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KEYLESS START VEHICLE SECURITY SYSTEM USING RFID

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Abstract
This paper proposes an RFID (Radio Frequency Identification) accessed ignition system for automobiles that enhances security and provides convenient access to authorized users. The system comprises an RFID reader, an antenna, and an ignition controller, which work together to ensure that only authorized users can start the engine. The user's RFID tag is attached to the vehicle key, which must be presented within the range of the RFID reader to activate the ignition controller. This system eliminates the need for a physical key and prevents unauthorized access, theft, or hotwiring of the vehicle. In this paper, we discuss the design and implementation of the RFID-accessed ignition system and evaluate its performance in terms of security, reliability, and user experience.
Keywords:RFID, ignition system, security, access control, anti-theft, automobile.

I. Introduction

Vehicle theft is a serious issue that affects people all around the world, causing financial losses and annoyance for automobile owners. Immobilizers and alarms are a couple of the technologies that have been created recently to stop auto theft. The vulnerability of car owners is increased by the ease with which professional criminals may overcome these systems.
As a solution to this problem, RFID (Radio Frequency Identification) technology has been put out as a more dependable and safe way to manage vehicle access. RFID tags, which contain unique identifiers, communicate with readers using radio waves. The automobile can start when the reader recognizes the tag and sends a signal to the ignition system.
In this work, we suggest an RFID-accessed ignition mechanism that gives car owners increased security.
The system comprises a tag, an ignition control device, and an RFID reader. The tag, which is integrated inside the key fob, is connected to the vehicle's installed RFID reader. The ignition control unit permits the automobile to start when the key fob is brought within proximity of the RFID reader and the tag is read.
The suggested approach has several benefits over conventional ignition systems. First, it makes driving more convenient by doing away with the need for physical keys. Second, it adds another level of protection because an RFID tag is difficult to copy or get around. Last, but not least, it reduces the chance of hot-wiring, a typical technique employed by thieves to steal cars.

II. Methodology

RFID Tags:

The description of an RFID tag is generally accurate. However, it's important to note that RFID tags can come in various shapes and sizes, not just credit-card sizes. Additionally, while some RFID tags operate at 125kHz, some tags operate at higher frequencies, such as 13.56 MHz or 900 MHz, depending on the application and desired read range.
Also, while some RFID tags may come with a fixed, unchangeable ID number, others may have the ability to store and transmit additional information, such as product information, serial numbers, or even temperature or humidity data. These types of tags are often referred to as "smart tags" or "sensor tags".

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Finally, the ability to read and access the unique ID number of an RFID tag requires the use of specialized software and hardware, such as an RFID reader or scanner. Without the proper equipment, the unique ID number of an RFID tag cannot be read or accessed.

Block Diagram:

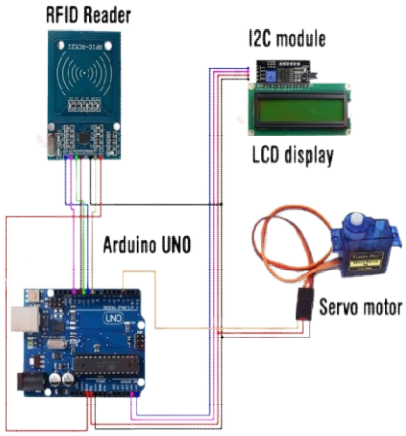

Figure.1. Block Diagram

EM 18 Reader:

We had the used EM-18 RFID reader module which operates at 125kHz. The module comes with an on-chip antenna and can be powered with a 5V power supply. The transmit pin of the module is connected to receive pin of the Arduino UNO board. Its basic use is to provide authorized access as this module can only provide access when we are having an access card or tag if any unauthorized people are trying to break the security system then this would make the system trigger the alarm.

Arduino UNO Board:

The Arduino Uno board is a microcontroller board based on the ATmega328P chip. It has 6 analog inputs, a 16 MHz quartz crystal, 14 digital input/output pins, 6 of which can be used as PWM outputs, a USB port, a power jack, and an ICSP header. It is compatible with various shields and modules, allowing for easy prototyping and expansion of projects. The board is programmed using the Arduino Integrated Development Environment (IDE), which is based on the C++ programming language. The IDE allows for easy writing, compiling, and uploading of code to the board. Additionally, the Arduino community provides a wide range of libraries and examples, making it easy for beginners and experts alike to quickly prototype and develop their projects. The Arduino Uno board is widely used in a variety of applications, from simple hobby projects to more complex industrial automation and control systems. Its low cost, ease of use, and wide range of available resources make it a popular choice for both beginners and experienced users in the field of embedded systems and microcontrollers.

III. Logic Behind the System

Relay:

We are using a 12-volt relay. The relay driver circuit is used to turn on the relay. Using this relay user can control any AC or DC device.

Buzzer:

We are using a piezoelectric buzzer. This is a warning/indication that an invalid attempt is done to gain access to the system.

DC motor:

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It will be used to show a demonstration of door or gate opening.

LCD Display:

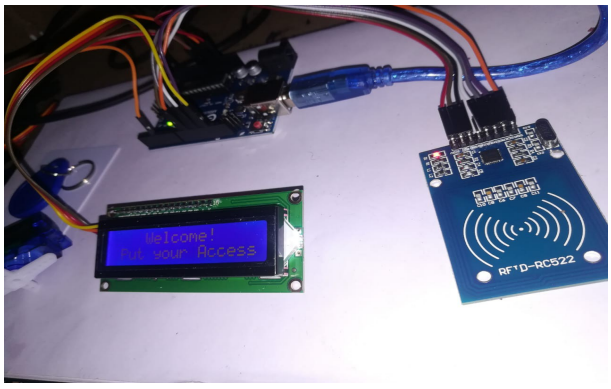
Liquid Crystal Display (LCD) was used. It displays on 2 lines each containing 16 characters. LCD has a total of 16 pins for interface with the processor. RS is an instruction or data select line. This pin is kept high or low by the microcontroller to indicate command instructions or data bytes on data bus db0-db7. A special feature of this LCD module is it allows the reading of data bytes stored in RAM. Pin no. 5 i.e. R/W is used for deciding between read operation or write operation. Graphic display has RAM for storing characters codes to be displayed on LCD.

IV. Result and Discussion

The implementation of an RFID-accessed ignition system has shown promising results in terms of improving security and access control to a vehicle's ignition system. The system effectively uses an RFID reader to verify the identification number of an RFID tag, and only allows access to the ignition system if the tag belongs to an authorized user. The system also provides a visual interface through an LCD, which displays information about the system status and whether access has been granted. This can provide users with a sense of reassurance and help to prevent potential security breaches.

The use of an RFID-accessed ignition system can be highly beneficial in a range of environments, including fleet management, car-sharing programs, and parking facilities. The system offers improved security by only allowing authorized users to start the vehicle, which can reduce the risk of theft and unauthorized use. Furthermore, the system provides an audit trail of who has accessed the vehicle, which can be useful in tracking vehicle use and identifying potential security breaches. This can be particularly important in fleet management, where companies need to ensure that vehicles are being used appropriately and by authorized personnel. However, it is important to note that the effectiveness of an RFID-accessed ignition system relies on the proper management of the authorized user list. If unauthorized users are added to the list, or if authorized users lose their RFID tag, the system may become compromised. Additionally, while an RFID-accessed ignition system can provide increased security and access control, it is not foolproof. Sophisticated thieves may be able to bypass the system or use other methods to gain access to the vehicle. Therefore, it is important to use the system as part of a broader security strategy, which may include physical barriers and surveillance measures. Overall, the implementation of an RFID-accessed ignition system can be highly beneficial in improving security and access control to a vehicle's ignition system. However, it is important to understand the limitations of the system and to use it as part of a broader security strategy.

Figure:2. RFID Accessed Ignition System



V. Conclusion

Compared to other systems like biometrics, RFID-based security, and access control is more secure and quick to react. The RFID system's benefit is that it operates without line-of-sight and requires no physical touch. When using an Arduino, the device is simple to use and operates swiftly while the code is being burned. Using Arduino, users can modify the function as necessary. It is also more accurate and simpler to use. This project can therefore help implement an access control application for a tracking system and offer security advantages. By expanding the reader range where the tag can be read, this project can be made better.

VI. Future scope

Integration with other security systems: To offer a complete security solution, the RFID-accessible ignition system can be integrated with other security systems like security cameras, GPS tracking, and alarm systems. This connection can increase the system's efficiency and offer more layers of security to guard against any security breaches.

Implementing a multi-factor authentication solution, such as integrating biometric authentication with RFID tag verification, will further strengthen the security of the system. Facial recognition and fingerprint scanning are two biometric authentication methods that can assist prevent unauthorized access by someone using a stolen or misplaced RFID tag.

Wireless communication: Using wireless communication technologies like Bluetooth or Wi-Fi can give the system extra functionalities like remote access and control. Given that remote vehicle tracking and control are possible with fleet management, this can be especially helpful.

Utilizing cloud-based management can offer a central platform for managing the list of authorized users and keeping track of the system's performance. The system's usability, scalability, and data analytics capabilities may all benefit from this.

Integration with autonomous driving technology: The combination of an RFID ignition system with an access control system for driverless vehicles can bring further security and access management capabilities. The system can limit authorized users' access to autonomous driving features, thereby reducing the risk of security breaches and enhancing vehicle management.

Utilizing low-power RFID tags and improving the system's power management can increase the system's energy efficiency. This can decrease the need for maintenance and increase the system's battery life.

A wide range of opportunities exists to enhance the functionality, security, and user experience of an RFID-accessed ignition system in the future. Future directions for the system could include the incorporation of other security systems, multi-factor authentication, wireless communication, cloud-based management, integration with autonomous driving technology, and energy efficiency**.**

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