

Research Article

Security System for Car using RFID, Thumb Impression, Steering wheel Lock Based on ARM 7

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Abstract

A total security system based on Global System for Mobile, Global Positioning System, Radio frequency identification technology, in-camera, steering wheel lock is developed to prevent a car from theft. This consists of GSM, GPS, RFID & a sensor. When anyone wants to open the door of vehicle, it will ask for correct RFID identification. Accelerometer sensor is used to measure any breaking of window & movement of car. When key is inserted, message displays on liquid-crystal display asking the user to enter thumb impression. If the user fails to enter the correct thumb impression in three trials, a text message is sent to the owner's mobile with vehicle location using GPS. When anyone enters in car, camera takes the photo and sends it to the owner. A steering wheel lock is also used for more prevention. Further the connection to fuel injector of the car is stopped so that unauthorized person cannot start the vehicle anyhow.

Keywords: GSM, GPS, RFID, Keil, accelerometer sensor, thumb impression, steering wheel lock.

1. Introduction

Now-a-days a number of car anti-theft security options are available. But these antitheft devices are very expensive. So there is a need of an excellent protection of vehicle with the reliable anti-theft device. Car central locking system gives the best protection. Again this system could not prove to provide complete security of the vehicle in case of theft. So a better developed system based on GSM, GPS, RFID, camera, steering wheel lock is developed. The designed & developed system can install in the vehicle. GSM is used for sending messages. This device uses the ARM 7 microcontroller which will interface to other peripheral devices like GSM, GPS, RFID reader, accelerometer sensor etc. The accelerometer sensor will interface to microcontroller which is used to sense the Vibrations. When vehicle is parked, the accelerometer will sense the vibrations or movement of the car. When vibration goes above a certain limit the SMS will be send to the owner's mobile. The vehicle is provided with the RFID reader. The door assembly is developed using DC motor which would be controlled using the relay. When an unauthorized person wants to open the door of car then he/she is unable to open without RFID tag. There may be possibility that the person may break the window of car, accelerometer will sense the vibrations and send the message to owner's mobile. After entering in car, the camera will take snap of person and send it to owner, after that user try to start, but unable because when key is inserted, one message will be displayed on LCD for

entering correct finger-print. User will be given three trials, after third trial, message will be send to owner's mobile with location of car & alarm will on. After that a steering wheel lock is used here, so no one can drive it until he/she removes the lock. This first section gives the introductory part, second section gives overview of systems designed previously and the proposed system. The third section gives the system overview including hardware and software specification. Fourth section includes the conclusion and future scope.

The switching system (SS) is responsible for performing call processing and Subscriber-related functions. The switching system includes the following functional units:

Home location register (HLR): The HLR is a database used for storage and management of subscriptions. The HLR is considered the most important database, as it stores permanent data about subscribers, including a subscriber's service profile, location information, and activity status. When an individual buys a subscription from one of the PCS operators, he or she is registered in the HLR of that operator

Mobile services switching centre (MSC): The MSC performs the telephony switching functions of the system. It controls calls to and from other telephone and data systems. It also performs such functions as toll ticketing, network interfacing, common channel signalling, and others.

Visitor location register (VLR): The VLR is a database that contains temporary information about subscribers that is needed by the MSC in order to service visiting subscribers. The VLR is always integrated with the MSC.

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1991, the abbreviation GSM was renamed to Global System for Mobile Communications. Module used here is S2/1040W/Z0936 SIM 900A. The GSM network can be divided into three parts

- 1) Mobile Station
- 2) Base Station
- 3) Network Subsystem

The mobile station (MS) consists of mobile equipment and a Subscriber Identity Module.

C. GPS: The Global Positioning System (GPS) is global navigation satellite. GPS has become a widely used aid to navigation worldwide and a useful tool for map-making, land surveying, commerce, scientific uses, tracking and surveillance. A GPS receiver measures its position by carefully timing the signals sent by the constellation of GPS satellites high above the Earth.



Fig. 2 GPS modem

D. Radio frequency identification (RFID): RFID is a generic term for technologies that use radio waves. The combined antenna and microchip are called an RFID transponder or RFID tag and work in combination with an RFID reader (sometimes called an RFID interrogator). This system consists of a reader and one or more tags. The reader's antenna is used to transmit radio frequency (RF). Depending on the type of tag, the energy is harvested by the tag's antenna and used to power up the internal circuitry of the tag. There are two common types of tag technologies. Passive tags are tags that do not contain their own power source.



Fig. 3 RFID reader

The Sunrom RFID Card Reader is developed specifically for passive tags. RFID tags and readers must be tuned to

the same frequency in order to communicate effectively. The read range of a tag depends on many factors: the frequency of RFID system operation, the power of the reader, environmental conditions, physical size of the tags antenna and interference. Taking into consideration a number of engineering trade-offs (i.e. antenna size v. reading distance v. power v. manufacturing cost), the Sunrom RFID card reader's antenna was designed with a RFID operation at a tag read distance of around 7 cm.

E. LCD

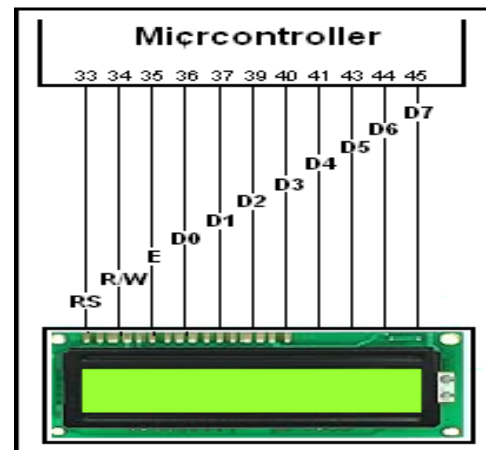


Fig. 4 LCD

LCD Pin Description: LCD is the common interface between software, hardware and user. LCD pin configuration is as follows

V_{CC} , V_{SS} , V_{EE}

V_{CC} & V_{SS} provides +5V & ground respectively, V_{EE} is used for adjusting LCD contrast.

RS (Register Select)

If RS = 0, the instruction command code register is selected, allowing the user to send a command such as clear display, cursor at home, etc. If RS = 1, data to be displayed on LCD.

R/W (Read/Write)

If R/W = 1, Read operation. If R/W = 0, Write operation. The LCD, to latch information presented to its data pins uses the Enable pin. When data is supplied to data pins, a high – low pulse must be applied to this pin in order to latch data present at the data pins. When D7 = 1, the LCD is busy in taking care of the internal operation, will not accept any new information. When D7 = 0, the LCD is ready to receive new data. LCD used here is 16 by 2.

F. Accelerometer (ADXL 335): The ADXL335 is a small, low power, 3-axis accelerometer. This measures acceleration with a minimum full-scale range of ± 3 g. It can measure the static acceleration of gravity in tilt-sensing applications and dynamic acceleration, shock, or vibration. The user can select the bandwidth of the accelerometer using the CX, CY, and CZ capacitors at the XOUT, YOUT, and ZOUT pins. Bandwidths can be selected to suit the application. ADXL335 is available in market in a small, low profile, 4 mm \times 4 mm \times 1.45 mm, 16-lead, plastic lead frame chip.



Fig. 5 Accelerometer sensor

G. Camera: It is possible to fit camera in a car very easily. This can be set to broadcast images to owner via the internet so at any time the car owner can see what is going on inside the car.

H. Relay: The relay we are using in this is electromechanical relay. The voltage required is +12V DC. It can be obtained using the relay driver IC. When the relay is excited by applying the 12V DC, the relay gets activated, turns ON the device and when the excited voltage is stopped, the relay gets deactivated and turns OFF the device.

I. Thumb Impression: This machine is available at a very low price. We can connect this machine directly with the computer system to transfer the data. USB device like pen drive can be used for data transfer. It takes less than 2 seconds to identify the thumb impression. It's Size is 21 X 3.5 X 14.5 cm. Module used is x990.

J. Steering Wheel Lock: Another most important security provided against theft is steering wheel lock. 'The club' is the most popular steering wheel lock and is least expensive. This lock goes over the steering wheel so no one can drive it until he/she removes the lock.

II) Software specifications

Keil was founded in 1986 to market add-on products for the development tools. It is provided by many of the silicon vendors. The Keil generates code for any device that is compatible with the 8051, 251, C16x/ST10, or ARM microcontrollers. The exception to this would be a device that has removed or changed the instruction set. However, that device would no longer be a compatible part. When we start a project using the Keil uVision IDE, we must select a chip from database.

4. Conclusion

Because of this security system, it is too hard to an unknown person to steal the car. This is a low-cost and excellent vehicle anti-theft control system. Some extra features like face recognition, alcohol sensor, tire lock can be added to give more security. Future scope is that the system should be embedded on single chip.

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