GSM based Vehicle Theft Control System

V.N.SIREESHA[1], N.K.NEELIMA[2], M.VASUDEVA KIRAN[3], M.SAI VENKAT SRINIVAS[4],
D.PRASANTH KUMAR[5]

[1]*Assistant Professor, Department of Electronics and Communication Engineering,
Satya Institute of Technology and Management-GVP, Vizianagaram.*
[2,3,4,5] *Final year students, Department of Electronics and Communication Engineering,
Satya Institute of Technology and Management-GVP, Vizianagaram.*

Abstract - This technical paper explains how to control Vehicle theft and it could be easily developed between a mobile phone and microcontroller using GSM (Global System for Mobile Communications) modem. The main concept in designing GSM based vehicle theft control system is introducing mobile communications into embedded systems. In this work, the entire system is hidden inside the vehicle until unless authorized one comes and giving security code to that system. This system avoids accessing of vehicles other than users. A keypad and display is provided inside the vehicle. Using that we can switch on and switch off the vehicle. The GSM based vehicle theft control system is a security system that is used for security applications as well. When we switch on the vehicle, the OTP is generated to owner mobile number by using GSM. If the entered password is correct then the vehicle will start, otherwise the owner of the vehicle will get an alert message i.e., someone is trying to access the vehicle. The information about the vehicle can also be displayed on LCD. Here, a normal lock(7-bit pin) is used which is known to the user only. The technology used to implement GSM based vehicle theft control system is Arduino UNO microcontroller board based on microchip ATmega328P microcontroller.

Keywords - GSM modem, LCD, Keypad, OTP, Arduino UNO, microchip ATmega328P.

I.   INTRODUCTION

In India, according to vehicle theft, burglary census from 2013 the vehicle thefts are increasing 8.47% on an average, for this situation the technology to avoid the theft of the vehicle must also be increased, Microcontroller based real time vehicle theft detection and prevention system provide solution for this problem. With the advancement in the technology we have solution for these insecure problems with the help of this project. The proposed system that functions as a security system have been designed that uses two main underlying concepts. These are password and GSM (Global System for Mobile Communications). The GSM is a globally accepted standard for cellular communication. The vehicle owner uses SIM inserted with in his mobile phone to send messages to GSM modem which is a part of the vehicle theft prevention system. This system is used for any vehicle like bus, bikes or cars and it is cost effective.

II.   LITERATURE REVIEW

In the beginning of 1980s several contrasting systems for mobile communications were advanced in Europe. In 1982 a number of European countries constructed a new standardization organization called "Group Special Mobil" (GSM). For increasing the lack of frequencies in the radio telephone services with the development of cellular networks in the 1970s which in turn lead to AMPS(Advanced Mobile Phone System) where the transmission were analog based. This was known to be the first generation in cellular networks. The second generation in cellular networks was based on digital transmission and was called with GSM(Global System for Mobile Communications). The GSM is a fully digital system, allowing both speech and data services. Today GSM is the largest system for mobile communications in the world, and exist on all countries.

III.   SYSTEM DESIGN

The block diagram of the proposed system is shown below. It consists of power supply unit, Arduino UNO, LCD display, GSM modem, DC motor, Motor driver, Switch, Keypad, buzzer. The brief description of each unit is explained as follows.

The main function of the system described below:
➢ Sending message to the owner of the vehicle by using GSM.
➢ For receiving the text message we need to interface the mobile phone with GSM modem.
➢ For developing some of GSM based applications we need to have some common peripherals including GSM modem, SIM, ATmega328P micro controller, LCD (Liquid Crystal Display), power supply.

The design of the project can be divided into two parts.

➢ Hardware implementation
➢ Software implementation

Hardware implementation deals in drawing the schematic on the plane paper according to the application, testing the design over the breadboard using various IC's.

The firmware parts deals in programming the micro controller so that it can control the operation of IC's used in

the implementation. In the present work, we have used Orcad design software for PCB circuit design and the Arduino IDE software development tool to write and compile the source code.

The block diagram discusses about the required components of the design is explained below.
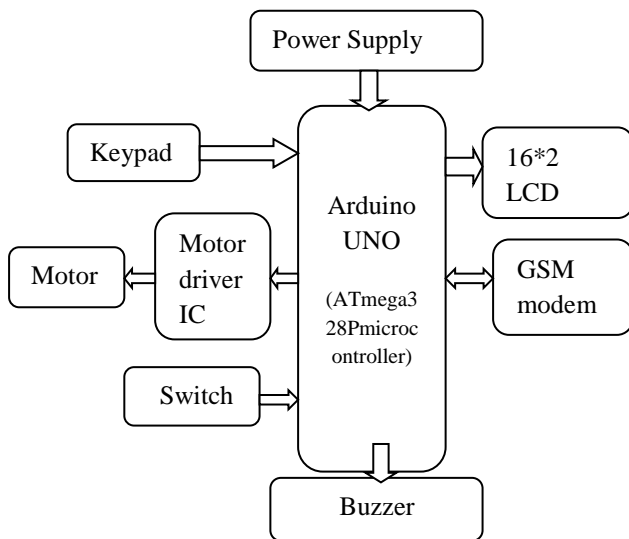

Fig 1: Block diagram of vehicle theft control system

a) ARDUINO UNO BOARD:

Arduino UNO board uses ATmega328Micro-controller. It contains 14 digital input output pins, reset button, an USB and power jack. Uno means one in Italian language which means Arduino 1.0 series. The Uno series is the latest version of USB Arduino boards. This Arduino board can be powered with both the USB connection as well as external power source. It selects the power source automatically. The technical specifications of the Arduino board are as follows:

- ➤ **Microcontroller: ATmega328P**
- ➤ **Operating voltage: 5V**
- ➤ **Input voltage (recommended): 7-12V**
- ➤ **Input voltage (limits): 6-20V**
- ➤ **Digital I/O pins: 14**
- ➤ **Analog Input pins: 6**
- ➤ **DC current per I/O pin: 40mA**
- ➤ **DC current for 3.3V: 50mA**
- ➤ **Flash memory: 32KB**
- ➤ **SRAM: 2KB**
- ➤ **EEPROM: 1KB**
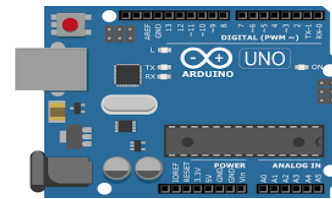- ➤ **Clock Speed: 16MHz**

Fig 2: Arduino Uno board

b) POWER SUPPLY:

Every electronic system, whether an entertainment gadget or a test and measurement equipment, requires one or more than one DC voltages for its operation. Power supply does the job of providing required DC voltages from available AC mains operated systems and DC input in case of portable systems.
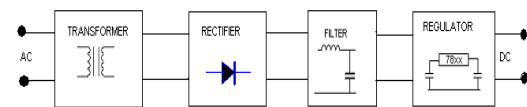

Fig 3: Power Supply Circuit

Transformer:

Usually, DC voltages are required to operate various electronic equipment and these voltages are 5v, 9v or 12v, but these voltages cannot be obtained directly. Thus a.c input available at the mains supply i.e., 230V is to be brought down to required voltage level.

Rectifier:

It converts A.C. into pulsating D.C. In this project, a bridge rectifier is used because of its merits like good stability and full wave rectification.

Filter:

It removes the ripples from the output of rectifier and smoothens the D.C. output received from the filter is constant until the mains voltage and load is maintained constant.

Voltage Regulator:

A voltage regulator is an electrical regulator designed to automatically maintain a constant voltage level.

c) LIQUID CRYSTAL DISPLAY:

Liquid Crystal Displays are created by sandwiching a thin (10-12 micro mm) layer of liquid crystal fluid between two glass plates. In this project, 16*2 LCD is used.
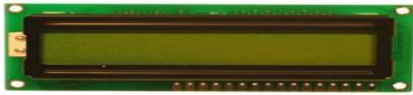
Fig 4: Liquid Crystal Display

d) GSM MODEM:

GSM (global system for mobile communications) is an open, digital cellular technology used for transmitting mobile voice and data services GSM operates at the 850MHz,900MHz,1800 MHz and 1900MHz frequency bands GSM uses time division multiple access (TDMA)for communication purpose. In this work I have selected GSM SIM900A because it is used in many applications like SMS, data transfer etc. ATmega328P controller within very short time period read the sensor values and creates SMS AT (Attention) commands.

Fig 5: GSM SIM900A Module

e) SWITCH:

An electrical switch is a device used to interrupt the flow of electrons in a circuit. Switches are either completely on (closed) or off (open). In this project, if an unauthorized person tries to steal the vehicle, the microcontroller gets an interrupt. The interrupt to a microcontroller is through a switch mechanism which is connected to the system.

f) KEYPAD:

A keypad is one of the most commonly used input devices. It is used in microprocessor applications. A keypad having 12 keys, it is wired as 3 columns by 4 rows. A keypad is often needed to provide input to an Arduino system.

Fig 6: Keypad

g) DC MOTOR:

A DC motor is an electrical machine which converts electrical energy into mechanical energy. The universal motor can operate on direct current but it is a light weight brushed motor used for portable power tools and appliances.

h) MOTOR DRIVER IC:

The L298N is an integrated monolithic circuit.L298 is a high power version of L293 motor driver IC. It is a high voltage, high current dual H-bridge driver L298 is specially designed for high power applications. This IC consists of 15-pins which are used to control a set of two DC motors instantaneously in any direction.

Fig 7: L298N motor driver IC

i) BUZZER:

A device that makes a buzzing noise. An audio signalling device. It is based on the principle of Inverse Piezo electric effect. It has polarities.

Fig 8: Buzzer

IV.   RESULT

The real time view of the system is shown in the figure. The working of the project is that when we switch on the vehicle then the OTP is send to the owner mobile number by using GSM modem. Here, we are also using manual lock (7-bit pin) which is only known to the user. By using that manual lock we can also control the vehicle. The generated OTP is then entered by using keypad. If the entered OTP is correct, then the vehicle will start otherwise the owner will get an alert message. To stop the vehicle, the user can send an SMS to the GSM modem. The advantage of the project is if any unauthorized person is accessing the vehicle, then the owner will get a theft message and if the owner does not have an android phone but he/she can send SMS to the GSM modem.

Fig 9: Project Output

V.   CONCLUSION

In this paper we have studied and implemented a complete working model using a microcontroller. Using this project, one can control the vehicle engine by means of an SMS. The main purpose of this paper is to prevent vehicle theft. Thus, in this way crimes are reduced to a great extent as vehicles today are being stolen in large number. Hence, vehicles today require high security which can be achieved with the help of this application.

VI.   ADVANTAGES AND APPLICATIONS
➢ Advantages
1. Low power consumption.
2. Flexible and reliable.
3. Easy to install and easy to operate.
4. More reliable than manual operation.
5. Losses are minimal.
6. This project can implement for security of supply.
➢ Applications

1. Automotives and transport vehicles.

2. Security, transport and logistics.

VII. FUTURE SCOPE

Further enhancement can be done to this paper by using a GPS system that helps us to find out the exact position of the vehicle with the help of its latitude and longitude which then can be sent to the owner of the vehicle via SMS.

This data can be then entered by the owner on google map to find out the exact location of the vehicle.

VIII. REFERENCES

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Author 1: Mrs.V.N.SIREESHA
Assistant Professor, M.Tech.,
Department of Electronics and Communication Engineering.
Satya Institute of Technology and Management-GVP, VZM.

Author 2: N.K.NEELIMA
Final year B.Tech student.
Department of Electronics and Communication Engineering.
Satya Institute of Technology and Management-GVP, VZM.

Author 3: M.VASUDEVA KIRAN
Final year B.Tech student.
Department of Electronics and Communication Engineering.
Satya Institute of Technology and Management-GVP, VZM.

 Author 4: M.SAI VENKAT SRINIVAS
 Final year B. Tech student.
Department of Electronics and Communication Engineering.
Satya Institute of Technology and Management-GVP, VZM.

Author 5: D.Prasanth kumar
Final year B.Tech student.
Department of Electronics and Communication Engineering.
Satya Institute of Technology and Management-GVP,VZM.