It is a low-power, high-performance CMOS 8-bit micro-computer having 4K bytes of Flash Programmable and Erasable Read Only Memory (PEROM). The device is manufactured by Atmel's high-density nonvolatile memory technology and is compatible with the MCS-51 instruction set and pin-out. The on-chip Flash allows the program memory to be reprogrammed in-system or through a conventional nonvolatile memory programmer. By adding a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C51 is a powerful microcomputer, which provides a highly flexible and low cost, that is so many embedded control applications.

#### D. Level converter MAX 232

It is a level converter to use for GSM, GPS and microcontroller to communicate serially and interfacing between them.

#### E. 16x2 LCD

A 16x2 LCD is used for displaying position values. A 9v battery is used to power up the circuit. When we send command to LCD these command go to command register and are processed their. Data which we send to LCD can be any alphabet, digit or ASCII character.



Fig. 4: LCD

#### F. Buzzer

It is output device. When there is SMS received then Buzzer turns ON. Buzzer will take the attraction from other vehicles passing through it.

#### G. Transistor as a Switch

Output of micro-controller is not enough to drive the buzzer directly. Therefore to drive the buzzer we are using transistor as switch.

#### H. Relay Driver

It is an output device. Output of microcontroller is not enough to drive the relay directly.

#### I. Car Ignition Control

We are using ignition control as an output. Controlling is takes place with the help of relays.

#### J. Power supply

For getting +5 volts supply, the + 9 volts supply from power supply output is taken. And it is given to 7805. The minimum input to 7805 is +7 Vdc and Maximum input is + 35 vdc. And we are giving + 9 Vdc as input to the 7805. Therefore the output of the 7805 is constant regulated +5 Vdc.

### V. MODEL VIEW

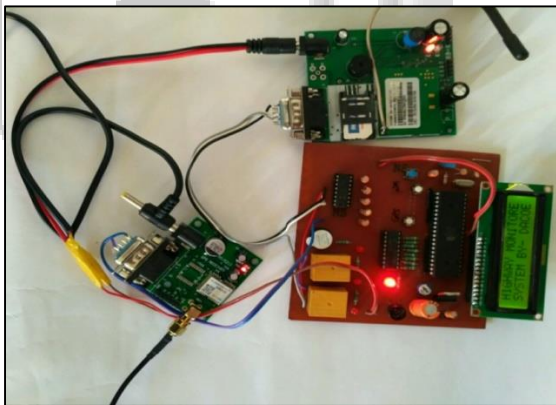


Fig. 5: Model View

### VI. APPLICATION

- 1) You can locate your theft vehicle easily using your mobile without any extra cost.
- 2) It can be used for trucks carrying to valuable materials, to keep track of the status of delivery and location of the truck at all times.
- 3) You can easily install in any vehicle such as cars, boats, trucks, trains and motorbikes.
- 4) The device is used in cops department and fire service.

### VII. CONCLUSION

The project is all about controlling theft of a vehicle. The system is about making vehicle more secure by the use of

GPS, GSM technology and a web application. It can also be beneficial for:

- 1) This system user friendly, easily installable and easily accessible.
- 2) This system is not limited to find out the location but also calculate the distance between two stations.
- 3) With the help of ignition control we can control speed of the vehicle.

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