

RFID Smart Door Lock Security System Exploration

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Abstract

An entry system will permit only authorized individuals to access the organization. This system can also be installed at various locations within the organization to monitor personnel movement and restrict entry to sensitive areas. This method enhances security by identifying and apprehending suspicious individuals. Radio Frequency Identification (RFID) technology, a wireless system, can be utilized to develop an access control system. Research has demonstrated the application of RFID technology in automating processes across diverse fields, from the industrial sector to home automation. An entry control system that restricts access exclusively to authorized personnel can significantly enhance security within an organization. By installing this system at various points throughout the organization, it is possible to track the movement of individuals and restrict access to sensitive areas. This not only helps in monitoring employee activities but also aids in identifying and managing potential security threats by detecting suspicious behaviours.

Keywords

CPU Scheduling Algorithms, Hybrid Algorithm, Efficiency, Execution Time, Scheduler, Optimization

I. INTRODUCTION

RFID credit card protection is designed to facilitate secure, scalable access to applications, resources, and services, all managed by a security card provider. Security companies offer their services based on a fundamental model. This system is a mobile information platform with a realtime visual display of activities, enhancing efficiency and reducing the need for manual data entry. RFID is an emerging technology that uses radio waves to identify devices or objects. To evaluate security and privacy concerns, it's essential to provide a brief introduction to the basic elements of RFID systems. A typical RFID system includes one or more RFID tags, a reader, and a backend device. Each tag contains a unique identification code. An RFID reader emits radio frequency electromagnetic fields that power the tag. The tag responds to the reader's query by transmitting its unique identification data via radio waves. This data is decoded by the reader and sent to the local software device through middleware. The middleware acts as an interface between the tag reader and the RFID applications device. The device then compares the code with the data stored in the host database or backend device. If there is a match, the process is considered successful.

Evolution of RFID Smart Door Technology

RFID smart door technology has evolved significantly over the years. Initially, RFID (Radio Frequency Identification) technology was primarily used for tracking and identification purposes. However, with advancements in technology, RFID has been integrated into smart door systems to enhance security and convenience. Users now have the option to customize their RFID smart door settings according to their preferences. This

includes setting up schedules for automatic locking/unlocking, creating virtual keys for guests, and integrating with voice assistants the evolution of RFID smart doors has transformed them from basic access control devices to sophisticated components of smart home systems, offering enhanced security, convenience, and customization options for users.

Importance of RFID Smart Door Technology

RFID door tags are essential components in RFID smart door systems. These tags play a crucial role in providing secure and convenient access control. RFID door tags contain unique identification information that allows the RFID reader to recognize and authenticate individuals. In summary, RFID door tags are integral to the functionality of RFID smart door systems, providing a secure, efficient, and customizable access control solution for residential, commercial, and institutional settings.

II. LITERATURE SURVEY

Verma and Tripathi [2] explains RFID, Radio Frequency Identification is an inexpensive technology, can be implemented for several applications such as security, asset tracking, people tracking, inventory detection, access control applications. The main objective of this paper is to design and implement a digital security system which can deploy in secured zone where only authentic person can be entered. We implemented a security system containing door locking system using passive type of RFID which can activate, authenticate, and validate the user and unlock the door in real time for secure access. The advantage of using passive RFID is that it functions without a battery and passive tags are lighter and are less expensive than the active tags. A centralized system manages the controlling, transaction and operation task. The door locking system functions in real time as the door open quickly when user put their tag in contact of reader.

Tedjini and Perret [7] explains Radio-frequency identification (RFID) is one of the most enabling technologies that continues to be considered in numerous applications. It is basically a wireless system exploiting the principle of communication by reflected waves. This paper reviews the principle of RFID systems, and discusses the main characteristics. Since the tag is the most constrained device in RFID - since it is usually does not have a battery, and is quite versatile and low cost- the paper reviews different tag designs, as well as some advanced results and proposals.

Nath et al. [6] explains the system proposed is a door unlocking system containing multiple doors any of which can be used to access a certain zone e.g. a laboratory or library. The system is implemented using a central server which contains a central database gathering all the information about the authorized personnel. The hardware components required are RFID reader, passive RFID tags, wireless transmitter & receiver (433 MHz) and an Arduino microcontroller. Software assistance of Arduino IDE and Processing Development Environment (PDE) are required for control. There is also provision for real-time monitoring of users' activities i.e. entry and exit. This is made possible by automatic synchronization of the system with a secured webpage via internet

III. EXISTING SYSTEM

Traditional Door Lock System

The existing door lock system typically consists of traditional lock and key mechanisms. These systems require physical keys to unlock doors, which can be cumbersome and less secure compared to modern RFID door tag systems. Upgrading to an RFID door tag system offers enhanced security, convenience, and flexibility in access control. If you're considering upgrading your existing door lock system, RFID technology could be a valuable and efficient solution for your security needs.

Limitations of Traditional System

Security Vulnerabilities: Traditional lock and key systems are susceptible to security breaches such as lock picking, key duplication, and unauthorized access. This can compromise the safety of the premises and valuable assets.

Lack of Access Control: With physical keys, it can be challenging to manage and control access permissions effectively. It's difficult to track who has keys, and if a key is lost or stolen, it poses a security risk as anyone in possession of the key can potentially gain entry.

Inconvenience: Physical keys can be inconvenient to carry, easy to misplace, and time consuming to use, especially in scenarios where multiple keys are required for different doors or areas.

Difficulty in Integration: Traditional lock and key systems are often standalone and not easily integrated with modern security or building automation systems, limiting the ability to incorporate advanced features like remote access control or automation.

Modern RFID Smart Door Systems

RFID technology provides enhanced security features that help safeguard premises against unauthorized access. With encryption, unique tag identifiers, and customizable access control settings, RFID door tag systems offer a robust defense mechanism that deters intruders and ensures only authorized individuals can enter designated areas. RFID door tag systems offer contactless access, allowing users to enter buildings or facilities by simply waving or tapping their RFID enabled tag or card near a reader. This hands-free approach not only enhances convenience but also minimizes physical contact, which is crucial in today's hygiene-conscious environment.

Challenges with RFID AMSRT Door System

- **Security vulnerability:** These systems are susceptible to unauthorized access.
- **Cost:** cost of implementing these systems can be a barrier.

IV. PROPOSED SYSTEMS

The proposed system of an RFID smart door system involves the integration of RFID (Radio Frequency Identification) technology to enhance security and access control. A RFID smart door system typically consists of RFID tags, RFID readers, a control unit, and software for monitoring and managing access.

RFID Tags: Each individual authorized user is assigned a unique RFID tag. These tags contain a microchip that stores user identification data. When a user approaches the door, the RFID tag emits a signal when activated by the reader.

RFID Readers: The RFID readers are installed near the door and are responsible for detecting the RFID tags in proximity. The readers communicate wirelessly with the tags and capture the tag's unique identification information.

Control Unit: The control unit processes the data received from the RFID readers and determines whether to grant or deny access based on the information stored in the system's database. It controls the locking mechanism of the door, allowing access only to authorized individuals.

Software: The software component of the system manages user credentials, access permissions, and activity logs. It provides administrators with the ability to add or remove users, set access levels, and track entry and exit events in real-time.

Access Control: The proposed system offers enhanced security features such as two-factor authentication, time-based access restrictions, and remote monitoring capabilities. Administrators can remotely control access permissions and receive alerts for unauthorized access attempts.

Integration: The RFID smart door system can be integrated with other smart home or security systems, enabling seamless automation and centralized control. Integration with mobile applications allows users to manage access remotely and receive notifications on their smartphones.

V. COMPONENTS USED

Rfid Reader

RFID (Radio Frequency Identification) readers play a crucial role in various applications, from inventory management to access control systems. These devices are designed to interact with RFID tags, which contain unique identification data. RFID readers come in different types, such as fixed, handheld, and desktop readers, each serving specific purposes.



In an RFID system, the reader emits radio waves to communicate with RFID tags within its range. When a tag enters the reader's field, it captures the tag's data and processes it for further actions. RFID readers can read multiple tags simultaneously, enabling efficient

tracking of items or individuals in real-time. One key advantage of RFID readers is their ability to provide contactless identification.

Arduino UNO

The Arduino Uno is a popular microcontroller board in the Arduino family, widely used for various electronics projects due to its simplicity and versatility. Here are some key features and aspects of the Arduino Uno:

Key Features

Microcontroller: The Arduino Uno is based on the ATmega328P microcontroller, which runs at 16 MHz. It has 32 KB of flash memory for storing programs, 2 KB of SRAM, and 1 KB of EEPROM.

Input/Output Pins: It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a USB connection for programming and power, a power jack, an ICSP header, and a reset button.

Power Options: The board can be powered via the USB connection or an external power supply (7-12V DC) through the power jack. It also has a VIN pin to accept voltage directly.

Compatibility: Arduino Uno is compatible with a wide range of shields (add-on boards) that extend its capabilities, such as motor drivers, Ethernet modules, and wireless communication modules.

Programming: It can be programmed using the Arduino Software (IDE), which is based on a simplified version of C++.

Ease of Use: Arduino Uno is designed to be beginner-friendly, with a straightforward interface and community support for troubleshooting and learning.



Buzzer

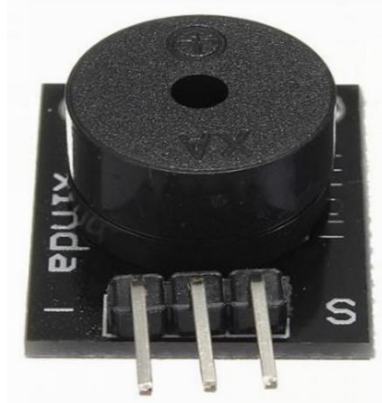
A buzzer is an electronic component that produces sound or an audible alert. Its role varies across different applications, including:

Alert and Warning Systems: Buzzers are used in alarms and warning systems to signal emergencies or important notifications. For example, they are integral to fire alarms, doorbells, and car reverse indicators.

User Interface Feedback: In consumer electronics, buzzers provide auditory feedback to indicate actions like button presses or to confirm settings, enhancing user interaction.

Timers and Reminders: Buzzers are used in kitchen timers, watches, and other devices to alert users at specific times or intervals.

Industrial Applications: They serve as alerts for machinery status, process completion, or equipment malfunctions in industrial settings.



LED

LED (Red), LED (Green) function

LED (Red): If any unknown card is used in the device, then this red LED will burn and the door will not open.

LED (green): When a device is used in a known card, this green LED will burn and the door will open.



VI. APPLICATIONS

RFID smart door tag systems have various applications in enhancing security and access control in different settings. Here are some common applications of RFID smart door tag systems:

Access Control: RFID smart door tag systems are widely used for access control in buildings, offices, and residential complexes. Individuals can use RFID tags to gain entry

through secured doors, gates, or turnstiles, providing a convenient and secure way to manage access.

Employee Attendance Tracking: In workplaces, RFID smart door tag systems can track employee attendance by recording when employees enter or exit the premises. This data can be used for attendance management, payroll processing, and monitoring employee movement within the facility.

Asset Tracking: RFID tags attached to assets or equipment can help in tracking and managing inventory within a facility. By using RFID smart door tag systems, organizations can monitor the movement of assets in real-time, reducing the risk of theft or loss.

Parking Access: RFID smart door tag systems are utilized in parking facilities to control access to parking lots or garages. Users can use RFID tags to enter and exit parking areas, allowing for efficient management of parking spaces and enhancing security.

Smart Home Security: In residential settings, RFID smart door tag systems can be integrated into smart home security systems. Homeowners can use RFID tags to unlock doors, disarm security systems, and monitor access to their homes, adding an extra layer of security.

Event Management: RFID smart door tag systems are employed in event management for ticketing, access control, and attendee tracking. By issuing RFID tags to event participants, organizers can streamline entry processes, enhance security, and gather valuable data on attendee behavior.

VII. CONCLUSION

Numerous safety systems have been suggested in order to protect RFID buildings towards feasible attacks particularly all of us outlined the various software field from the RFID technologies in addition to a few achievable section of its software. We now have set up powerful protection depending on encryption technique Evaluating the suggested program along with current program, we now have satisfied along with each Guideline for example program authentication protection as well as functional runtime. Regarding protection, the machine is actually fairly guaranteed with regard to eliminating the actual biometric program as well as forerunning the actual procedure at the rear of the actual home windows. Regarding runtime, the actual system's needed period is more preferable compared to current. In conclusion, RFID smart door lock systems offer a range of benefits in terms of access control, security, and convenience. By utilizing RFID technology, these systems provide efficient and secure ways to manage access to buildings, offices, homes, and other facilities. They are commonly used for access control, employee attendance tracking, asset management, parking access, smart home security, and event management. Overall, RFID smart door lock systems enhance security measures, streamline access processes, and provide valuable data for monitoring and managing entry and exit points.

VIII. REFERENCES

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