

DIGITAL VEHICLE LOCKING SYSTEM USING GSM

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ABSTRACT

Currently almost of the public having an own vehicle, theft is happening on parking and sometimes driving insecurity places. The safe of vehicles is extremely essential for public vehicles. This paper deals with the design & development of an embedded system, which is being used to prevent /control the theft of a vehicle. The developed instrument is an embedded system based on GSM technology. The instrument is installed in the engine of the vehicle. An interfacing GSM modem is also connected to the microcontroller to send the message to the owner's mobile.

The main objective of this instrument is to protect the vehicle from any unauthorized access, through entering a protected password and intimate the status of the same vehicle to the authorize person (owner) using Global System for Mobile (GSM) communication technology. This system deals with the concept of network security. The main concept in this design is introducing the mobile communications into the embedded system. The entire designed unit is on a single board.

1. INTRODUCTION

In these days, automobile thefts are increasing at an alarming rate all over the world. So to escape from these thieves most of the vehicle owners have started using the theft control systems. The commercially available

anti-theft vehicular systems are very expensive. Here, we make an attempt to develop an instrument based on ATmega328 microcontroller and operated using GSM technology. The instrument is a simple and low cost vehicle theft control embedded system.

The Global System for Mobile communications (GSM) is the most popular and accepted standard for mobile phones in the world established in 1982 and it operates in 900 MHz frequency. Over billion people use GSM service across the world. The utility of the GSM standard makes international roaming very common between mobile phone operators, enabling subscribers to use their phones in many parts of the world. GSM differs significantly from its predecessors in both signaling and speech clarity, as its channels is digitized. It means that the GSM system is now considered as a third generation (3G) mobile communication system.

2. COMPONENTS, INTERFACINGS AND PROTOCOLS:

1. Arduino
2. 4x3 Matrix keypad
3. 16x2 Liquid crystal display (LCD)
4. 12V Relay and DC Fan
5. GSM Modem
6. GSM Mobile

7. MAX232 line driver
8. L293D motor driver & DC motor
9. Buzzer
10. DB9 connector

outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an

ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started

2.1 Arduino Uno Board

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM

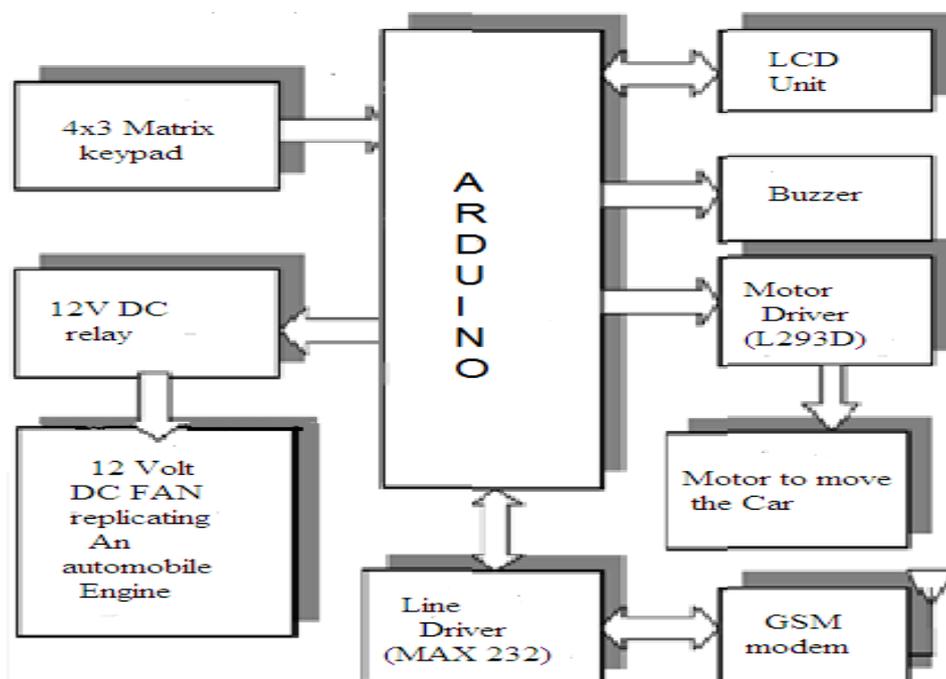


Fig.01: Block diagram

2.1.1 Features of Arduino UNO board:

1. Microcontroller ATmega328
2. Operating Voltage 5v
3. Input Voltage(recommended) 7-2V
4. Input Voltage(limits) 6-20V
5. Digital I/O Pins 14 (of which 6 provide PWM output)
6. Analog Input pins 6
7. SRAM 2 KB(ATmega328)
8. EEPROM 1 KB(ATmega328)
9. Clock Speed 16 MHZ

2.2 4x3 Matrix keypad

Keypads and LCDs are the most widely used input/output devices. In this section, we

first discuss keypad fundamentals, along with key press and key detection mechanisms, and then it is shown how a keypad is interfaced to an 8051 μ C. Keypads are organized in a matrix of rows and columns. The CPU accesses both rows and columns through ports. When a key is pressed, the row & column are connected; otherwise there is no connection between them.

In the below figure a 4X3 matrix keypad

is connected between two ports. The rows are connected to an output port and the columns are connected to an Input port. If no key has been pressed, reading the input port will yield 1s for all columns since they are all connected to high voltage (Vcc). If all the rows are grounded and a key is pressed, one of the columns will have 0

since the key which is pressed provides the path to ground. It is the function of the microcontroller to scan the keyboard continuously to detect and identify the key which has been pressed.

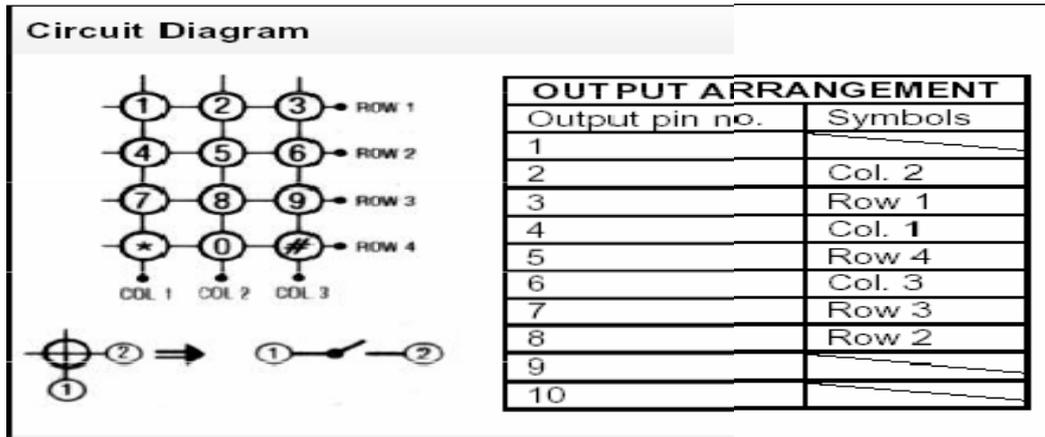


Fig. 03: Schematic diagram of Keypad

2.3 LCD Unit

A 16x2 character Line LCD module is a parallel port module. An 8051 program must interact with the outside world using input & output devices that communicate directly with a human being. One of the most common devices attached to an 8051 μ C is an LCD display. LCD requires 3 control lines as well as 8 I/O lines for the data bus. So this LCD will require a total of 11 data lines.

The three control lines are referred to as EN, RS, and RW. The EN line is called "Enable." This control line is used to tell the LCD that you are sending it data. The enable pin used by the LCD latches the information presented to its data pins. When data is supplied to data pins, high to low pulse must be applied to this "EN" pin in order to latch the data present at the data pins. This pulse must be a minimum of 450 ns wide.

The RS line is the "Register Select" line. When RS is low (0), the data is to be treated as a command or special instruction (such as clear screen, position cursor, etc.). When RS is high (1), the data being sent is text data, which should be displayed on the screen. The RW line is the "Read/Write" control line. When RW is low (0), the information on the data bus is being written to the LCD. When RW is high (1), the program is effectively querying (or reading) the LCD. Some commands are given below for reference.

Table 01: LCD Command Codes

Code (Hex)	Command to LCD Instruction
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1	Clear Display of the screen
38	2 line, 5X7 Matrix
80	Force cursor to begin from 1 st line
C0	Force cursor to begin from 2 nd line

2.4 12V Relay and DC Fan

The relay is an electromagnetic switch. When relay is activated, then it closes the loop of ignition, hence start the engine. When relay is de-

Activated, it opens the loop of ignition, hence stop the ignition of the automobile. A DC Fan is connected with the relay replicating the automobile engine to verify the operation of the system.

2.5 GSM Modem

The GSM modem comes with a serial interface through which the modem can be controlled using AT command interface. Here a SIMCOM made (SIM300) modem interfaced with the microcontroller operates in 900MHz frequency

The protocol used by GSM modems for setup and control is based on the AT-Command set. The GSM modem specific commands are adapted to the services offered by a GSM modem such as :text messaging,calling a given phone number,deleting memory locations etc.since the main objective for this application is to show how to send and receive text messages, only a subset of the AT-Command set needs to be implemented. The following section describes the AT-Command set.

Command	Description
AT	Check if serial interface and GSM modem is working.
ATE0	Turn echo off, less traffic on serial line.
AT+CNMI	Display of new incoming SMS.
AT+CPMS	Selection of SMS memory.
AT+CMGF	SMS string format, how they are compressed.
AT+CMGR	Read new message from a given memory location.
AT+CMGS	Send message to a given recipient.
AT+CMGD	Delete message

2.6 GSM Mobile

In our project we used a GSM mobile to receive the SMS sent by the instrument regarding the engine-on status. His mobile number must be programmed with the source code. So that the control unit can send the SMS and in the same time the authorized person received the same SMS to take care of his vehicle.

2.7 MAX232 Line Driver

A MAX232 chip is required to convert RS232 voltage levels to TTL levels, and vice versa. ATmega328 has one transmitter (TxD) and a receiver (Rx) for transferring and receiving serial data from the port 3 (P3.0 and P3.1). They require a line driver to make them RS232 compatible. A line driver converts the RS232's signals to TTL voltage levels that will be acceptable to ATmega328's Tx and Rx pins.

2.8 L293D motor driver IC & DC motor

The purpose of using 4 no. of 12V DC motors is to drive the hardware kit just like an automobile. Since, MCU can interpret the logic 1 as 5v & 0 as 0v, so L293D motor driver IC is

4. FLOW CHART

used to convert 5v logic to 12v logic to drive the motor efficiently with full RPM. Here used one IC to drive 2 motors. Accordingly there are used two ICs for our prototype model.

2.9 Buzzer

A buzzer is an audio signaling device, which may be mechanical, electro-mechanical or electronic. Typical use of buzzers / beepers includes alarms and timers etc.

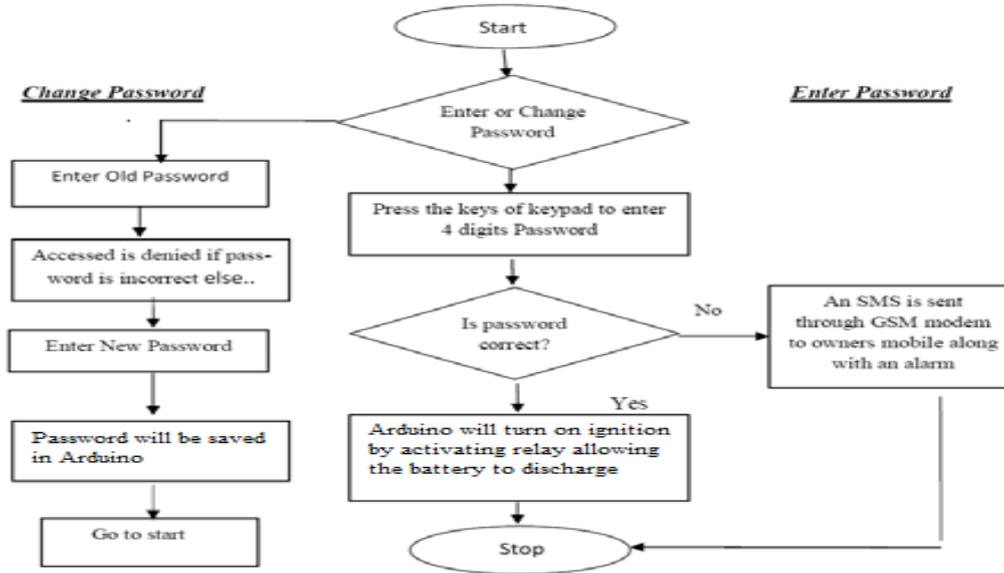
3. WORKING OF THE MODULE

The embedded system installed in the engine of the vehicle along with the GSM modem. By entering a correct password (like: *abcd) the instrument allows to activate the 12V relay and then ignition of the engine will start. Hence start the vehicle. If anyone tries to enter the password randomly, then after three trials, the Arduino will block the entry of further password. Then, the buzzer will be turned on to create a noise to panic the culprit, followed by sending a message "**Alert: Car Is Under Threat**" through GSM modem to the owner's mobile for further action for prevention of his vehicle.

According to the prototype model after entering correct password the Fan will move and at the same time, according to the instruction it will run forward for 10 sec and backward for 10 sec like an automobile.

Password can be changed by the following proper procedure. First enter #, then enter the old password, then new password. Now test, whether the new password is working or not. As per algorithm given below the new password will retain even after power failure. So it will work as usual.

The source code is written in embedded C language. To develop the source code the flow chart of the project is shown in the figure below.



5. ADVANTAGES

- Assembling Cost is low
- Control the Vehicle theft

5. CONCLUSION

This is a unique method of designing and assembling a low-cost, compact theft control system for an automobile. This instrument is an ultimate threat to vehicle thieves. By installing this instrument in the automobile engine it is very difficult to access by an unknown person, since it is based on GSM Technology. In future, there is no doubt, that all of the vehicles will be embedded with this unique kit. In addition to the above features we can also add extra features like thumb/face recognition to ascertain more security of the vehicle.

6. FUTURE WORK

- Cameras can be incorporated into the system to identify the person
- GPS system can be added to keep the track of the vehicle that is being stolen

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