

RFID & Fingerprint Based Vehicle Security System with GSM & GPS Technology

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Abstract:

Vehicle theft has become the major problem in any country. This paper focuses on preventing vehicle theft by incorporating some verification modules. This system uses GSM and GPS technologies which enables user to track the vehicle from any remote location. It includes biometrics, i.e. Fingerprint to verify the registered user. RFID is also connected to access the vehicle in urgency.

Keywords — Arduino UNO, Fingerprint, RFID, GSM, GPS, Buzzer, Display

I. INTRODUCTION

The Automotive Information Council (AIC) reports that over one million Automobiles are stolen in the country each year. So approximately one motor vehicle theft occurs for every 31 seconds. Hence it has become essential to secure the vehicles from burglary cases.

This paper focuses on securing the automotive using the technologies like Radio Frequency Identification (RFID) technology and Biometrics, i.e. Fingerprint with the help of GSM & GPS.

Some of the reasons due to which vehicle security is limited are given below:

- Most of the cars have similar alert sounds.
- Alarms can be disabled on theft attempts.
- Alarm sound can be ignored in crowded areas.

By these reasons, the simple security systems employed in vehicles cannot give utmost protection from burglars. So there is an immense need to go for advanced security systems.

II. EXISTING METHOD

Till now many vehicle security systems incorporated in which utmost security lacks.

- Design and development of GPS-GSM based tracking system with Google map based monitoring. In this system they have incorporated GSM & GPS using which the vehicle can be tracked after the theft occurrence. The major drawback in this system is the vehicle cannot be protected before theft.
- Anti theft system for vehicles using fingerprint sensor. In this system the probable vehicle theft can be prevented. To achieve this they have incorporated biometrics, i.e. a fingerprint. The major drawback in this system is, if the

user wants to give his vehicle to his friend he cannot come and access the vehicle by using fingerprint every time.

III. PROPOSED METHOD

In the proposed system, the security is advanced by incorporating Fingerprint and RFID. Initially the user needs to confirm his/her identification before accessing the vehicle. For user identification finger print sensor is used. The finger print sensor is attached to ARDUINO UNO. The role of ARDUINO UNO is to access the finger print sensor by using its commands. There is Serial Communication between Finger Print Module and PC. The user will first put his/her thumb on sensor. Matching will be done from sensor data base. If match found then access will be granted. If user is invalid then sensor doesn't read the user's thumb.

If the user's friend wants to access the vehicle, RFID will come into action.

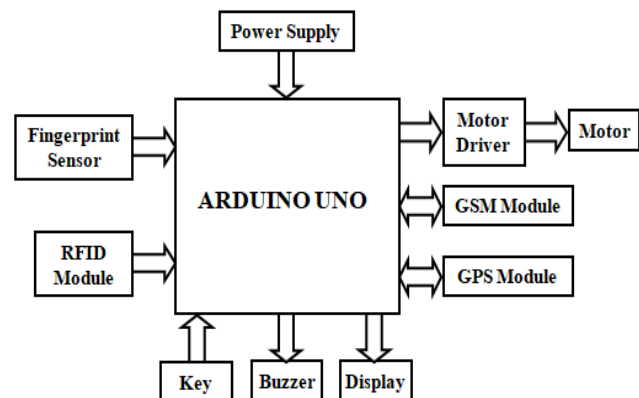


Figure 1: Block-Diagram

IV HARDWARE DESCRIPTION

4.1.1. ARDUINO UNO:

The Arduino Uno board is a microcontroller based on the ATmega328. It has 14 digital input/output pins in which 6 can be used as PWM outputs, a 16 MHz ceramic resonator, an ICSP header, a USB connection, 6 analog inputs, a power jack and a reset button. This contains all the required support needed for microcontroller. In order to get started, they are simply connected to a computer with a USB cable or with a AC-to-DC adapter or battery.

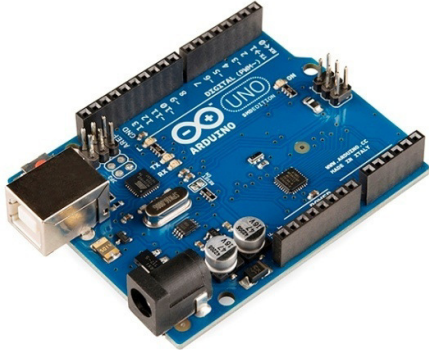


Figure 1: ARDUINO UNO

4.1.2 FINGER PRINT SENSOR:



Figure 2: Finger print sensor

Fingerprint scanners are of three types.

1. Optical Fingerprint scanner
2. Capacitive Fingerprint scanner
3. Ultrasonic Fingerprint scanner

In this system we use Optical Fingerprint scanner.

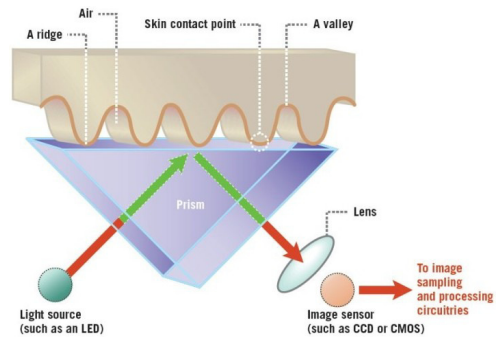


Figure 3: Fingerprint working principle

Optical fingerprint scanners are the oldest method of capturing and comparing fingerprints. As the name suggests, this technique relies on capturing an optical image, essentially a photograph, and using algorithms to detect unique patterns on the surface, such as ridges or unique marks, by analysing the lightest and darkest areas of the image.

4.1.3. RFID:

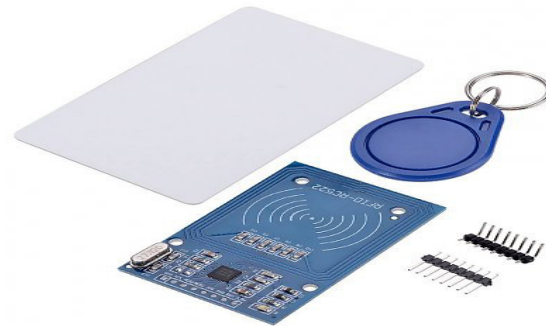


Figure 5: RFID READER & TAGS

RFID is an acronym for “radio-frequency identification” and refers to a technology whereby digital data encoded in RFID tags or smart labels are captured by a reader via radio waves. RFID is similar to bar-coding in that data from a tag or label are captured by a device that stores the data in a database. RFID, however, has several advantages over systems that use barcode asset tracking software. The most notable is that RFID tag data can be read outside the line-of-sight, whereas barcodes must be aligned with an optical scanner.

RFID utilize radio waves to accomplish this. At a simple level, RFID systems consist of three components: an RFID tag or smart label, an RFID reader, and an antenna. RFID tags contain an integrated circuit and an antenna, which is used to transmit data to the RFID reader (also called an interrogator). The reader then converts the radio waves to a more usable form of data. Information collected from the tags is then

transferred through a communications interface to a host computer system, where the data can be stored in a database and analyzed at a later time.

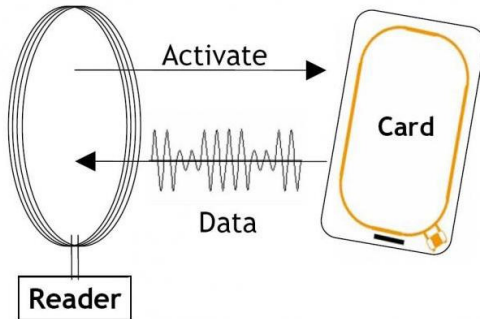


Figure 6: RFID WORKING

4.1.4. GSM MODULE:

GSM/GPRS module is used to establish communication between a computer and a GSM-GPRS system.

GSM/GPRS Modem can perform the following operations.

1. Receive, send or delete SMS messages in a SIM.
2. Read, add, search phonebook entries of the SIM.
3. Make, Receive, or reject a voice call.

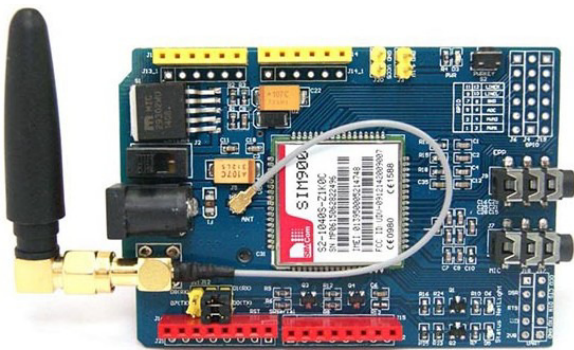


Figure 7: GSM MODULE

4.1.5. GPS MODULE:

Global Positioning System can be used to provide security throughout the off state condition of the vehicle. Even there is a possibility to drive away vehicle in switch off condition. There are cases where one vehicle can be totted in another higher vehicle. Thus, GPS prevents vehicle lifting and theft detection.

This tracking system can inform you the location and route travelled by vehicle, and that information can be observed from any other remote location.



Figure 8: GPS MODULE

4.2. SOFTWARE DESCRIPTION:

Arduino C software:

Arduino is the hardware platform used to teach the C programming language as Arduino boards are available worldwide and contain the popular AVR microcontrollers from Atmel. It is a full-featured integrated development environment (IDE) that uses the GCC C software tools for AVR microcontrollers and is free to download.



Figure 9: Arduino C software

V WORKING AND RESULTS

The main working of this system is:

Whenever the user wants to access the vehicle, the system asks for Finger print scan. If the fingerprint matches the user can take the vehicle. If it's not, the system won't read the fingerprint and vehicle cannot be turned ON.

In case if the user's friend wants to access the vehicle, every time the user cannot come and put the finger print to give a vehicle to his/her friend. In this case the second user can go for RFID. The owner of the vehicle can simply give the RFID TAG using which his/her friend can access the vehicle without using Fingerprint at all.

If any unauthorized person tries to access the vehicle by placing random RFID TAG, the system alerts the user by alarm sound and the message will be sent to owner's mobile consisting longitude and latitude details using which the owner can track the vehicle.

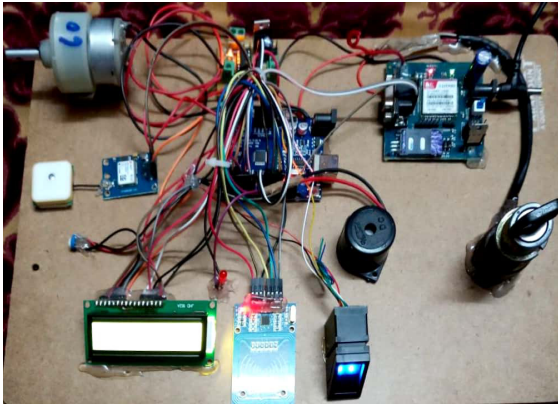


Figure 4: FINAL OUTPUT



Figure 11: MESSAGE ON LCD DISPLAY

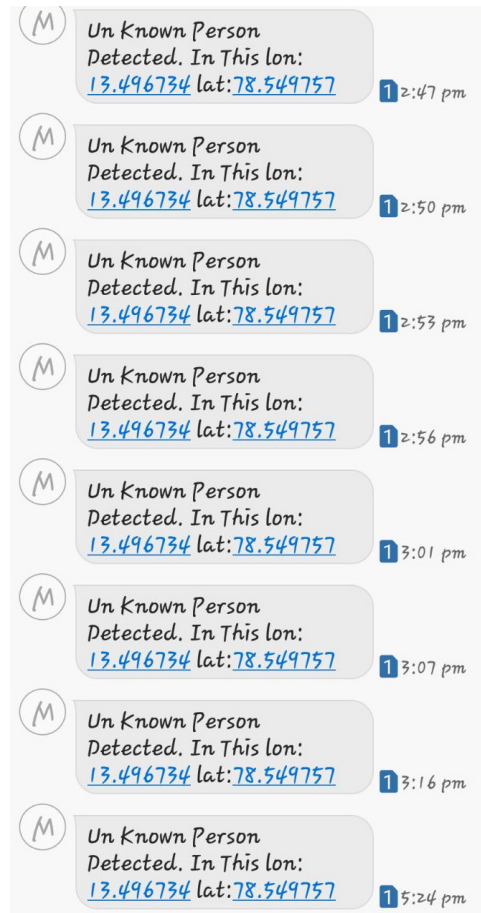


Figure 12: ALERT MESSAGE TO OWNER INCASE OF UNAUTHORIZED ACCESS

VI CONCLUSION

Security is fundamental criteria in all kind of applications. This project is aimed at improving the level of security for vehicles. As the fingerprint is a promising biometric pattern for identifying a person in terms of both security and ease of use.

It provides more advantages over password and token-based security. And the RFID gives extra features in terms of reliability and protection. This is a unique method of implementing low-cost, packed in theft control system for an automobile which is highly reliable.

Hence this system can be used for security in terms of usability, size, privacy and operational temperature range.

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