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Rfid-Door Lock Using Arduino

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Abstract- This research Security is a major concern in homes, offices, and restricted areas. Traditional lock systems using mechanical keys have limitations such as key loss, duplication, and lack of access control. To overcome these issu es, this project presents the design and implementation of an RFID Door Lock using Arduino. The proposed system uses Radio Frequency Identification (RFID) technology to allow only authorized users to access the door. An RFID reader reads the unique ID of the RFID card or tag and sends it to the Arduino microco ntroller. The Arduino compares the scanned ID with the pre-stored authorized IDs. If the ID matches, the system.

Keywords – RFID Arduino Access Control System Smart Door Lock servo motor

I. INTRODUCTION

The Registration Certificate Arya fight RfID Door lock using arduino is an essential document that proves the ownership of a vehicle and provides important information, including the vehicle's registration number, owner's details, chassis number, and other regulatory data. Traditionally, vehicle information is stored in physical documents or decentralized systems, which often result in several inefficiencies. These manual methods of maintaining and accessing vehicle information can lead to delays, human errors, loss of data, and even security breaches. For instance, during routine vehicle inspections, law enforcement officers need to manually verify vehicle details, which can be time-consuming and prone to mistakes. Similarly, vehicle registration processes often involve extensive paperwork, further adding to inefficiencies.

To address these limitations, this paper proposes an An RFID door lock with Arduino uses an RC522 RFID reader, an Arduino (Uno/Nano), and a solenoid lock or servo motor to grant access via registered RFID tags. The RFID reader connects via SPI, sending UID data to the Arduino, which compares it against authorized IDs to trigger a relay for the lock.

II. RELATED WORK

RFID-based door lock systems are widely used in modern security applications because they provide contactless, fast, and reliable access control. Many researchers and developers have worked on similar systems using microcontrollers like Arduino, PIC, and Raspberry Pi.

III. PROPOSED ALGORITHM

Step 1: RFID Tag Scanning
- When an RFID card is brought within the range of the reader, the reader scans the unique ID (UID) stored on
- The RFID reader is activated and awaits an RFID tag to be presented.

Step 2: Data Transmission to Microcontroller
- The RFID reader sends the scanned UID to the microcontroller for processing.
- The microcontroller validates the format of the UID to ensure that it corresponds to a valid RFID tag.

Step 3: Communication with the Web-Based Database
- The microcontroller establishes communication with the web-based database over a network connection.
- It sends the UID to the database, requesting the corresponding vehicle information.

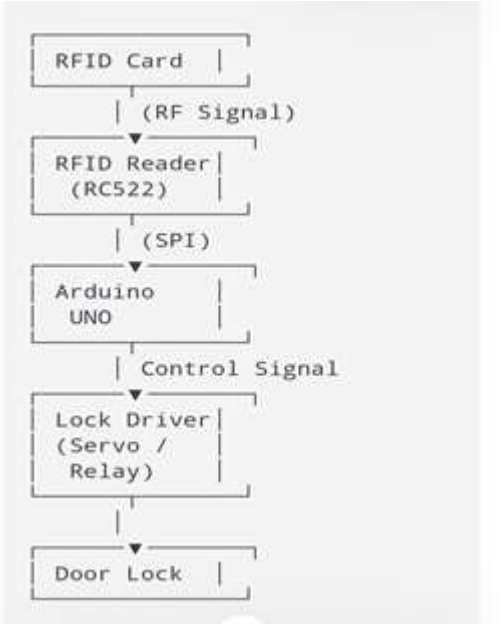
Step 4: Data Retrieval from the Database
- The database searches for the UID in its records to retrieve the vehicle information.
- If a match is found, it returns the details (e.g., vehicle registration number, owner name, model, etc.) to the microcontroller.

Step 5: Error Handling
- If the UID does not match any records in the database, the system generates an error message, such as "Vehicle Not Found."
- The error message is displayed on the screen for the user.

Step 6: Displaying Vehicle Information
- Once the data is retrieved successfully, the microcontroller processes it and sends it to the display unit.
- The vehicle details are shown on the screen for verification and further use (e.g., by law enforcement officers, toll booths, etc.).

Step 7: System Idle Mode

• After completing the process, the system resets and returns to an idle state, waiting for the next RFID card to be scanned.

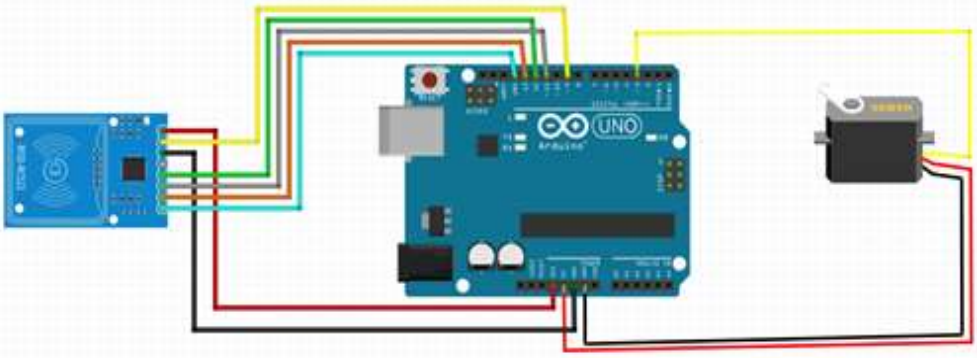


IV. PSEUDO CODE

Start
Initialize RFID Reader Initialize Microcontroller
Initialize Web-based Database Connection While system is ON:
Wait for RFID Tag to be scanned If RFID Tag is scanned:
Read UID from RFID Tag

Send UID to Microcontroller Microcontroller sends UID to Database If UID is found in Database:
Retrieve corresponding vehicle information Send vehicle data to Microcontroller Display vehicle data on screen
Else:
Display "Vehicle Not Found" error message Return system to idle state
End While
Flowchart

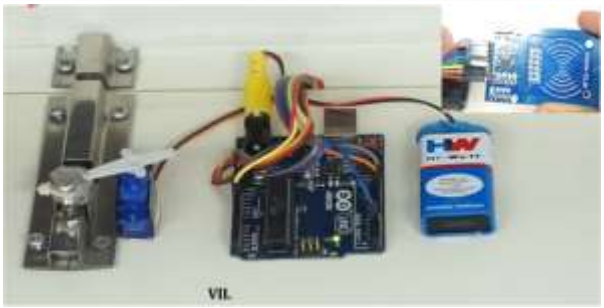
V. CIRCUIT DIAGRAM



VI. RESULTS

PROGRAM

```
#include <SPI.h> #include <SPI.h> #include <MFRC522.h>
#include <Servo.h>
#define SS_PIN 10
#define RST_PIN 9
MFRC522 mfrc522(SS_PIN, RST_PIN);
Servo myServo;
```



```
void setup() { Serial.begin(9600); SPI.begin(); mfrc522.PCD_Init();
Serial.println("Place your RFID card to unlock the door");

myServo.attach(6);
myServo.write(0); // Door locked initially
}

void loop() {
// Look for new cards
if (!mfrc522.PICC_IsNewCardPresent()) { return;
}


// Select one of the cards
if (!mfrc522.PICC_ReadCardSerial()) { return;
}

// Read card UID String content = "";
for (byte i = 0; i < mfrc522.uid.size; i++) { content.concat(String(mfrc522.uid.uidByte[i] < 0x10 ? "0" : "")); content.concat(String(mfrc522.uid.uidByte[i], HEX));
}
content.toUpperCase(); Serial.print("Card UID: "); Serial.println(content);

// Compare UID with authorized UID
if (content == "YOUR_CARD_UID") { // Replace with your card UID Serial.println("Access Granted"); myServo.write(90); // Unlock door delay(5000); // Keep door unlocked for 5 seconds myServo.write(0); // Lock door again
} else {
Serial.println("Access Denied");
}
}

#include <SPI.h> #include <MFRC522.h> #include <Servo.h>

#define SS_PIN 10
#define RST_PIN 9

MFRC522 mfrc522(SS_PIN, RST_PIN);Servo lockServo; int servoPin = 3;
// Replace with your card UID
byte authorizedUID[4] = {0x23, 0xA1, 0xB4, 0x1C};

void setup() { Serial.begin(9600); SPI.begin(); mfrc522.PCD_Init();

lockServo.attach(servoPin); lockServo.write(0); // Lock position

Serial.println("Place RFID card...");
}

void loop() {
if ( ! mfrc522.PICC_IsNewCardPresent()) return;

if ( ! mfrc522.PICC_ReadCardSerial()) return;

Serial.print("Card UID: "); bool authorized = true;

for (byte i = 0; i < 4; i++) { Serial.print(mfrc522.uid.uidByte[i], HEX); Serial.print(" ");

if (mfrc522.uid.uidByte[i] != authorizedUID[i]) {
    authorized = false;
}
}

Serial.println();
if (authorized) { Serial.println("Access Granted"); unlockDoor();
} else {
Serial.println("Access Denied"); } mfrc522.PICC_HaltA();
}
void unlockDoor() {
lockServo.write(90); // Unlock delay(3000);
// Door open time lockServo.write(0);
// Lock again}
```

VIII. CONCLUSION

The RFID Door Lock using Arduino is a secure, reliable, and user-friendly access control system. By integrating an Arduino with an RFID reader and a servo motor or solenoid, this system allows only authorized users to unlock a door using their RFID card or tag.

REFERENCES

1. Title: RFID Door Lock Using Arduino
2. Authors: [Sahil Shinde ,Pushkar Rahane, Sudarshan Suryavanshi, Krishna Tayde]
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