

# RFID Bus Ticketing: Revolutionizing Public Transportation

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# RFID Bus Ticketing

**1**

## **Efficiency at its Best**

Say goodbye to long queues and paper tickets. With RFID technology, passengers can effortlessly tap their cards for a seamless boarding experience.

**2**

## **Real-time Tracking**

The built-in GSM module enables real-time communication between the bus and the central database, allowing for accurate tracking of vehicle movements and passenger data.

**3**

## **Enhanced Security**

RFID tags provide a secure and tamper-proof ticketing system, reducing the risk of fraud and ensuring a safe and reliable journey for all passengers.

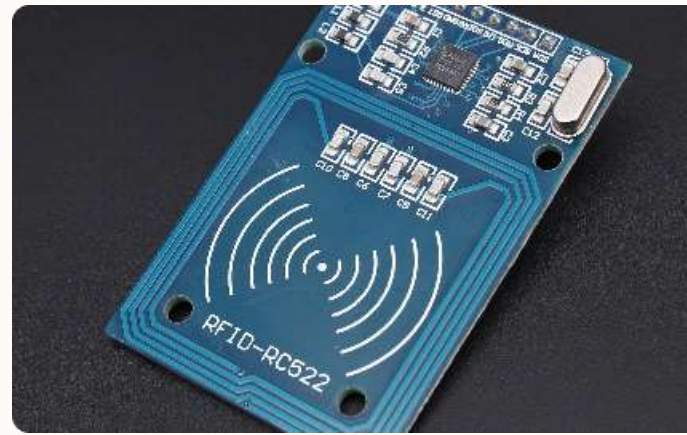
# Arduino-Based System

Utilizing Arduino UNO, this innovative system integrates various modules and sensors to create a comprehensive smart ticketing solution.



## Arduino UNO

The heart of the system, Arduino UNO, acts as the control center, processing data from the RFID and GSM modules.



## RFID-RC522 Module

This RFID module allows for quick and reliable identification of passengers by reading their RFID cards or tokens.



## GSM800 Module

The GSM module enables seamless communication between the bus and the central server, ensuring real-time data updates.

# The Power of RFID

Explore the capabilities of RFID technology, propelling bus ticketing into a new era of convenience and efficiency.

## Automated Fare Calculation

With precise tracking of passenger entry and exit, the system automatically calculates fares, eliminating the need for manual ticketing.

1

## Identification Made Easy

Passengers simply swipe their RFID cards or tokens near the RFID reader, instantly registering their presence and validating their tickets.

2

3

## Streamlined Data Management

By collecting and analyzing data from each transaction, transit authorities can streamline operations, improve service delivery, and make informed decisions.

# future work : the GSM Connection

Unleash the power of real-time communication with the GS M800 module, enabling a seamless connection between the bus and the central server.

## Constant Updates

The GSM module ensures that the bus's location, passenger count, and other crucial data are communicated to the server in real-time.

## Emergency Alerts

In case of emergencies or schedule changes, the GSM module enables immediate notifications to passengers and authorities.

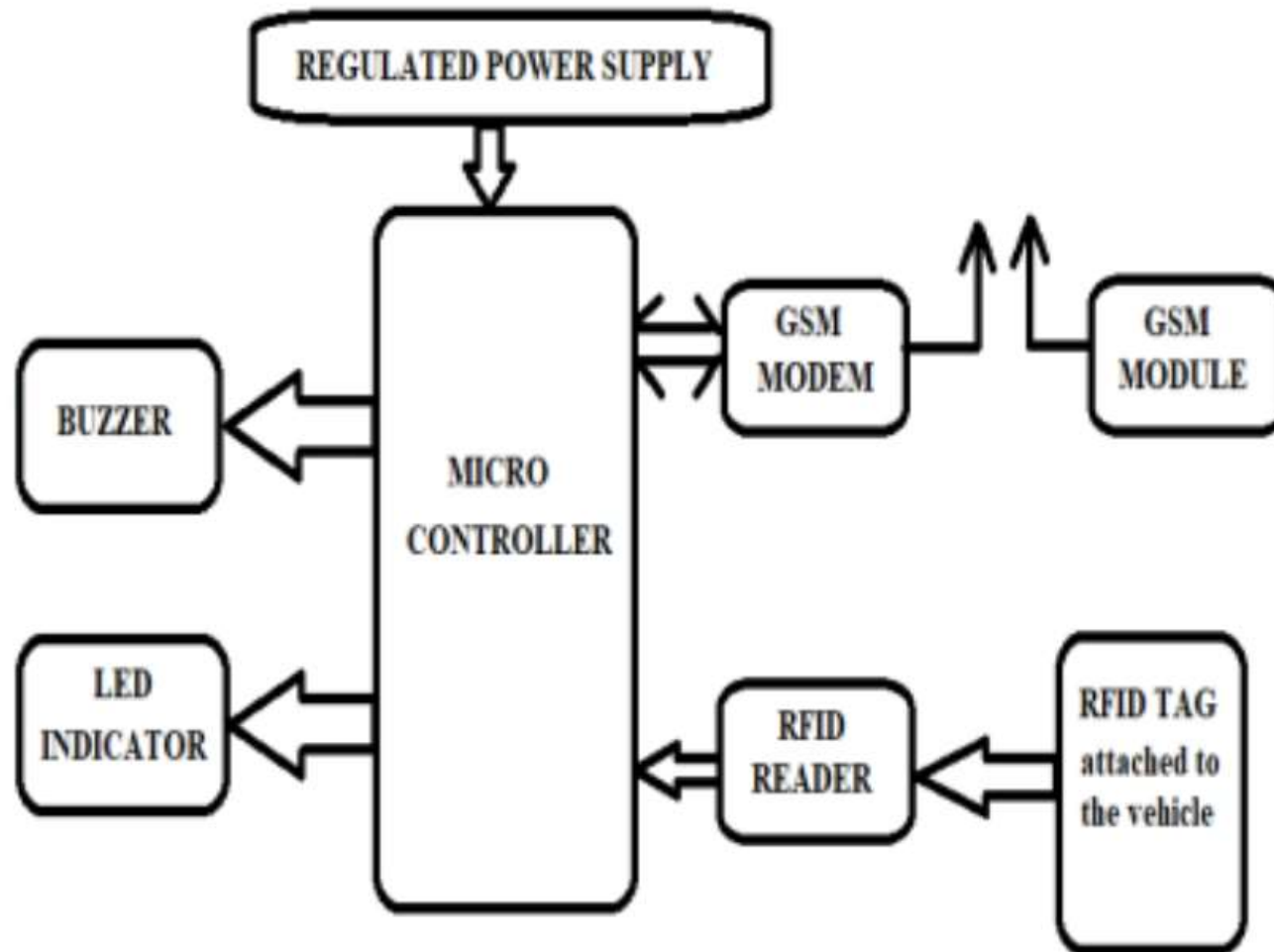
## Efficient Fleet Management

Transit authorities can monitor bus performance, schedule maintenance, and optimize routes through the continuous data exchange facilitated by the GSM module.

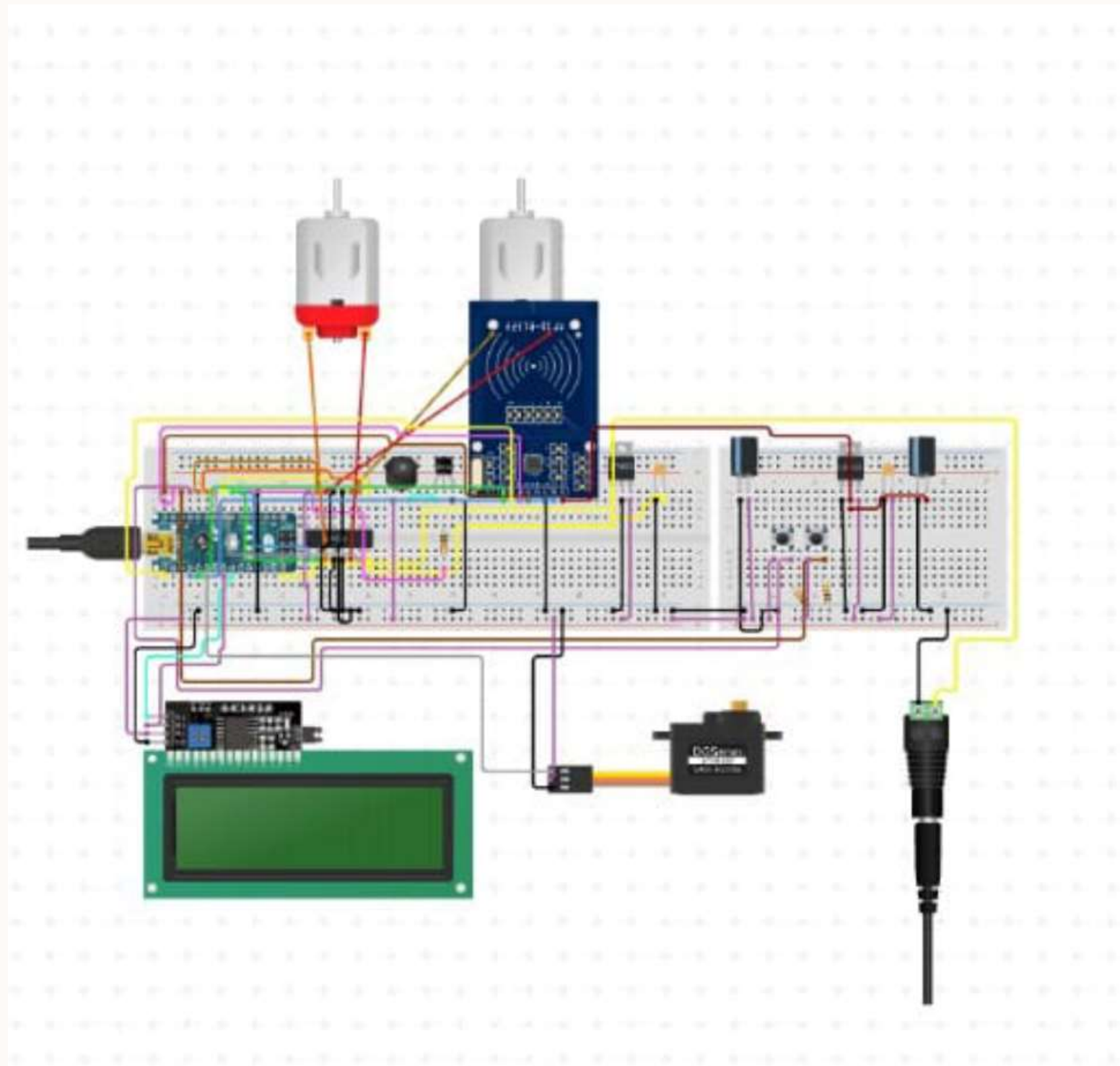
## Improved Passenger Experience

Real-time updates on bus timings and availability enhance passenger convenience and satisfaction, enabling a reliable and comfortable journey.

# System Architecture



circuit diagram :





# coding:

```
//include the RFID libs
```

```
#include <SPI.h>
```

```
#include <MFRC522.h>
```

```
//include the LCD lib
```

```
#include <LiquidCrystal.h>
```

```
//declare the reset and SDA pins of RFID
```

```
#define SS_PIN 10
```

```
#define RST_PIN 9
```

```
//Create MFRC522 instance.
```

```
MFRC522 mfrc522(SS_PIN, RST_PIN); //Create MFRC522 instance.
```



# //declare what LCD pins u are sending data

```
LiquidCrystal lcd(3, 2, 6, 4, 7, 5);
```

```
String pass1 = "CHIBUEZE";
```

```
String acct1 = "6A 2D 67 07";
```

```
String pass2 = "SMART";
```

```
String acct2 = "77 1F 73 63";
```

```
int balance1 = 1000;
```

```
int balance2 = 1000;
```

```
int rate = 200;
```

```
void setup()
```

```
{
```

```
Serial.begin(9600);
```

# //Initiate S P I bus

```
SPI.begin();
```

```
// Initiate MFRC522
```

```
mfrc522.PCD_Init();
```

```
//begin the LCD
```

```
lcd.begin(16, 4);
```

```
//state your actuator pins
```

```
pinMode(A0, OUTPUT);
```

```
pinMode(A1, OUTPUT);
```

```
pinMode(A2, OUTPUT);
```

# //display a welcome note

```
lcd.setCursor(0, 0);

lcd.print("WELCOME CHIBUEZE ");

delay(4000);

lcd.setCursor(0, 0);

lcd.print(" BUS TICKET ");

lcd.setCursor(0, 1);

lcd.print(" PAYMENT SYSTEM ");

delay(2000);

lcd.clear();

lcd.setCursor(0, 2);

lcd.print(" ");

lcd.setCursor(0, 3);

lcd.print(" ");

}
```

# coding:

```
void unregistered(){  
  
  tone(A0, 1000);  
  
  delay(500);  
  
  noTone(A0);  
  
  delay(500);  
  
  tone(A0, 1000);  
  
  delay(500);  
  
  noTone(A0);  
  
  delay(500);  
  
  tone(A0, 1000);  
  
  delay(500);  
  
  noTone(A0);  
  
  delay(500);  
  
  lcd.setCursor(0, 0);  
  
  lcd.print(" UNREGISTERED ");
```

```
void loop() {  
  
  //turn off the actuators  
  
  digitalWrite(A0, LOW);  
  
  analogWrite(A1, 0);  
  
  analogWrite(A2, 0);  
  
  lcd.setCursor(0, 0);  
  
  lcd.print("Bus Fare is #");  
  
  delay(2000);  
  
  lcd.setCursor(0, 1);  
  
  lcd.print("PLS GET A VALID CARD");  
  
  for (int positionCounter = 0; positionCounter < 43; positionCounter++) {  
  
    // scroll one position left:  
  
    lcd.scrollDisplayLeft();  
  
    // wait a bit:  
  
    delay(150);  
  
  }  
  
}
```

```
//lcd.clear(); }
```

```
void loop()
```

```
//turn off the actuators
```

```
digitalWrite(A0, LOW);
```

```
analogWrite(A1, 0);
```

```
analogWrite(A2, 0);
```

```
    lcd.setCursor(0, 0);
```

```
    lcd.print("Bus Fare is #");
```

```
    lcd.println(rate);
```

```
    lcd.println(" ");
```

```
    lcd.setCursor(0, 1);
```

```
    lcd.print(" Swipe To Pay ");
```

# coding:

```
// 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();
```



```
//this is where u put the UID of the card that you want to give access
```

```
if (content.substring(1) == "6A 2D 67 07")
```

```
{ analogWrite(A2, 255) ;
```

```
delay(250);
```

```
analogWrite(A2, 0);
```

```
delay(250);
```

```
analogWrite(A2, 255);
```

```
if (balance1 >= rate){ balance1 -= rate;
```

```
    lcd.setCursor(0, 0);  
    lcd.print("  Hi CHIBUEZE  ");  
    lcd.setCursor(0, 1);  
    lcd.print("__Payment O.K__  ");
```

```
  }  
  else{  
    lcd.setCursor(0, 0);  
    lcd.print(" Sorry CHIBUEZE  ");  
    lcd.setCursor(0, 1);  
    lcd.print("Insuficient Fund");
```

```
  }  
  delay(4000);  
  lcd.setCursor(0, 1);
```

```
if (content.substring(1) == "77 1F 73 63") {
    analogWrite(A2, 255);
    delay(250);
    analogWrite(A2, 0);
    delay(250);
    analogWrite(A2, 255);

    if (balance2 >= rate){
        balance2 -= rate;
        lcd.setCursor(0, 0);
        lcd.print("    Hi SMART    ");
        lcd.setCursor(0, 1);
        lcd.print("__Payment O.K__    ");
    }
    else{
        lcd.setCursor(0, 0);
        lcd.print("  Sorry SMART  ");
        lcd.setCursor(0, 1);
        lcd.print("Insuficient Fund");
    }
    delay(4000);
    lcd.setCursor(0, 1);
    lcd.print("_Balance is #");
    lcd.println(balance2);
    lcd.println(".    .");
    delay(4000);
    return;
```

```
else{ lcd.clear();
```

```
analogWrite(A1, 255);
```

```
delay(250);
```

```
analogWrite(A1, 0);
```

```
delay(250);
```

```
analogWrite(A1, 255);
```

```
unregistered();
```

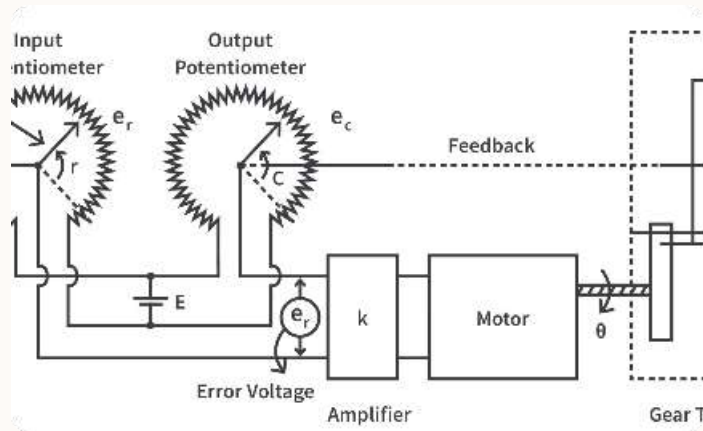
```
}
```

```
lcd.clear();
```

```
}
```

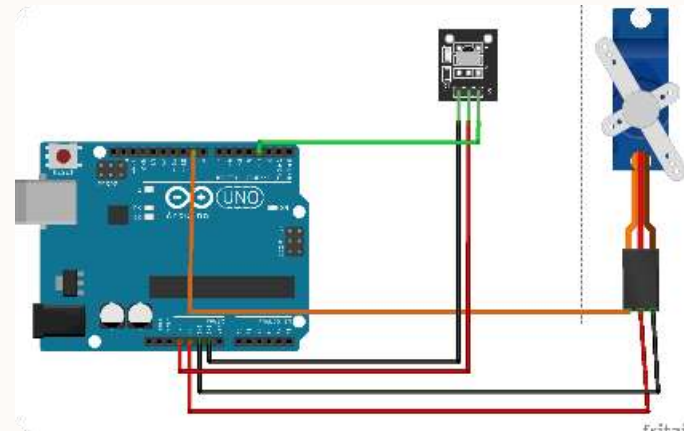
# Integration of Servo Motor

Discover the role of the servo motor in the RFID bus ticketing system, ensuring secure and convenient access control.



## Access Control

The servo motor controls the opening and closing of the bus door, allowing only validated passengers to board.



## Arduino Integration

Through Arduino's precise control, the servo motor operates smoothly, enhancing the overall efficiency of the ticketing system.



## Reliability and Durability

Designed for continuous usage, the servo motor ensures long-lasting performance, reducing maintenance requirements.

# Conclusion

As we conclude this presentation, let's recap the key points and consider the potential benefits and future applications of RFID bus ticketing.

## 1 Effortless Travel

RFID technology simplifies the ticketing process, making bus travel more convenient for passengers.

## 2 Data-Driven Decision Making

Transit authorities can leverage the collected data to optimize operations, improve efficiency, and enhance the overall transportation experience.

## 3 Scalable Solution

The RFID bus ticketing system can be implemented across various cities, providing a versatile and scalable ticketing solution.