

## Rfid based Access Control System Using Arduino

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### Abstract :

In the present scenario , security plays a vital role everywhere. To accomplish this, an RFID-based access control system based on Arduino was developed where RFID stands for Radio Frequency Identification Technology. The device accomplishes the necessary task by combining RFID technology and Arduino. RFID is a communication technology that is widely referred to as electronic tags. Radio signals can be used to identify a particular target, and the related data can be read and written without the need for direct communication. As life has become more intellectual in recent years, radio frequency recognition technology has advanced quickly, and is now commonly used in identity documents, defence, and production control . In this system, when the RFID reader recognizes an RFID tag, it compares the recognized tag's UID with stored UID database to see if they match. Access is allowed if the captured user UID matches one of the previously stored UIDs; or else does not access. This system is secure , fair and reliable.

**Keywords:** Arduino UNO, RFID Module, UID/tags, Database, Buzzer, Keypad

## 1. INTRODUCTION

Security and managing people at certain locations is the main issue now a days. Physical security is not the best option . We agree that security is more than just about technology; it is also about how people live their lives and assisting them in making the most of their time. The primary goal of implementing an access control system is to ensure that physical access to your buildings or sites is limited. It is the method of electronically limiting entry to improve security. It will keep track of who enters which areas and when. People's minds can be freed from security with the right access control scheme, allowing them to reach their full potential. It's often a simple task ,but it performs the vital task of safely controlling entry in day-to-day life. This is what we call Security for Life, and it's all about giving people more independence in their daily lives. The access control system ,as well as the data it produces, will improve not only security but also efficiency, success, innovation, and even happiness.

## 2.LITERATURE REVIEW

This is to prevent illegal access and present an automated attendance management system using Eclipse Oxygen.3a software for maintaining the proper record in the database and digital signature system is interfaced with personal computers to increase the security.[1]

This paper examines the current state of RFID-based access control systems and proposes a design scheme for an intelligent RFID-based access control system.[2]

This paper presents about the device which will detect the attendees tags and checks a person has passed through the system in one of two directions: in or out. This project is also an easy-to-use framework.[3]

This automatic billing system is an IoT integration that is done because it is a low-power, low-cost system that is easy to build. Due to the platform of the RFID tag and detector, it has a very high accuracy.[4]

This paper discusses the goal of developing a framework that is more advanced than just RFID detection and punching approved entry attendance. The latest plan is to incorporate a feature known as "VOICE GREETINGS" and audio files are saved in SD card each with different names and quotes, with its own tag ID.[5]

This paper addresses the automation of checkpoints and toll plazas for smarter traffic management, which helps people by saving time and reducing fuel consumption. Radio waves are used by RFID to classify and monitor objects. Endpoints are

RFID tags attached to objects that uniquely mark them.[6]

This paper discusses about the system which is made based on an incident at one of Bengaluru's ATMs, which called into question about the security and safety measures used at ATM machines. Safe ATM door locking system with RFID is a system for making ATM doors more secure and providing better protection to users.[7]

This paper presents about the system which is an easy and reliable way to keep track of student attendance on a wide scale. The proposed attendance tracking framework utilizes the Internet of Things (IoT) principle to log and retrieve data from a server/cloud and make it accessible to the user at any time and from any place.[8]

In this system ,the machine's operation demonstrated precision when it came to identifying RFID accounts, distinguishing between plastic and non-plastic bottles, storing or modifying account points, and dispensing items. The system could be powered by either commercial or solar energy.[9]

This paper discusses about the system which is used in a field with tall and wide tree/plant canopies. RFID solution for identifying orchard and vineyard sprayer movement was proposed, which could identify sprayer position and direction of travel even when the guiding device failed due to unreliable satellite signals.[10]

The proposed system, a student monitoring and attendance management system based on RFID technology, would improve the manual attendance process, particularly in a business or school setting. This system uses an automated system to keep track of student attendance. We can use this method to monitor a specific student to see if he or she is skipping classes.[11]

This paper presents about implementation of a low-cost signal scanner for obtaining signals from the air and determining RSSI parameters. It focuses on the use of low-cost RF scanners to acquire RFID signals and measure the Received Signal Strength Indication (RSSI) values without emitting signals into the air.[12]

### **3.PURPOSE**

The designing and implementation of RFID based Access Control System using Arduino is based on the following objectives

- a. To reduce the security risk of unauthorized access
- b. .It will follow the flow of identification, authentication and authorization.
- c. It is easy inventory management and reliable
- d. It is more safe, easy to use and make work less and it is suitable for different sectors.

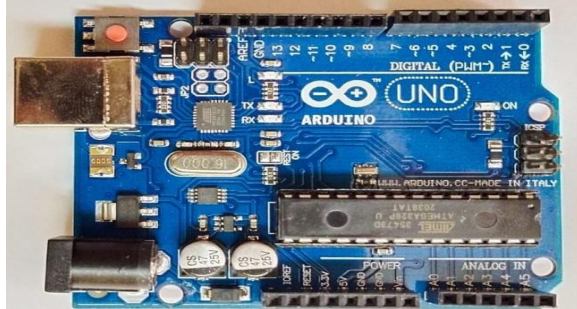
### **4.HARDWARE COMPONENTS**

- Arduino Uno
- MFRC522 RFID
- Buzzer
- LED
- Keypad

#### **A. ARDUINO UNO**

Arduino was developed at the Ivrea Interaction Design Institute to provide a simple forum for people without a background in programming or electronics to create new stuff. One of the most common and commonly used Arduino processor boards is the Uno. Shields come in a range of shapes and sizes (plug in boards adding functionality).When you

can't connect the board to the PC's USB port, you can power it from the 2.1 mm barrel jack with a separate power supply, or from the USB connector (usually up to 500 ma for all electronics including shield). Arduino is a free and open-source platform that uses basic hardware and programming tools. Arduino boards can accept inputs such as push buttons, passwords, and other types of information and transform them to outputs such as motor activation, LED switching, and online publishing. The board receives and sends a series of instructions to the microcontroller.



**Figure 1: ARDUINO UNO BOARD**

### **B. MFRC522 RFID**

RFID (radio-frequency identification) is widely used in access control. It is used to transmit data in order to recognize individuals or objects without having to make physical contact. RFID uses radio signals to recognize the object instead of contacting with the device and it is used to detect wide range of objects.

RFID functions in two ways:

1. Active: it is self-powered and has a long range.
2. passive: it has a shorter range and is operated by a reader.

The features of RC522 are 13.56MHz RFID module , Operating voltage is of 2.5V-3.3V, Communicates with SPI,I2C protocol, UART and Current Consumption is of 13-26 mA. It contains 8 pins.



**Figure 2: MFRC522 RFID MODULE**

### **C. BUZZER**

Buzzers are electronic transducers with a DC power supply that are commonly used in sound devices such as computers, printers, copiers, alarms, electronic toys, automotive electronic equipment, telephones, clocks, and other electronic items. 5V active buzzer This section dedicated sensor expansion module and the board, when used together, can complete a simple circuit design, allowing "plug and play." The buzzer here is used to generate sounds that signify various device

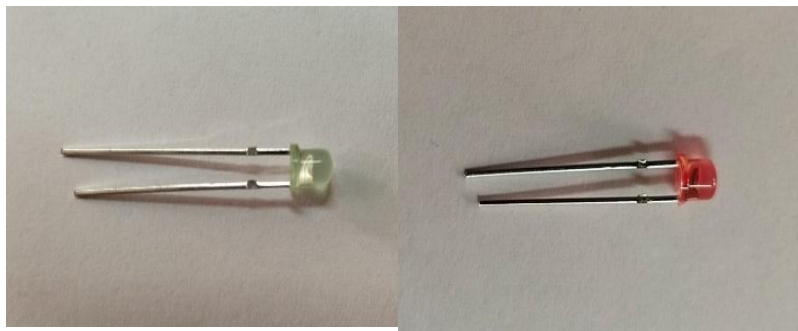
circumstances, such as alarming.



**Figure 3: BUZZER**

#### **D. LED**

The Light Emitting Diode (LED) is a device that transforms electric current into optical energy and is used as a indicator for different system situations.



**Figure 4: LIGHT EMITTING DIODES**

#### **E. KEYPAD**

In most ventures, the 4\*4 matrix keypad is used as input. It has a total of 16 keys, all of which have the same input values. The 4\*4 Matrix Keypad Module is a non-encoded matrix keypad with 16 parallel keys. The pins on the outside attach the keys of each row and column.



**Figure 5: KEYPAD**

## 5. SOFTWARE

- Arduino IDE

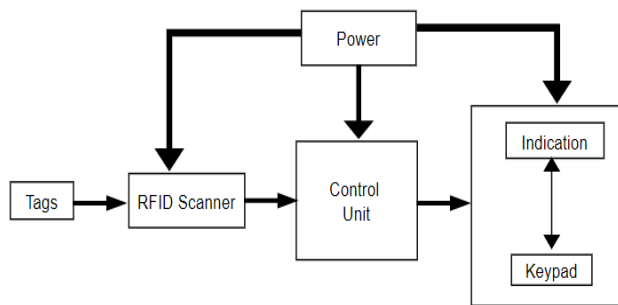
The software Arduino IDE is freely accessible software. It is utilized for preparing the code and uploading code into the module. This arduino software helps in code compilation which is very easy for com

## 6.METHODOLOGY

### DESIGN

In this project ,we designed the RFID based Access Control System consists of both hardware and software part.

The design of the project is shown below.



**Figure 6.1: DESIGN OF THE PROJECT**

### CONTROL UNIT

In the control unit , the main module is arduino. In this project , arduinouno was used because it is reliable and easily accessible. It receives the information from the rfid scanner when the tag is scanned and it checks and confirms with the information stored in the database. It shows the confirmed information in both software and hardware . In software, it shows in serial monitor and in hardware it shows by glowing the led and buzzer.

### RFID SCANNER

RFID Scanner plays a major role in the project . It scans the tags which will have the unique identifier (UID) for every tag . The tag's unique identifier will be displayed in the serial monitor of Arduino software.

### INDICATION

The indication circuit consists of

- LED
- Buzzer

It shows in serial monitor also which helps the user to identify whether their card is authorized or not. It shows the indication with led and buzzer in hardware which helps to identify the unauthorized person's entry.

## KEYPAD

In this project , keypad is used to enter the pincode when the correct RFID tag is identified. For every particular RFID tag the different pincode will be given .After entering the pincode through keypad only it will be accessed.

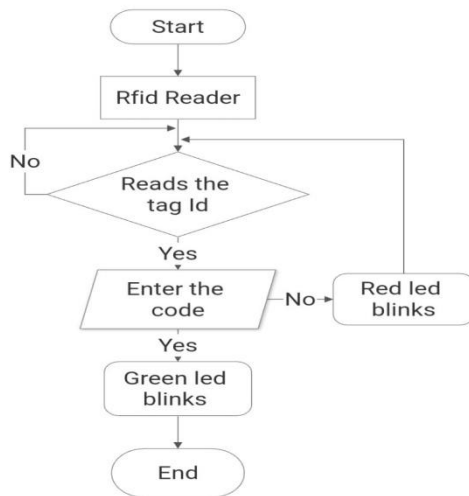


Figure 6.2: FLOWCHART OF THE PROJECT

## 7. WORKING

The working of this project is very simple and doesn't even take much time .It starts with the scanning of the RFID tags .If the RFID tag is authorized. The user has to enter a pincode set for that particular tag and if the RFID tag is not authorized then the red LED glows and buzzer makes a long beep . The user has about seven seconds to enter a pincode if he/she doesn't then a long beep with red LED will be the output. If the user enters the correct pincode then green LED glows and the buzzer gives out a short beep that indicates the person have been accessed. The system can only grant access if the correct tag is scanned and when the correct pincode is entered; if the incorrect tag is scanned, the system will refuse access.

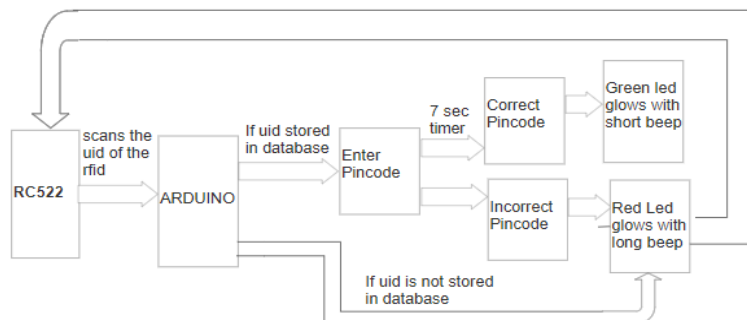
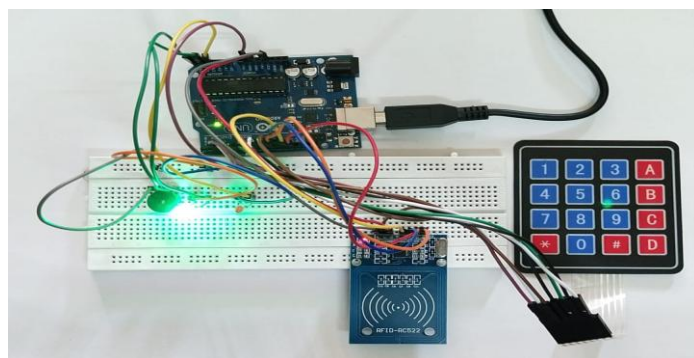
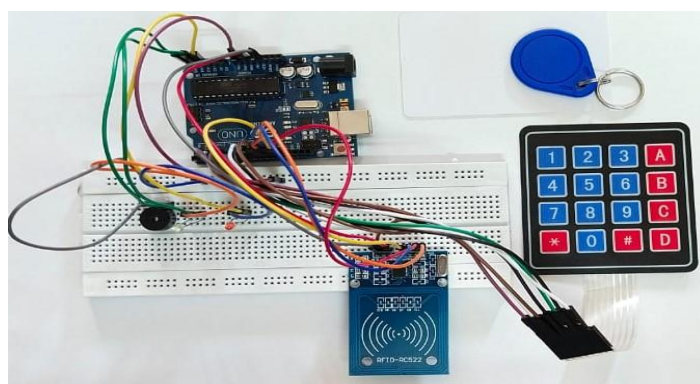


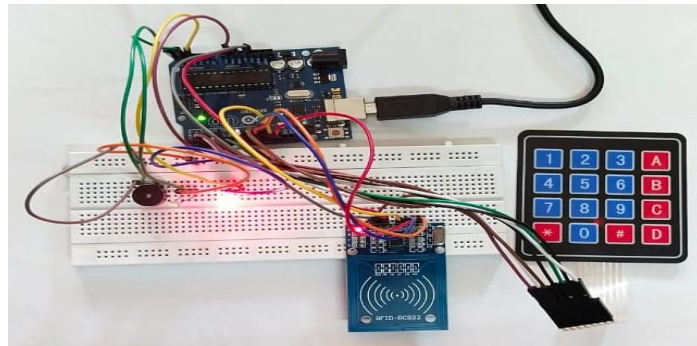
Figure 7: BLOCK DIAGRAM

S.no	People	RFID Authorised		Enter Password		Accessed	
		Yes	No	Right	Wrong	Yes	No
1	Person 1	✓		✓		✓	
2	Person 2	✓			✗		✗
3	Person 3		✗		-		-

## 8. RESULT

The Access Control System using Arduino and RFID is framed and arranged. The result of the project is





```
COM3
Send
CardAccessOn
Correct PinCode
CardAccessOn
WrongCode
WrongCode or Timer expired
Autoscroll Show timestamp Newline 9600 baud Clear output
```

## 9. CONCLUSION

The main aim of the project is to identify the unauthorized persons without direct contact & the process is easier and can be easily adapted. It improves the security with updated technology. This prototype helps in accomplishing the security and access control task. This will result in a smart card system that meets today's and future needs. To make new features in this system more information is needed. This system is helpful for protecting people and giving them a security for their lives. This plays a main role in day-to-day life. The modifications can be done in this system. This system is a good prototype and useful.

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