

GSM Based Vehicle Theft Control System

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Abstract— The purpose of this project is to find the vehicle where it is and also you can stop that particular vehicle by sending a message .The entire system is hidden inside the vehicle , until unless authorized one comes and giving security code to that system. A keypad and a display is provided inside the vehicle. Using that we can switch on and switch off the vehicle. And also we can track the vehicle using this GSM modem. If the wrong password is entered, then the location of the vehicle is tracked by the GPS module and the message will be send to the owner of the vehicle.

Index Terms— GSM and GPS, Tracking vehicle, Embedded Domain.

1) INTRODUCTION

Automotive industry uses Controller Area Network (CAN) as the in-vehicle network for the Engine Management, the body electronics like door and roof control, air conditioning and lighting as well as for the entertainment control. Nowadays all most all car manufacturers have also started implementing CAN based vehicle automation. CAN networks used in engine management to connect several ECU's. based on the discussion and data related to stolen vehicle, it is observed that the vehicle theft is a global problem. Nobody likes his or her vehicle to get stolen. The vehicle manufacturers installed a minimum standard security system such as an alarm based security system. Due to the inefficient conventional car security alarm system, the possibility of the vehicle can be stolen is high. However, this device is not effective enough. It does not have any pager system attached to it.

2) EXISTING SYSTEM

These day's vehicle theft cases are higher than ever, give your vehicle an excellent protection with the only reliable anti-theft device. Vehicle Electronic control unit ensures the Best guarantee to protect your car from different kinds of theft cases. It is a vehicle security device that offers excellent protection to your vehicle. A vehicle with Electronic control

unit security system helps the user to lock and unlock doors at the press of a button. Mainly two types of Electronic control unit are used in Auto industry -Automatic Electronic control unit and Manual Electronic control unit that ensures smoother and secured operation. Again this system could not prove to provide complete security and accessibility of the vehicle in case of theft. So a more developed system makes use of an embedded system based on GSM technology.

3) PROPOSED SYSTEM

The main concept in this design is introducing the mobile communications into the embedded system. The vehicle thief takes only a few minutes to deactivate the security system. Furthermore, nobody will pay an attention when the car alarm goes off. Based on these reasons, it is proposed that a GSM-based vehicle anti-theft system development is designed and developed to improve the performance of the current vehicle security system. Somehow if there is another way of transmitting the alarm to the vehicle owner that is not limited to the audible and line of sight, the system can be upgraded. SMS is a good choice of the communication to replace the conventional alarm, because it can be done and does not require much cost. Although most of people know GPS can provide more security for the vehicle but the main reason people does not apply it because the cost. Advance vehicle security system is too expensive. Cost for the gadget is too high. Besides that, people also must pay for the service monthly. The main objective of this project is to design, construct and test a GSM-based vehicle anti-theft system that can be used to improve the performance of vehicle security system.

4) MATERIALS AND METHODS

a) SOFTWARES

The Software's we are using here is

1. MPLAB IDE
2. PicKit-3

b) FLOWCHART

5) EXPERIMENTAL SETUP

a) PIC ASSEMBLED PCB+UART+LCD

The microcontroller is a device that can perform a specific function according to the coding/program burnt into its program memory. The microcontrollers are special purpose devices used in many applications like automobile, medical, instrumentation, battery management, smart phones accessories, motor and control drives, USB and wireless technology etc. One of the most reputed manufacturers of micro-controller is MICROCHIP PCB design. They have the vast series of micro-controllers from 8bit, 16, 32 bit controllers both in SMD and through whole package. This board is built with PIC16F877A as a microcontroller unit. The input supply to the board can be fed from both ac and dc. It uses a crystal oscillator for generating frequency. A serial communication is achieved by an UART protocol.

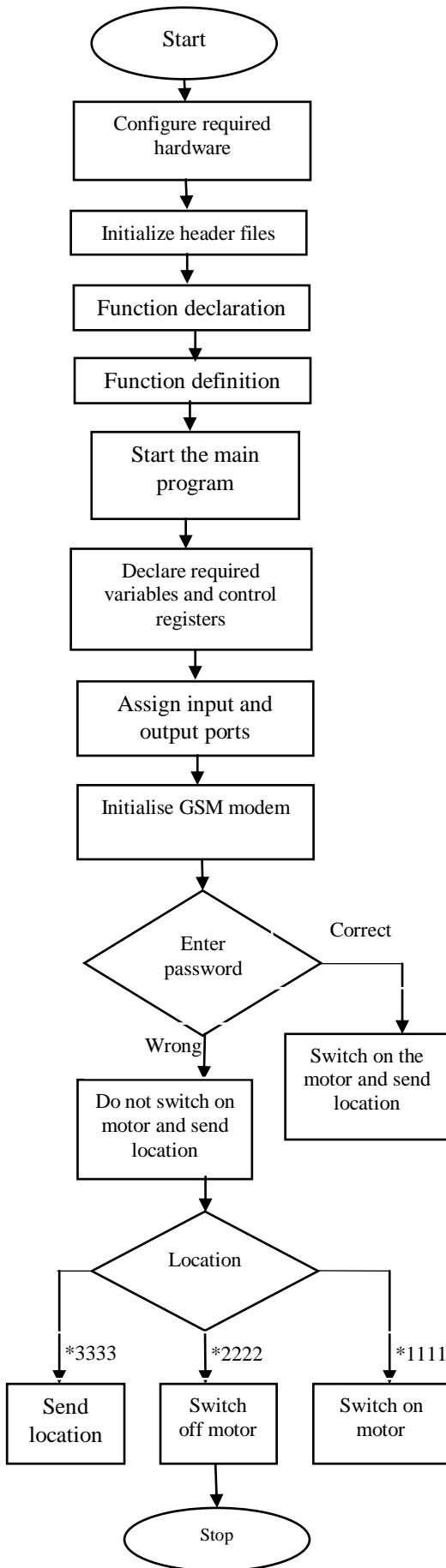


Figure 1: Flowchart

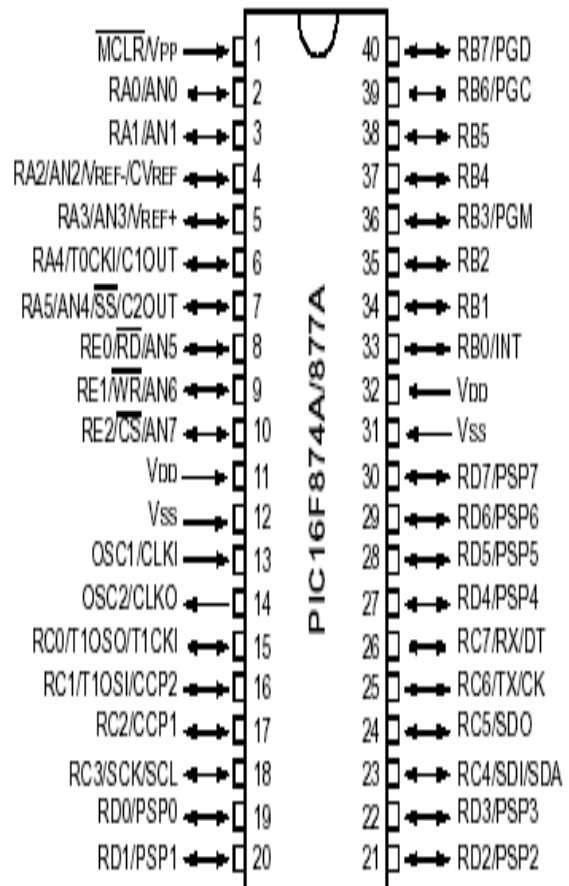


Figure 2: PIC16F877A

This board is specially designed for connecting digital and analog sensors which has input voltage range 5 or 12V_{DC} as well as it can be interfaced with serial communication devices, relay boards etc. The output can be monitored in LCD as well as pc. Data EEPROM is used to store data defined by the user. PCB design. When a variable is defined it is stored in program memory and the value of the variable is stored in data EEPROM Synchronous serial ports are used to communicate with other peripheral devices like serial EEPROMS, A/D converters and shift registers.

PCB design. They have two modes. 1- SPI Serial Peripheral Interface 2- I2C Inter Integrated Circuit.

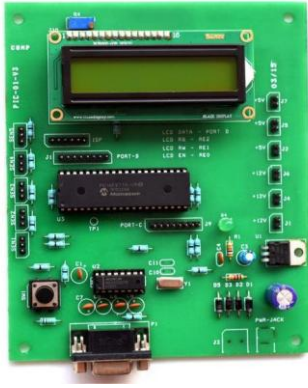


Figure 3: PIC Assembled PCB

b) BLOCK DIAGRAM

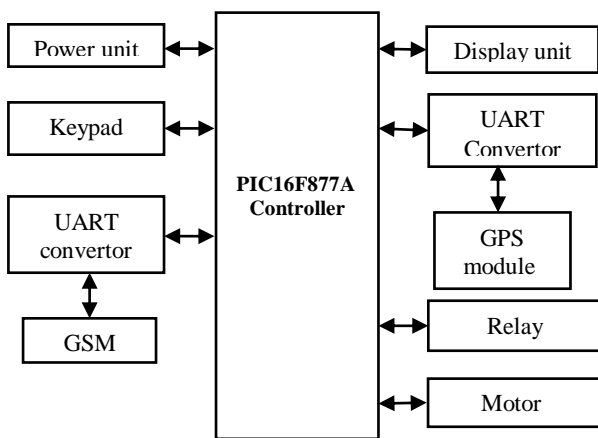


Figure 4: Block diagram of proposed system

c) 16X2 LCD

LCD stands for liquid crystal display. Their programming is also same and they all have same 14 pins (0-13) or 16 pins (0 to 15). Alphanumeric displays are used in a wide range of applications, including palmtop computers, word processors, photocopiers, point of sale terminals, medical instruments, cellular phones, etc. This is an LCD Display designed for E-blocks. It is a 16 character, 2-line alphanumeric LCD display connected to a single 9-way D-type connector. This allows the device to be connected to most E-Block I/O ports. The LCD display requires data in a serial format, which is detailed in the user guide below. The display also requires a 5V power supply. The 16 x 2 intelligent alphanumeric dot matrix displays are capable of displaying 224 different characters and symbols.



Figure 5: 16x2 LCD

The following are the features of LCD

- 1) Input voltage: 5v
- 2) E-blocks compatible

- 3) Low cost
- 4) Compatible with most I/O ports in the E-Block range
- 5) Ease to develop programming code using Flow code.

d) 5X1 KEYPAD

A miniature keyboard or set of buttons for operating a portable electronic device, telephone, or other equipment it is also possible to use numerous additional modules linked to the development system through the I/O port connectors. A keypad is a set of buttons arranged in a block or pad for a specific task. It contains 5 keys arranged in matrix format. The pulses from the microcontroller are used for switching keys in a keypad. In order the keypad to work properly, pull-down resistors should be placed on the microcontroller's input pins, thus defining logic state when no button is pressed. By combining zeros and ones on the output pins, it is determined which button is pressed? It does not require separate power supply for switching. The keypad may be used for a multi input switching.

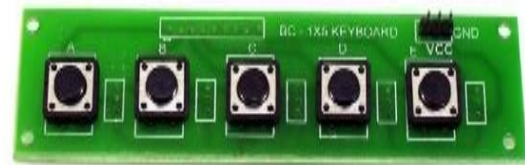


Figure 6: 5X1 Keypad

The following are the features of 5X1 KEYPAD

- 1) No need of input voltage
- 2) Multi input switching.

e) SIMCOM GSM/VOICE MODEM

This GSM Modem can work with any GSM network operator SIM card just like a mobile phone with its own unique phone number. Advantage of using this modem will be that its RS232 port can be used to communicate and develop embedded applications. Applications like SMS Control, data transfer, remote control and logging can be developed easily. Using this modem can either be connected to PC serial port directly or to any microcontroller through MAX232. It can be used to send/receive SMS and make/receive voice calls. It can also be used in GPRS mode to connect to internet and run many applications for data logging and control .This GSM Modem can accept any GSM network act as SIM card and just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. The SIM800C is a complete Dual-band GSM/GPRS solution in a SMT module featuring an industry-standard interface, the SIM800CS is a quad-band GSM/GPRS module that works on frequencies GSM850MHz, delivers performance for voice, SMS, Data

and Fax in a small form factor and with low power consumption.

The following are the features of GSM

- 1)Configurable baud rate
- 2)SMA connector with GSM Antenna.
- 3)SIM Card holder.
- 4)Built in Network Status LED
- 5)Normal operation temperature: -20 °C to +55 °C
- 6)Input Voltage: 4.5V-12V DC



Figure 7: GSM Voice MODEM

And some of the applications of GSM are

1. Short message service(SMS)
2. Incoming/outgoing voice calls
3. Internet
4. SMS based Remote Control and Alerts
5. Security Applications
6. Sensor Monitoring
7. GPRS Mode Remote Data logging

f) USB TO RS232 CONVERTER

This 6ft converter plugs into your computer's USB port and provides you with a DB-9 RSR232 connection. After installing the drivers onto your Windows, Mac or Red Hat Linux system, the FTDI chipset inside the cable will enumerate as a COM port with a baud rate adjustable to whatever setup you want to connect to RS232. We were curious what made this cable work, so we tore one open and found that it's simply an FTDI FT232 paired with a Zywyn, ZT213 RS232 Transceiver.



Figure 8: USB to RS232 converter cable

The USB_RS232 cables are a family of USB to RS232 levels serial UART converter cables incorporating FTDI's FT232RQ USB to serial UART interface IC device which handles all the USB signaling and protocols. The cables provide a fast, simple way to connect devices with a RS232 level serial UART interface to USB. Each USB-RS232 cable contains a small internal electronic circuit board, utilizing the FT232R, which is encapsulated into the USB connector end of the cable. The integrated electronics also include the

RS232 level shifter plus Transmitter and Receiver. LEDs which give a visual indication of traffic on the cable.

g) GPS WITH EXTERNAL ANTENNA

The Global Positioning System (GPS) is a global navigation satellite system that provides location and time information in all weather conditions. GPS satellites transmit signal information to earth. This signal information is received by the GPS antenna in order to measure the user's correct position. In this, GPS antenna is connected externally through SMA connector. The GPS concept is based on time and the known position of specialized satellites. GPS satellites continuously transmit their current time and position. A GPS receiver monitors multiple satellites and solves equations to determine the precise position of the receiver and its deviation from true time. At a minimum, four satellites must be in view of the receiver for it to compute four unknown quantities.



Figure 9: GPS with external antenna

The following are the features of GPS

1. Supply voltage: 9v to 12v DC
2. Interface: UART RS232
3. Optional TTL UART also available
4. GPS antenna frequency :1575.42MHz

h) SINGLE RELAY

Relays are simple switches which are operated both electrically and mechanically. Relays consist of a n electromagnet and also a set of contacts. The switching mechanism is carried out with the help of the electromagnet. The main operation of a relay comes in places where only a low-power signal can be used to control a circuit. Some relays are called contactors. A relay is an electromechanical switch which is activated by an electric current. A single relay board arrangement contains driver circuit, power supply circuit and isolation circuit. A relay is assembled with that circuit. The driver circuit contains transistors for switching operations. The transistor is use for switching the relay. An isolation circuit prevents reverse voltage from the relay which protects the controller and transistor from damage. The input pulse for switching the transistor is given from the microcontroller unit. It is used for switching of a single device.

The following are the features of Single Relay

1. Input voltage: 12V DC
2. Driver unit: ULN2003A
3. Isolation unit: In4007
4. Fast switching

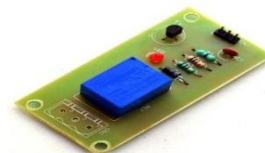


Figure 10: Single relay board

6) COCLUSION

The foremost objective of this paper is to assist and ensure the safety and security of the vehicle. To investigate the performance of the whole strategy, several trials have been conducted on the different locations in order to get the GPS coordinates. The assistive device in this work will inform the owner if someone tries to steal the vehicle. In the distant future, it can be extended to a system to suit outdoor environments and can be made compact for usage and future works may be carried on for developing android application to avoid message throwback.

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