

**VISVESVARAYA TECHNOLOGICAL UNIVERSITY**  
**JNANA SANGAMA, BELAGAVI-590018**



**A Mini-Project Report on**  
**“RFID - PROJECT”**

*Submitted In partial fulfillment for the award of degree of*

**BACHELOR OF ENGINEERING**

*In*

**ELECTRONICS AND COMMUNICATION ENGINEERING**

*Submitted by*

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**2021-2022**



# VISVESVARAYA TECHNOLOGICAL UNIVERSITY

Belagavi, Karnataka

2021-2022



## BASAVARAJESHWARI GROUP OF INSTITUTIONS BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

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## CERTIFICATE

Certified that the Mini-Project work entitled “**RFID - Project**”, is a bonafide work carried out by **Sree Sai E.S (3BR19EC041), Khaja Moinuddin Khadri (3BR19EC067), Noor Mohammed G (3BR19EC101), Pradeep S (3BR19EC110)** the bonafide students of Ballari Institute of Technology and Management in partial fulfillment for the award of degree of **Bachelor of Engineering in ELECTRONICS AND COMMUNICATION ENGINEERING** of the **Visvesvaraya Technological University, Belagavi** during the academic year 2021-2022. It is certified that all corrections/suggestions indicated for internal assessment have been incorporated in the report deposited in the departmental library. The report has been approved as it satisfies the academic requirements in respect of Mini-Project work prescribed for the said Degree.

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# ACKNOWLEDGEMENT

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The successful completion of our project was possible because of the help of the people who guided and encouraged us, whom we would like to acknowledge.

We express our warm and profound sense of gratitude to all the eminent faculties who inspired, guided and supported us in accomplishing our project work. We are deeply indebted to Mr.Hemanth Kumar R.K, our guide and to our coordinators Mr. VINAY KUMAR J, Mrs. NILAM CHEDDA for their noble gesture, support, coordination, valuable suggestions and guidance given to us in completing the project.

We are thankful to DR. SADYOJATHA K M Head of the Department of Electronics and Communication Engineering and our guide Mr.Hemanth Kumar R.K for their valuable guidance and suggestion. We would like to express our sincere gratitude to our Director and Chairman Dr. YASHWANTH BHUPAL, Deputy Director Y. J. PRITHVI RAJ and our beloved principal Dr. YADAVALLI BASAVARAJ for providing facilities in the college campus.

We sincerely thank Mr.Hemanth Kumar R.K for his guidance and moral support and helping us out whenever we were in need.

Further we would extend our heartfelt benevolence to all the teaching and non-teaching staff of Electronics and Communication engineering for rendering the much-needed co-operation during all these days and we would also wish to reiterate the pivotal role played by our parents in all our lives as they have been the embodiment of sacrifice by catering our needs all the days of our life and enabling us to build this project by providing the much-needed moral and financial support.

On the whole we are indebted to each and every one for standing by us during the difficult times and supporting us in making this venture worthy and cherish able.

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# ABSTRACT

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Access control is the process of verifying a user claimed identity and giving or denying the access. The proposed project is to secure the system to control the entry of various items through a door or passage using RFID technologies.

Radio Frequency Identification (RFID) technologies allow the transmission of a unique serial number wirelessly, using radio waves. The two key parts of the system that are needed to do this are the RFID 'Tag' and 'Reader'.

# RFID Door Lock System

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## Introduction :

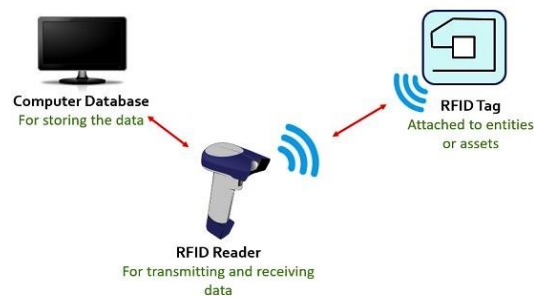
**R**adio Frequency Identification (RFID) is a generic term for technologies that use radio waves to automatically identify people or objects from a distance of several inches to hundreds of feet. This is an Automatic identification (Auto-ID) technology by which any object can be identified automatically. Barcode, Magnetic Strip, IC card, Optic Character Recognition (OCR), Voice Recognition, Fingerprint and Optical Strip etc are also identification technologies.

RFID technology use automatic data capture system which helps in increasing system efficiency. Combination of tag and reader is used for identification purpose. A code is stored in RFID tag and this tag is attached to a physical object. Now object becomes unique identifiable. Then object transmit code from tag. In this way reader get information about object. RFID is not actually a new technology, but it is applied in new ways. RFID is rapidly growing technology.



RFID offers much advantage over traditional identification device like barcode. To read the barcode, the barcode scanner needs to be in line of sight with the label. It means that the manual movement of the objects or scanner is necessary. RFID, on the other hand can read data from tag without line of sight. Also no alignment is necessary in RFID technology.

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Several frequencies are used in RFID applications: 125 KHz, 13.56 MHz and 860-930 MHz for passive RFID, 433MHz and 2.45GHz for active RFID. The global standardisation of RFID system is an important issue. RFID has been implemented by different manufacturers in different ways. There is no global standard that can be used everywhere.

Various standards or protocols are proposed for different RFID applications. These standards include hardware physics specification, tag-reader air interface specification and reader-host command specification. A number of organisations have set standards for RFID, including the International Organisation for Standardisation (ISO), the International Electro technical Commission (IEC) and global.

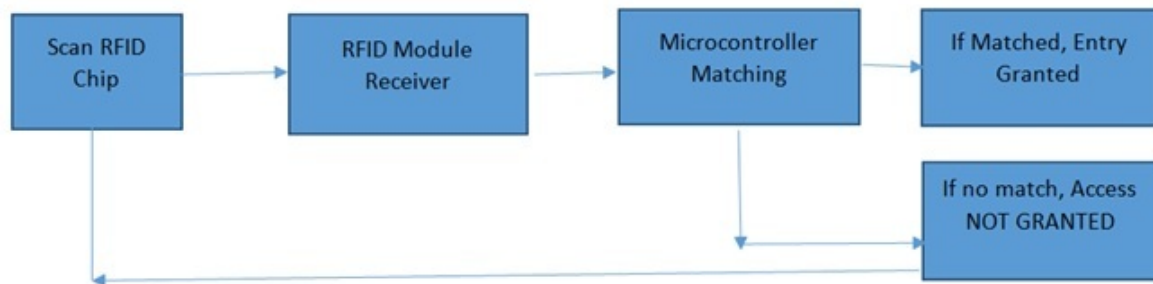
## Problem Statement :

- Designing a student attendance management based on Radio Frequency Identification (RFID) enables maintaining every student attendance easier with minimal intervention of the class teacher.
- The Metro Train in Indian cities use contactless RFID tokens and Smart cards as a ticket. To reduce the people at the ticket counter waiting for the ticket. It is the tap and move technology.
- It can also be used as Door lock system that can open the door with tap and fast way of analog door lock.
- Recently, There is news that the government is launching ePassport, by using RFID Technology which reduces the utilisation of Fake passport in India.

## Objectives :

- To demonstrate a practical application of the RFID technology, to use as a door lock and collects all data and store in the database. To analyse who unlocked the door at what time
- To understand the working of RFID system.
- To know this RFID technology and the areas where this technology can be implemented.

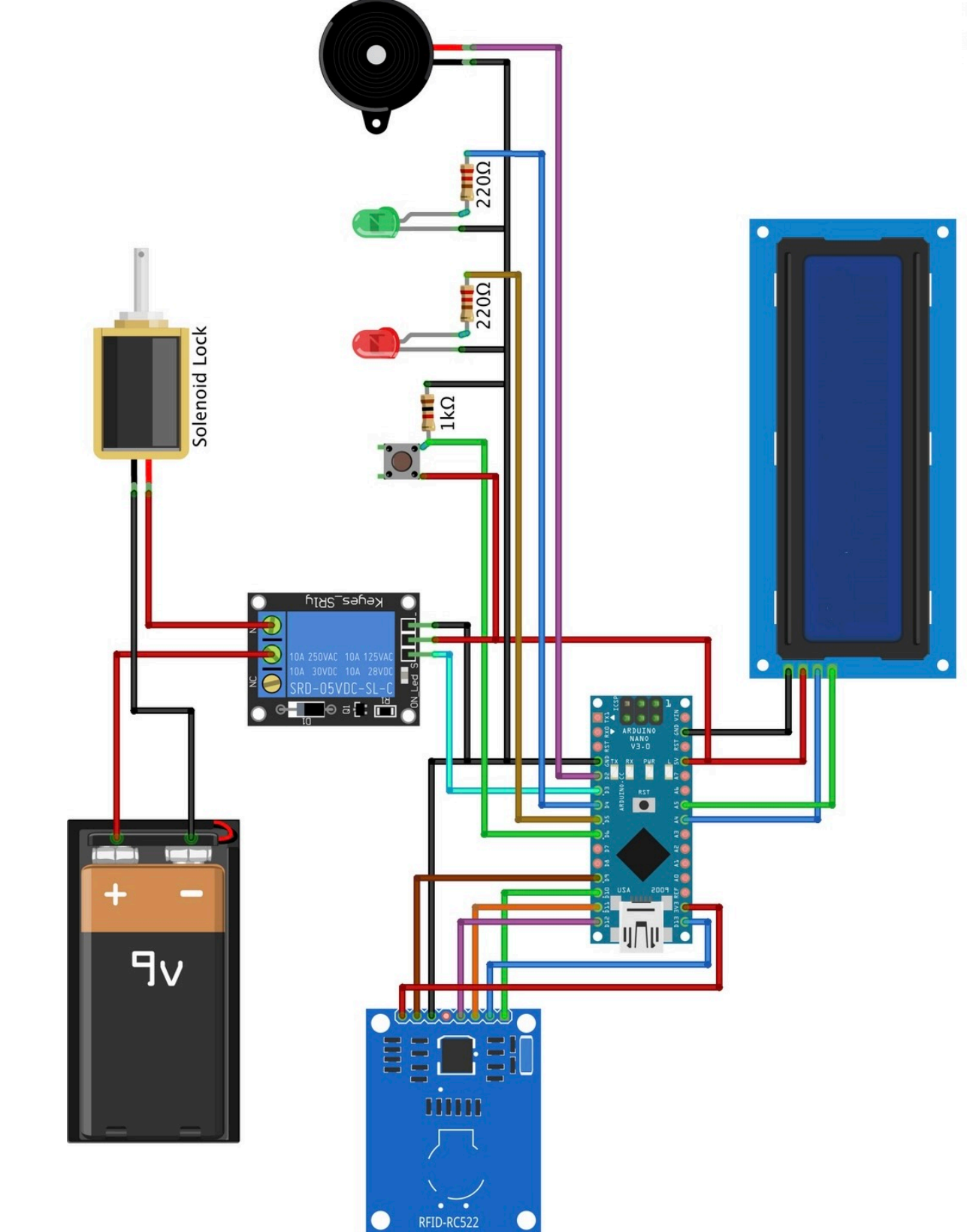
## Block Diagram :



## Expected Outcomes :

- RFID has the potential to **save organisations time and money** by providing real-time traceability, identification, communication, temperature, and location data for people and resources.
- The RFID technology will open new doors to make organisations, companies more secure, reliable, and accurate.
- And it can directly save the data to the database that has been provided and database can also be a cloud database, which will provide live information.





## Methodology

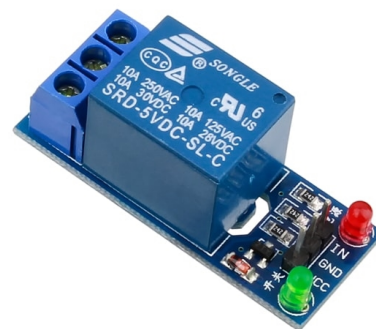
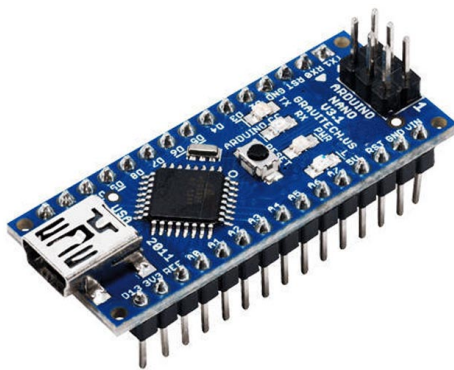
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### Components Required :

- **RFID Reader** : The reader is a handheld or fixed unit that can interrogate nearby RFID tags and obtain their ID numbers using radio frequency (RF) communication (i.e. the process does not require contact). When a passive tag is within range of a reader, the tag's antenna absorbs the energy being emitted from the reader, directs the energy to 'fire up' the integrated circuit on the tag, which then uses the energy to beam back the ID number and any other associated information.
- **RFID Tag** : A Radio Frequency Identification Tag (RFID tag) is an electronic tag that exchanges data with a radio frequency identification (RFID) reader by using radio waves.



- **Arduino Nano** : The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328, ATmega328P Microcontroller is from 8-bit AVR family.

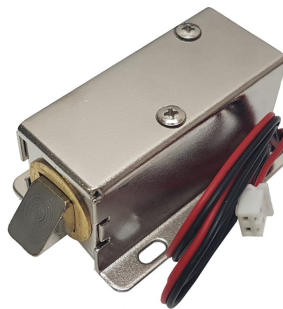


- **Relay Module** : The Single Channel Relay Module is a convenient board which can be used to control high voltage, high current load such as motor, solenoid valves, lamps and AC load. It is designed to interface with microcontroller such as Arduino, PIC and etc.

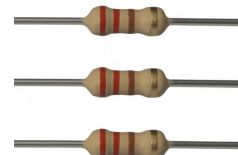
- **16\*2 I2c LCD Display :** This is a 16x2 LCD display screen with I2C interface. It is able to display 16x2 characters on 2 lines, white characters on blue background. Usually, Arduino LCD display projects will run out of pin resources easily, especially with Arduino Uno. And it is also very complicated with the wire soldering and connection.



- **12v Solenoid Lock :** The 12V DC solenoid lock is used for locking sell-machine, storage shelf, file cabinet and etc. The solenoid 12V lock works as the circuits disconnects, and it will unlock as the instant power-on. The solenoid lock features a anti-theft and shockproof design, the lock is better than other kinds of locks.



- **LED :** A light emitting diode is a diode that produces visible light when an electric current goes through it. They are profoundly effective and produces monochromatic light.

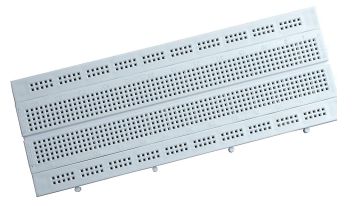


- **Resistors :** A resistor is an electrical component that limits or regulates the flow of electrical current in an electronic circuit. In this we are using 220 ohms and 1 ohms resistor.

- Tactile button : A tactile switch, also known as haptic switches, is a momentary switch designed to provide tactile feedback or response when pressed to activate it.



- Buzzer : It is a two pin device which gives sound component to our work. The piezo signal produces sound dependent on the switch of the piezoelectric impact
- Jumper wires : Jumper links are utilised to move electric flow from one point to other inside a circuit. Because of high conductivity, jumper links are made of copper and aluminium. In this model, we have utilised three mix of jumper link for example male to male, female to female and male to female.



- BreadBoard : A breadboard allows for easy and quick creation of temporary electronic circuits or to carry out experiments with circuit design.



- 12v Battery : A device containing an electric cell or a series of electric cells storing energy that can be converted into electrical power.

## Software Code

---

```
#include <Wire.h>
#include <SPI.h>
#include <MFRC522.h>
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x3F, 16, 2);

#define SS_PIN 10
#define RST_PIN 9
#define LED_G 4 //define green LED pin
#define LED_R 5 //define red LED
#define BUZZER 2 //buzzer pin
#define lock 3
MFRC522 mfrc522(SS_PIN, RST_PIN); // Create MFRC522 instance.
int Btn = 6;

void setup()
{
  Serial.begin(9600); // Initiate a serial communication
  SPI.begin(); // Initiate SPI bus
  mfrc522.PCD_Init(); // Initiate MFRC522
  pinMode(LED_G, OUTPUT);
  pinMode(LED_R, OUTPUT);
  pinMode(BUZZER, OUTPUT);
  noTone(BUZZER);
  pinMode(Btn, INPUT);
  pinMode(lock, OUTPUT);
  Serial.println("Place your card on reader...");
  Serial.println();
  lcd.begin();
  lcd.backlight();
  lcd.clear();
  lcd.setCursor(0,0); // column, row
  lcd.print(" Scan Your RFID ");
  lcd.setCursor(0,1); // column, row
  lcd.print(" Door Locked ");

}
void loop()
{

if(digitalRead(Btn) == HIGH){

  Serial.println(" Access Granted");
  Serial.println();
  delay(500);
  digitalWrite(LED_G, HIGH);
  lcd.setCursor(0,1); // column, row
  lcd.print(" Door Un-Locked ");
  tone(BUZZER, 2000);
  delay(100);
  noTone(BUZZER);
```

```

delay(50);
tone(BUZZER, 2000);
delay(100);
noTone(BUZZER);
digitalWrite(lock,HIGH);
delay(3000);
digitalWrite(lock,LOW);
delay(100);
digitalWrite(LED_G, LOW);
lcd.setCursor(0,1); // column, row
lcd.print(" Door Locked ");
tone(BUZZER, 2000);
delay(100);
noTone(BUZZER);
delay(50);
}

```

```

// Look for new cards
if ( ! mfrc522.PICC_IsNewCardPresent())
{
    return;
}
// Select one of the cards
if ( ! mfrc522.PICC_ReadCardSerial())
{
    return;
}
//Show UID on serial monitor
Serial.print("UID tag :");
String content= "";
byte letter;
for (byte i = 0; i < mfrc522.uid.size; i++)
{
    Serial.print(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " ");
    Serial.print(mfrc522.uid.uidByte[i], HEX);
    content.concat(String(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " "));
    content.concat(String(mfrc522.uid.uidByte[i], HEX));
}
Serial.println();
Serial.print("Message : ");
content.toUpperCase();

```

```

if (content.substring(1) == "83 23 38 BB") //change here the UID of card/cards or tag/tags that
you want to give access
{
    Serial.println(" Access Granted");
    Serial.println();
    delay(500);
    digitalWrite(LED_G, HIGH);
    lcd.setCursor(0,1); // column, row
    lcd.print(" Door Un-Locked ");
    tone(BUZZER, 2000);
    delay(100);
    noTone(BUZZER);
    delay(50);
}

```

```

    tone(BUZZER, 2000);
    delay(100);
    noTone(BUZZER);
    digitalWrite(lock,HIGH);
    delay(3000);
    digitalWrite(lock,LOW);
    delay(100);
    digitalWrite(LED_G, LOW);
    lcd.setCursor(0,1); // column, row
    lcd.print(" Door Locked ");
    tone(BUZZER, 2000);
    delay(100);
    noTone(BUZZER);
    delay(50);
}

else
{
    lcd.setCursor(0,1); // column, row
    lcd.print("Invalid RFID Tag");
    Serial.println(" Access denied");
    digitalWrite(LED_R, HIGH);
    tone(BUZZER, 1500);
    delay(500);
    digitalWrite(LED_R, LOW);
    noTone(BUZZER);
    delay(100);
    digitalWrite(LED_R, HIGH);
    tone(BUZZER, 1500);
    delay(500);
    digitalWrite(LED_R, LOW);
    noTone(BUZZER);
    delay(100);
    digitalWrite(LED_R, HIGH);
    tone(BUZZER, 1500);
    delay(500);
    digitalWrite(LED_R, LOW);
    noTone(BUZZER);
    lcd.setCursor(0,1); // column, row
    lcd.print(" Door Locked ");
}
}

```

## **Conclusion :**

The RFID reader used is linked to the tag and card reader. However, either by adjusting the code or using a different RFID reader, one should be able to read the RFID code of the individual tags and cards. This will allow for more options in terms of how the user wants the security to be set up. By reading the specific RFID codes, you can change the accepted keys and also deny access for certain keys.

Therefore, RFID Door Lock is a very cheap and affordable design that allows convenience and security for users. The design is relatively small and easy enough to install with just a couple of screws. Of course there are additional features that can be added in order to improve the system as a whole. However, it is important to note the cost of the improvement should be taken into consideration.

However, the advance and highly secured version of the RFID technology is the NFC technology.



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5. <https://create.arduino.cc/projecthub/>

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