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Automobile Engine Locking System with GSM

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ABSTRACT- This paper deals with the design & development of an embedded system, which is being used to prevent /control the theft of a vehicle and also provide safety to avoid accidents if driver has been drunk. The developed instrument is an embedded system based on microcontroller and 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.

Keywords - Password, GSM Modem, AT Commands, Microcontroller, Interfacing, I2C, RS232 and UART protocols

I. 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 8051 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.

II. COMPONENTS, INTERFACINGS AND PROTOCOLS

1. AT89C51
2. GSM M95
3. LM7805
4. MAX232
5. LCD16X2
6. L293D/L298D board
7. 1N4007
8. 12-MHz crystal
9. Push to ON switch
10. LED
11. Capacitor 1000uf
12. Motors
13. 40 PIN IC BASE
14. Transformer 12V-0V (750mA)
15. Mains cord
16. Relay 12V
17. Bug stripe

III. MICROCONTROLLER UNIT

AT89C51 is an 8-bit microcontroller and belongs to Atmel's 8051 family. ATMEL 89C51 has 4KB of Flash programmable and erasable read only memory (PEROM) and 128 bytes of RAM. It can be erased and program to a maximum of 1000 times. AT89C51 from Atmel Corporation – Atmel fabricated the flash ROM version of 8051 which is popularly known as AT89C51 ('C' in the part number indicates CMOS). The flash memory can

erase the contents within seconds which is best for fast growth. Therefore, 8751 is replaced by AT89C51 to eradicate the waiting time required to erase the contents and hence expedite the development time. To build up a microcontroller based system using AT89C51, it is essential to have ROM burner that supports flash memory. Note that in Flash memory, entire contents must be erased to program it again. The contents are erased by the ROM burner. Atmel is working on a newer version of AT89C51 that can be programmed using the serial COM port of IBM PC in order to get rid of the ROM burner.
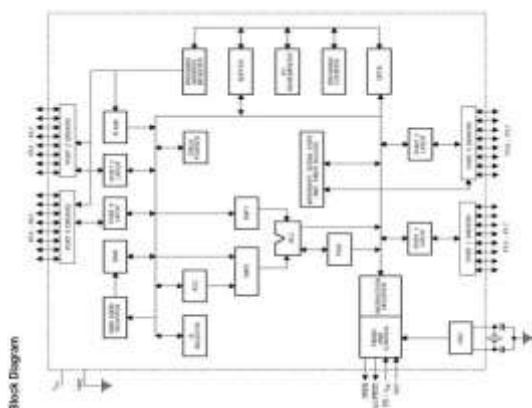

Fig. 1. AT89C51 Block Diagram

Features:
- Compatible with MCS-51 Products
- 4 Kbytes of In-System Reprogrammable Flash Memory.
- Endurance 1,000 Write/Erase Cycles
- Fully Static Operation: 0 Hz to 24 MHz
- Three-Level Program Memory Lock
- 128 x 8-Bit Internal RAM
- 32 Programmable I/O Lines
- Two 16-Bit Timer/Counters
- Six Interrupt Sources
- Programmable Serial Channel
- Low Power Idle and Power Down Modes

DC Power Supply Unit:
Here circuit requires 12V unregulated DC supply for battery charging. We used 230V to 12V-0-12V step down transformer. The output AC of 12V is rectified by center tap rectifier. Rectified output is pulsating; it is pure by the capacitor filter of 1000 uf 25V. Now the out of capacitor is DC 12V, is given to the battery for charging purpose.
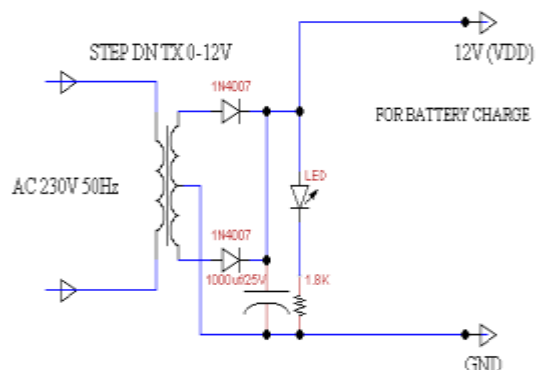

Fig. 2. Circuit diagram of DC Power supply

4x3 Keypad:
Key pads and LCDs are the most widely used input/output devices. In this section, we first discuss keypad fundamentals, along with key press an d key detection n mechanism s, and then it is shown how a keypad is interfaced to an 8051 µC. Keypads are organize d in a matrix of rows and columns. The CPU accesses both rows and columns through ports. When a key is pressed, the row and column are connected; otherwise e there is no connection between them.

Fig. 3. 4x3 Keypad

Liquid Crystal Display (LCD) unit:
LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix.

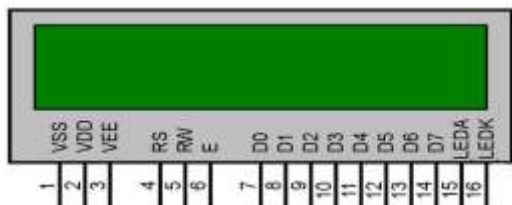This LCD has two registers, namely, Command and Data.

Fig. 4. 16x2 LCD

GSM Modem:

The GSM/GPRS Modem comes with a serial interface through which the modem can be controlled using AT command interface. Here a SIMCOM made (SIM30 0) modem interfaced with the microcontroller operates in 900 MHz 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 mess aging, callingagiven 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.

TABLE I: THE ARRANGEMENT OF CHANNELS

Command	Description
AT	Check if serial interface an d GSM modem is working.
ATE0	Turn echo off, less traffic on Serial line.
AT+CNMI	Display of new incoming S MS.
AT+CPMS	Selection of SMS memory.
AT+CMGF	S MS 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

MAX232 line driver:

A MAX 232 chip is required to convert RS232 voltage levels to TTL levels, and vice versa. 8051 has one transmitter (TxD) and a receiver (RxD) 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 R232's signals to TTL voltage levels that will be acceptable to 8051's TxD and RxD pins.

IV. BLOCK DIAGRAM AND CIRCUIT DIAGRAM

Block dia. shows that the connection of different modules with the Microcontroller and Microcontroller will provide data to some of the components and it also take data from some interfacing devices. All the assembly is connected on the single board.
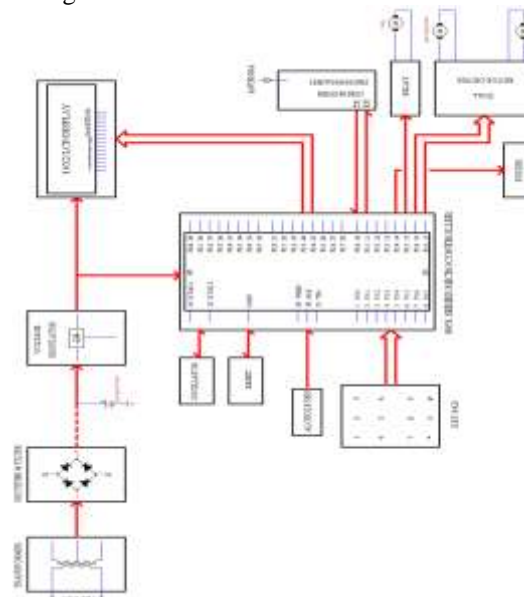

Fig. 5. Block diagram of the system

Circuit diagram of the system simulated and implemented on the Printed circuit board to achieve the desired goal of the system
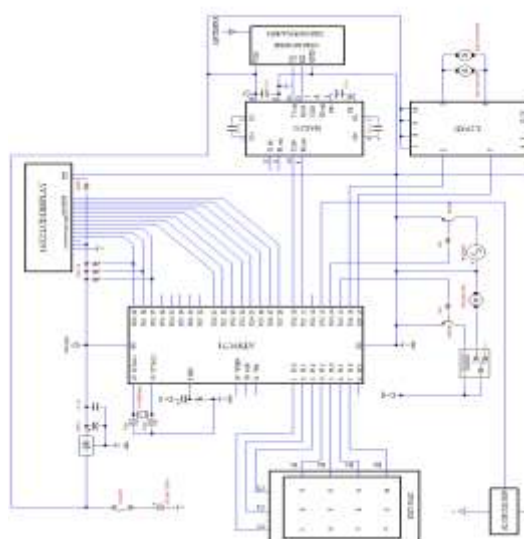

Fig. 6. Circuit diagram of the system

The PCB is designed for the circuit diagram shown above to sold all the listed components and build the complete system.
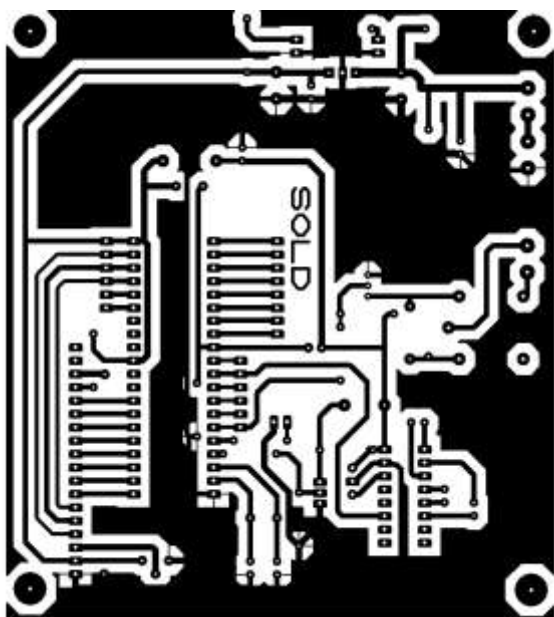
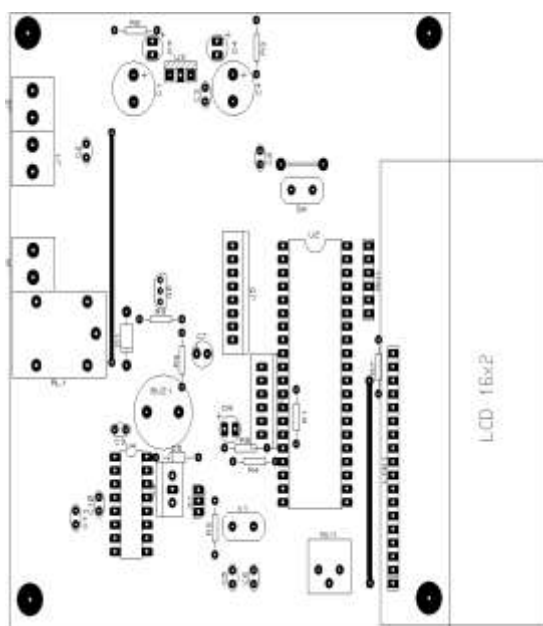**Fig. 7**.PCB Layout diagram of the system

Fig. 8.PCB component side of the system

V.   WORKING OF THE SYSTEM

Microcontroller is the heart of our system. It will control the entire system and provide command to the vehicle ignition system whether it should start or stop. GSM module will help to send SMS to the authorized person or Owner of the vehicle.

First insert a key in ignition, then system will ask for the correct password and Alcohol sensor is going to sense whether the person authorizing is drunk or not. If password and alcohol produces desired output then microcontroller program will check whether the output is per the desired value.

or not. If both are correct then system sends the SMS to the owner (Vehicle is ON). If ignition,

password and alcohol sensor is incorrect then microcontroller will not allow to start the vehicle and GSM module will send the SMS (vehicle is OFF) to the owner of the vehicle.

The Microcontroller used in this system is programmed to achieve the desired output for the system designed. The software written using Embedded C programming and the platform used to program is micro KEIL.

VI.   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 and alcohol sensor provide accident safety by sensing the alcohol consumption or not. 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.

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