Vehicle Security System Based on GSM Technology

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***Abstract*:** The aim of the vehicle security system is to use the wireless communication technology inventively for the automotive environments. The main focus of this project is to protect the thieving of vehicle. This is done with the help of GSM modem and circuit which consists of AT mega 16 microcontroller, relay and step down transformer. When someone tries to filch the car then microcontroller gets an interrupt and orders GSM Modem to send the message & the owner is made aware that someone is trying to pilfer his vehicle. The owner later can SMS to the GSM modem to 'stop the engine' and the vehicle is locked.

Keywords: GSM Modem, Step down transformer, AT mega16 microcontroller, European Conference of Postal and Telecommunications Administrations, Wireless communication, Security

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I. INTRODUCTION

Vehicle Security System is based on GSM module. A proper study and implementation of this project can be used for various applications. It is a classic example of wireless communications. The wireless communications industry is one of the fastest growing industries. Over the past few years, there has been an explosive increase in the theft of vehicles. With the help of study of GSM, theft intimation was very first invented in Spain and United Kingdom. According to the research, the highest rate of theft of vehicles was found in UK. The statistics has been found for theft intimation for vehicles. From Times of India, we found that vehicles are been stolen in India in every 23 minutes. So, crime branch and national bureau of crime has brought the theft intimation format in year 2001. But it was based on only buzzers. Now with the help of GSM modem, theft can be prevented at a high security based system. There is no problem when your car is in your vicinity. By using the detection of theft using car buzzer it's easy to protect your vehicle from getting theft. But when your car is far away from you the buzzer detection might not be that beneficial. Here more efficient protection method is required to protect your vehicle. This is the reason for creation of Vehicle Security system. This system uses a GSM modem. It provides the optimum level of safety to your vehicle when it's not in your vicinity. By using Vehicle Security you can protect your vehicle positioned miles away from you. As system uses GSM technology so, just by sending a sms u can control the ignition of your vehicle. The GSM stands for Global System for Mobile Communication. In 1981, work began to develop a European standard for digital cellular voice telephony when the European Conference of Postal and Telecommunications Administrations (CEPT) created the Group Special Mobile committee and later provided a permanent technical support group based in Paris.EU rules were passed to make GSM a mandatory standard. In 1987 Europe produced the very first agreed GSM Technical Specification in February). By 2005, GSM networks accounted for more than 75% of the worldwide cellular network market, serving 1.5 billion subscribers.

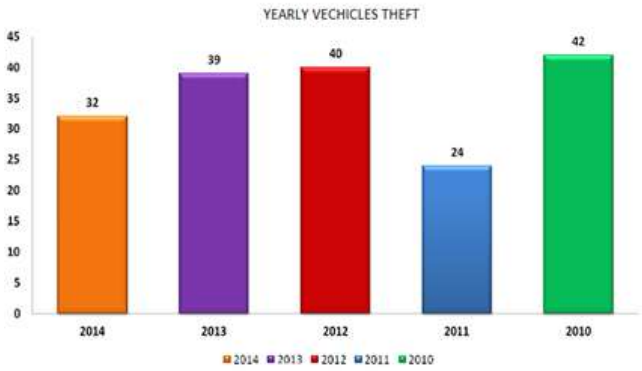

figure 1: aryl Vehicle Theft Chart.

II. SYSTEM OPERATING PROCESS

The figure 2 represents the working of Vehicle Security system. Microcontroller and Gsm modem are the key necessities of the system. The microcontroller used in this schematic is AT mega 16 Microcontroller. The microcontroller controls the entire system. GSM modem is used for communication purpose. The microcontroller is connected to the ignition system of the car by using relay. Whenever the ignition system of the car starts the microcontroller detects it and gives the signal to the GSM modem to send the message to the owner of the vehicle. When the owner receives the message if he reply's with correct code word then only the vehicle ignition system will get turn on or off respectively. If owner replies with the code word for keeping the ignition system on then the ignition system will remain on and relay will now stop sending signal

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3540 - 3542

to microprocessor. If owner replies with the code word to turn off the ignition system the microcontroller will process the signal and turn off the ignition system of the vehicle will stop. In this system the GSM modem plays a vital role, it receives the message from the owner then processes it and then depending upon the code word send by the owner it gives the instruction to the microcontroller whether to keep the ignition system on or turn it off. For receiving and sending message from GSM modem it consists of Max232 IC. This IC is used for serial communication. It controls the communication between the system and the owner. As this system is based on wireless communication so it provides the highest level of safety than any other system.

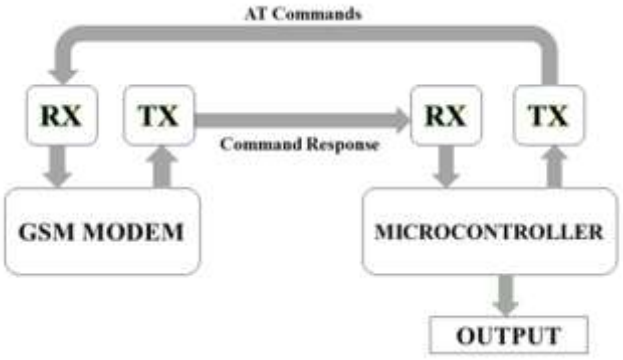

Figure 2: Project Schematic

A. Why Microcontroller AT Mega 16?

ATmega16 is an 8-bit high performance microcontroller of Atmel's Mega AVR family. It is high Performance, Low Power Atmel® AVR® 8-bit Microcontroller. ATmega16 is a 40 pin microcontroller. There are 32 I/O (input/output) lines which are divided into four 8-bit ports designated as PORTA, PORTB, PORTC and PORTD. It's operating voltage range is from 2.7V - 5.5V.It is faster as compared to other microcontroller. It has Advanced RISC Architecture. It has fully Static Operation. It has 131 powerful instructions. Most of the instructions execute in one machine cycle. Atmega16 can work on a maximum frequency of 16MHz. It also has various in-built peripherals like USART, ADC, SPI, JTAG etc. Each I/O pin has an alternative task related to in-built peripherals. ATmega16 has 16 KB programmable flash memory, static RAM of 1 KB and EEPROM of 512 Bytes. It also has on chip debug interface facility. So, it can be easily troubles hooted and repaired if required the microcontroller has General Purpose Register of 32 × 8 bit. It has Throughput up to 1 MIPS per MHz. Write & Erase cycles up to 10,000 Flash & 100,000 EEPROM. Data can be maintained up to 20 years at 85°C/ 100 years at 25°C. It consists of Optional Boot Code Section with Independent Lock Bits. In-System Programming by On-chip Boot Program. For keeping the Data Secure programming lock is provided for Flash Program and EEPROM.

At mega 16 consists of one 12-bit High Speed PSC (Power Stage Controller). The Power Stage Controller is a special timer comprising of 3 modules. This modules are important factors for driving the power stage of an equipment or a board. The 3 PSC modules appear similar to PWM generator with two complementary outputs. The PSC has 3 inputs which enables self-running PSC mode without the need of embedded software action and it can stop the waveform generation. The PSC can give the clock speed up to 64 MHz . So it can generate high speed PWM with a high resolution. AT mega 16 also has an auto stop function in case of emergency event There are one 8-bit & one 16- bit General purpose Timer & Counter with separate prescaler , compare mode and capture mode. It has 10-bit ADC & DAC respectively. There are four analog comparators with variable threshold detection. It also has high Precision Crystal Oscillator for CAN Operations (16MHz).There is on-chip temperature Sensor. On-chip programmable Watchdog Timer with separate oscillator. Due to the above specification and advantages we have used this microcontroller in the development of the system. So, it makes the system more effective and proficient.

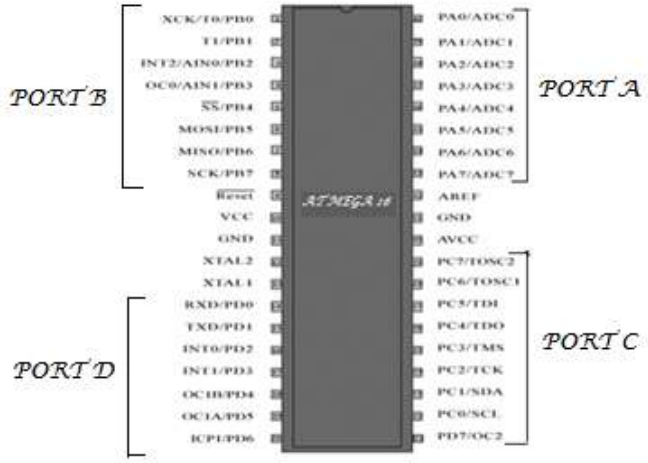

Figure 3: AT MEGA 16 PIN DIAGRAM

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B. Gsm Modem

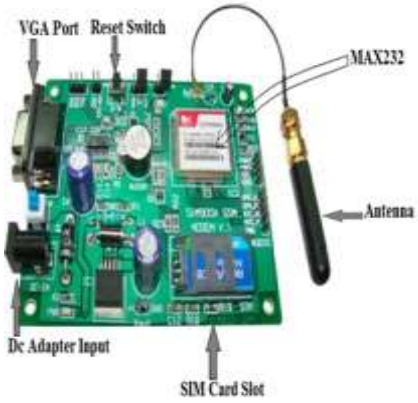

FIGURE 4: Gsm Modem

The GSM modem used in this system is SIM900 module. SIM900 is a Quad-band GSM/GPRS module. It requires minimum power supply of 9v to 12v. There are on-board power on and network indicator. It also has on-board indicator LED & buzzer for call indication It consists of powerful single-chip processor incorporating AMR926EJ-S core. It has SMT type suit for customer application. It has sturdy embedded TCP/IP protocol stack**.** The GSM modem consists of on-board SIM card slot. It can accept the SIM of any network provider. The GSM modem is programmed using hyper terminal software. The GSM modem only accepts the AT commands rather than the instructions used in normal programming. The AT commands are basically attention commands and they are requisite for programming any modem. The AT commands are derived from Hayes command set. Hayes command set was developed in 1977 to control the 300-baud Hayes smart modem. Various AT commands are sent to a cellular modem to execute different actions. Some of the AT commands used are

AT+CMGF= To set modem in message mode.

AT+CMGS= "mobile no" {for entering owner's mobile no.}.

AT+CMGR= "address" {used to read the message}.

AT+CMGL= Reading all messages positioned at different address.

III. CONCLUSION & FUTURE WORK

Vehicle security system is key requirement in large cities. Today vehicle thieving is increasing; with this system it can be controlled. The vehicle can be turned off , only with a simple SMS. This setup can be made more interactive by adding a display to show some basic information about the vehicle and also add emergency numbers which can be used in case of emergency.

The System can be further enhanced by providing the GPS support. It will make the system more effective as owner can also stop his vehicle from getting stolen and even trace it if the vehicle has travelled some miles before being stopped.

The concept of this project can be used in multiple domains.

Health care: To detect the accidents by using the advance pressure sensors in the vehicle. The pressure sensors will enable the GSM based system and send the SMS to the user. The user may be any relative of the own the car.

Home security: GSM based our project circuit become more advance by adding false password detection system to prevent home safe from robbery. If any other person will try to access your digital safe by entering wrong password the user will get the SMS. By replying to the SMS the user can prevent the safe from robbery and can alert the surrounding people by activating buzzer. It can also be for Fire detection by using Temperature sensors to make advance Fire alarm or Fire detection systems.

Home automation: It can also be use for activation of Air conditioner, controlling of switches or other house hold purposes.

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