Two Step Smart Locking System in Vehicles

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Abstract- Many people doesn't carry the important documents like license while driving which is very necessary to ensure that one is driving legally and safely. Also, stealing of vehicles is the major issue. so our proposed system doesn't allow an unauthorized user to start vehicle. Smart vehicle system first ask to enter a password and then license will be scanned. After this, if information is correct then user can start vehicle. A buzzer is also installed in the system so as to get notified when the password is wrong. Based on this concept the project is being designed so that it will be cost efficient to the users as well.

I. INTRODUCTION

" SAFETY STARTS WITH AWARENESS, AWARENESS STARTS WITH YOU"

A typical immobilizer system requires the vehicle ignition key to be authenticated by the Engine Control Unit each time the vehicle is started. But most of the time key can be get stolen. This will be major drawback, if we are using only ignition key for security of vehicles.

Also, when you are out on a drive alone or with your family, you carry the above documents to keep yourself away from all the legal obligations and be a responsible citizen. In case you don't have the required documents, you will have to pay the required fine. But people don't recognize the importance of the legal documents required for driving.

In this case, we need such a system which doesn't allow the thieves or unauthorized person to start the vehicle. Hence, we are increasing the security level of our vehicles. Such vehicle having this system is called as' Two Step Smart Locking System '.

Smart vehicle first ask user to enter a password. There will be three chances for user to enter password including one master password. After entering the correct password, the system will allow user to scan your license /smart card, then & then only user can start the vehicle.

II. BACKGROUND STUDY

Driving a vehicle is nothing short of an adventure ride for many. People spend a huge chunk of their money on buying their dream car. However, a car owner's dream can come crashing down in case the vehicle meets with an accident. Though accident is an event one cannot have control over, there are certain precautionary measures one can take to ensure they are driving legally and safe. So just like you carry your list of must-have items in your bag, there are certain documents that are an absolute must-have when you are out driving on the Indian roads

1)Car insurance policy: The Motor Vehicles Act, 1988 has made it mandatory for every vehicle owner to possess a third-party car insurance cover.
2)Driving license: The Motor Vehicles Act, 1988 makes it mandatory for a vehicle owner in India to carry a valid driving license. Driving without a valid driving license is a punishable offence in India and your claim will get rejected on this ground. Also, Pollution Under Control Certificate and Registration certificate.

But the problem is how many of us carry the required documents?

Also ,"Probably the most important factor in the rate of motor vehicle theft is the number of motor vehicles per capita in the country." Using data supplied by the United Nations Office on Drugs and Crime, the estimated worldwide auto-theft rate is 65.8 per 100,000 residents. However, data is not available for all countries, and this crime rate reflects only the most recent year of reported data. For the 4,429,167,344

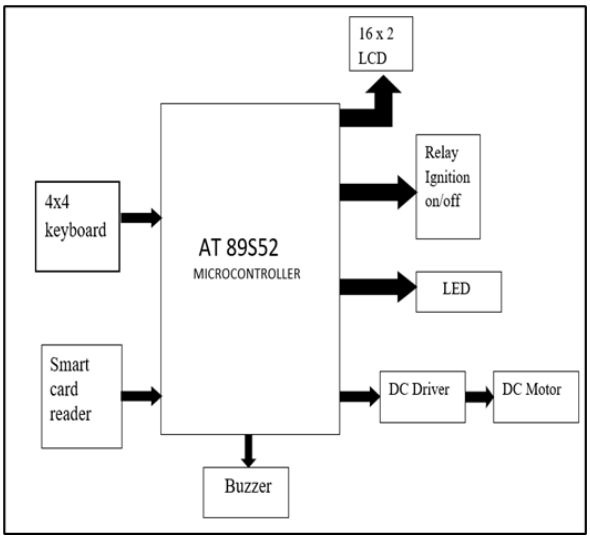
people these countries represent, there were a total 2,915,575 cars stolen. Uruguay has the highest auto-theft rate for any fairly large country in the world, at 437.6 per 100,000 residents in 2012.Our proposed system works for increasing the followers of traffic rules and for safety of our vehicles.

III. OBJECTIVES AND SCOPE

Generally, stealing of vehicle is not affordable mainly for middle class people as per their economical conditions & they are also not able to take a new one. Hence, we are introducing smart vehicle system which fulfills the following requirements:

1) Safety of vehicle -
   At the end of the day, the goals are simple: safety & security. Hence, we are designing the system which provides higher level security of vehicle.
2) Increasing followers of traffic rules & regulations
   This system will automatically increases the followers of Government traffic rules & regulations as it needs license / smart card.

IV. BLOCK DIAGRAM AND DESCRIPTION



V. BLOCK DESCRIPTION

1] Microcontroller: This module is the central control unit of the system. This device is interfaced with 4x4 keypad, Smart card reader, 16x2 LCD, Relay ignition ON/OFF, LED& Buzzer.

2] LCD: 16x2 character Display is used in system for displaying particular message which is given by controller.

3] Buzzer: It generates continuous beep usually when supplied with power but we can generate a signal beep to provide indication of incorrect password.

4] 4x4 keypad: This is used to enter the authorized password.

5] Smart card reader: To send the saved data of user.

6] Relay ignition: for the purpose of ignition ON/OFF.

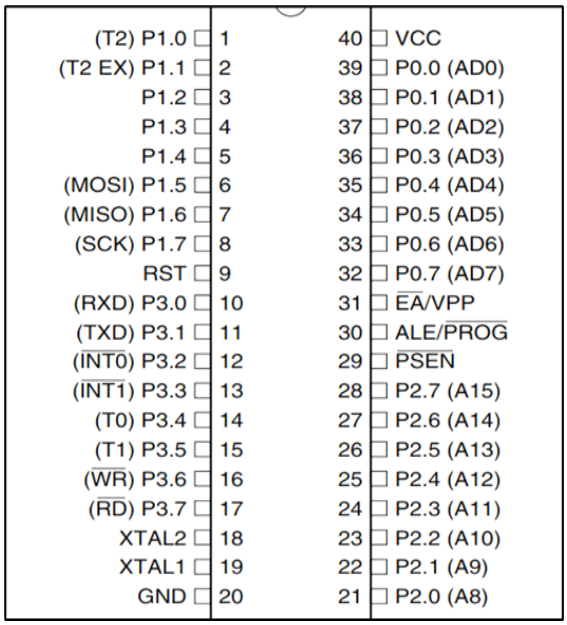
7] LED: It is used to indicate the result.

8] DC Motor: It is used for demonstration of vehicle.

9] DC Driver: It is used to drive DC motor.

VI. MICROCONTROLLER

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density non-volatile memory technology and is compatible with the industry-standard 80C51 instruction set and pinout.



The Microcontroller also has Operating mode, Idle Mode and Power down mode which makes it suitable for battery operated applications. Few considerable drawbacks of the microcontroller is that it does not have in-built ADC and does not support SPI or I2C protocols. However you can utilize external modules for the same.

Atmel microcontroller can be programmed with different software's that is available in the market. Arduino, Keil uVision are the most used platforms to name a few. If you are planning on serious programming and expansion with community support then Keil is recommended. In order to program the Atmel microcontroller, we will need an IDE (Integrated Development Environment), where the programming takes place. A compiler, where our program gets converted into MCU readable form called HEX files. An IPE (Integrated Programming Environment), which is used to dump our hex file into our MCUs.

To dump or upload our code into Atmel IC we need a programmer, the most commonly used programmer is the USBASP which has to be purchased separately. Also simulating you program on software before trying it on hardware will save a lot of time. So, you can use software like ISIS proteus from Lab center to simulate you r programs.

VII. SMART CARD READER

Smart card readers are used with smart cards which are a type of plastic technology card with a built-in chip used for. electronic processes including personal identification, access control, authentication, and financial transactions. Smart card readers obtain or "read" this type of data.

EM-18 RFID reader operates at 125 KHz and it comes with an on-chip antenna and it can be powered with 5V power supply. It provides serial output along with weig and output. The range is around 8-12cm. serial communication parameters are 9600bps, 8 data bits, 1 stop bit. Its applications include Authentication, e-toll road pricing, e-ticketing for public transport, attendance systems etc. Check all the RFID Projects here.

The output provided by EM-18 RFID reader is in 12 digit ASCII format. Out of 12 digits first 10 digits are card number and the last two digits are the XOR result of the card number. Last two digits are used for error checking.

For example, card number is 0200107D0D62 read from the reader then the card number on the card will be as below.
02 – preamble
00107D0D = 1080589 in decimal.
62 is XOR value for (02 XOR 00 XOR 10 XOR 7D XOR 0D).
Hence number on the card is 0001080589.

VIII. SOFTWARE IMPLEMETATION

Software used and its features:
a. Proteus 8 software
b. OrCAD
c. Keil compiler

a. PROTEUS 8 SOFTWARE:
Proteus is a simulation and design software tool developed by Lab center Electronics for electronic center design. It also posses 2D CAD drawing feature. It is software suite containing schematic, simulation as well as PCB designing. ISIS is the software used to draw schematics and simulate the circuits in the real time. The simulation allows human access during run time, thus providing real time simulation.

IX. FEATURES

1.ISIS has wide range of components in its library.
2.It has the sources, signal generators, measurement and analysis tools like oscilloscope, voltmeter, ammeter etc, probes for real time monitoring of the parameters of the circuit, switches, displays, loads like motors and lamps, discrete components like resistors, inductors, capacitors, transformers, digital and analog integrated circuits, semi-conductor switches, relays, sensors, microcontrollers, etc.

b. KEIL COMPILER: Keil development tools for the 8051-microcontroller architecture support every level of software developer from the professional applications engineer to the student just learning about embedded software development.

The industry standard Keil C Compilers, Macro Assemblers, debuggers, single board computer and Emulators support all 8051 derivatives and help your project completed on schedule.

X. C.MULTISIM

Multisim is industry-standard SPICE simulation and circuit design software for analog, digital, and power electronics in education and research.

Multisim provides engineers the SPICE simulation, analysis, and PCB design tools to quickly iterate through designs and improve prototype performance.

XI. FEATURES

- Ability to Reinforce Theory with Interactive Circuit Simulation.
- Exploration with Simulation-Driven Instruments.
- Data Visualization Data with 20 Powerful Analyses.
- Ability to Compare Simulated Data and Real Measurements from NI ELVIS inside Multisim.
- Simplification of the Teaching of Digital Circuits with the PLD Schematic

METHODOLOGY AND WORKING

WORKING

Our project is based on two step verification smart locking system, for that we have to install two such devices which can be used as a verification device. In our project we are using a 4x4 keypad as a primary verification device, secondly, we use a EM Reader or smart card reader which is used as a license which can be scanned by the EM Reader and the system can start successfully. The smart card is the vital component for the security reason, it contains a systematic algorithm of code installed within the smart card so that it can detect the EM reader and we can successfully verify the second step of verification. This project is a small and a compact size so it is very easy to install. Our main motive of this project is to make the system on without any keys. Therefore, various integrated components are used to make the project or system work properly.

Firstly, we have to make analysis that what components are required for this system. Microcontroller 8051 was our main processor as a heart of this system but while coding and installing we countered many bugs and lags. There instead of that we preferred a different microprocessor named AT89S52, it is a next generation or advanced version of 8051 microprocessor. It includes a low power, high performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash Memory and 256 bytes of RAM. Since it is similar to 8051 architecture these microcontrollers are as per industry standards. Other components we used are LCD, which receives character codes from the microprocessor then latches the code to its display. RAM transforms each character code into a 5*7 dot matrix characters on its LCD screen. The LCD unit incorporates a character generated ROM which produces 160 different 5*7 dot matrix character pattern.

Moreover, a Buzzer is also installed in the system so as to detect when the password is wrong by the user. It generates continuous beep usually when supplied with power. Relay Ignition is also used in the system, it is basically an electrical device that works as a switch for the power to ignition system and the fuel system of our vehicle. The relay system gets activated when we turn on the ignition of your vehicle with the key. The same function is done by the EM Reader instead of the keys. DC Motor is also installed to start the system on after successful verification.

INTERFACING

1. LCD Interfacing with Microcontroller

Display units are the most important output devices in embedded projects and electronics products. 16x2 LCD is one of the most used display unit. 16x2 LCD means that there are two rows in which 16 characters can be displayed per line, and each character takes 5X7 matrix space on LCD. In this tutorial we are going to connect 16X2 LCD module to the 8051 microcontrollers (AT89S52). Interfacing LCD with 8051 microcontrollers might look quite complex to newbies, but after understanding the concept it would look very simple and easy. Although it may be time taking because you need to understand and connect 16 pins of LCD to the microcontroller. So first let's understand the 16 pins of LCD module.

We can divide it in five categories, Power Pins, contrast pin, Control Pins, Data pins and Backlight pins.

category	Pin no.	Pin name	Pin function

Power Pins	1	VSS	Ground Pin, connected to Ground
	2	VDD	Voltage Pin +5V
Contrast Pin	3	V0 or VEE	Contrast Setting, connected to Vcc thorough a variable resistor.
Control Pins	4	RS	Register Select Pin, RS=0 Command mode, RS=1 Data mode
	5	RW	Read/ Write pin, RW=0 Write mode, RW=1 Read mode
	6	E	Enable, a high to low pulse need to enable the LCD
Data Pins	7-14	D0-D7	Data Pins, Stores the Data to be displayed on LCD or the command instructions
Backlight Pins	15	LED+ or A	To power the Backlight +5V
	16	LED- or K	Backlight Ground

All the pins are clearly understandable by their name and functions, except the control pins, so they are explained below:

RS: RS is the register select pin. We need to set it to 1, if we are sending some data to be displayed on LCD. And we will set it to 0 if we are sending some command instruction like clear the screen (hex code 01).

RW: This is Read/write pin, we will set it to 0, if we are going to write some data on LCD. And set it to 1, if we are reading from LCD module. Generally, this is set to 0, because we do not have need to read data from LCD. Only one instruction “Get LCD status”, need to be read some times.

E: This pin is used to enable the module when a high to low pulse is given to it. A pulse of 450 ns should be given. That transition from HIGH to LOW makes the module ENABLE.

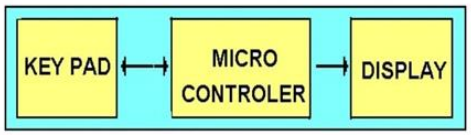
2. 4x4 Keypad interfacing with Microcontroller

The keypad is used as an input device to read the key pressed by the user and to process it.4x4 keypad consists of 4 rows and 4 columns. Switches are placed between the rows and columns. A keypress establishes a connection between the corresponding row and column between which the switch is placed. To read the keypress, we need to configure the rows as outputs and columns as inputs.

Columns are read after applying signals to the rows in order to determine whether or not a key is pressed and if pressed, which key is pressed. For more information about the keypad and how to use it, refer to the topic 4x4 Keypad in the sensors and modules section.

The key board here we are interfacing is a matrix keyboard. This key board is designed with a particular rows and columns. These rows and columns are connected to the microcontroller through its ports of the micro controller 8051. We normally use 8*8 matrix key board. So only two ports of 8051 can be easily connected to the rows and columns of the key board. Whenever a key is pressed, a row and a column gets shorted through that pressed key and all the other keys are left open. When a key is pressed only a bit in the port goes high. Which indicates microcontroller that the key is pressed. By this high on the bit key in the corresponding column is identified.

Once we are sure that one of key in the key board is pressed next our aim is to identify that key. To do this we firstly check for particular row and then we check the corresponding column the key board. To check the row of the pressed key in the keyboard, one of the rows is made high by making one of bit in the output port of 8051 high. This is done until the row is found out. Once we get the row next out job is to find out the column of the pressed key. The column is detected by contents in the input ports with the help of a counter. The content of the input port is rotated with carry until the carry bit is set.



Circuit diagram of *INTERFACING KEY BOARD TO 8051.*

3. RFID interfacing with Microcontroller

An RFID (Radio-frequency identification and detection) reader is a device which is used to communicate with RFID tags by receiving and transmitting signals. Interface RFID with 8051These signals use radio waves for wireless communication. RFID tag is applied to products, individuals or animals to identify and track them. The identification is done through a unique serial number. This topic covers the interfacing of a passive RFID system with AT89C51. The code of RFID tag is also displayed on an LCD interface. The free source code for the program is available in C. An RFID module basically consists of two parts, namely, a tag and a reader. A typical RFID system consists of an antenna, a transceiver and a transponder (RF tag). The radio frequency is read by the transceiver and the information is transferred to a device for further processing. The information (the unique serial number) to be transmitted is stored in the RF tag or transponder. The transponder contains a chip and an antenna mounted on a substrate. The chip transmits the relevant information through antenna.

RFID Reader used to read our RFID cards. Using the module with microcontrollers to read a card's data is very simple and required just a serial connection. The module should be powered at 3.3 – 5.5 VDC, and it requires a direct connection to the microcontroller's Serial Rx pin. The card data is transmitted over the serial line when the card is brought near the module.

RFID is Radio Frequency Identification. An RFID reader is used to read RFID tags (which contain certain unique data stored in a chip). An RFID reader and an RFID tag, both have a coil surrounding them. When an RFID tag is shown near an RFID Reader, it collects the unique tag data (a combination of digits and characters) from the RFID tag. Power the µRFID reader; when an RFID tag is shown near the reader, electromagnetic induction will take place between the coils and this powers the chip inside tag. This chip will send data electromagnetically to the reader. The reader will receive this electromagnetically transferred data and outputs it serially. Every RFID reader comes with Serial output pins. We can collect the read data through these serial pins using AT89S52.

When a high value is sent to the SEL pin of the reader, TTL Serial communication is enabled.

The output in this mode is the 10-digit card no (ASCII) + 2-digit XOR result (ASCII)

Different RFID tags work on different frequencies. Here low frequency, 125 kHz, RFID tags have been used. These tags work within a range of 10 cm. When an RFID tag comes in this range, the reader detects it and sends a unique code of the tag serially. This serial code, consisting of 12 bytes, is received by the microcontroller.

- Mechanical Arrangement

Fig mechanical arrangement

CONCLUSION

In this report, we have presented SMART LOCKING SYSTEM IN VEHICLE. By taking an overall survey it can be found that there are many problems are existing related to vehicles like stealing of vehicle. As well as no. of people are not following the traffic rules made by Government. There are systems existing for safety of vehicles like GSM GPS technology but they are dependent on network. So such systems are seem disadvantageous. But by using SMART VEHICLE system:

- We are able to achieve all the proposed features and functions.
- We are increasing the security level of our vehicle using SMART VEHICLE system.
- We are promoting the importance of traffic rules and regulations.
- It is affordable to all classes of society.

FUTURE SCOPE

1) In future, we can also use Biometric Identification system.
2) Also, we can add a feature which will send a message to the owner of vehicle if any unauthorized authentication happens.
3) If anyone try to steal the vehicle without using key or try to break the system, we proposed then we can avoid this by using ACCELEROMETER.

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