RFID ACCESS DOOR LOCK

Submitted To
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Project CSE-1(Group-4)

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Problem Statement

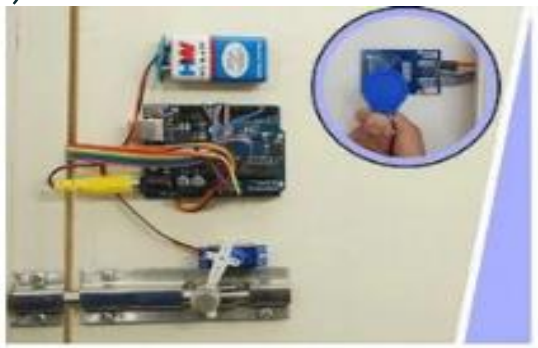
"Existing door locking methods, such as keys and passcodes, are susceptible to security breaches through loss, theft, or unauthorized sharing. These vulnerabilities compromise the safety of premises. A solution is needed to enhance security and convenience in access control systems."

Solution Proposed

"Our proposed solution is to implement an RFID door lock system. Utilizing RFID technology, each authorized individual will be provided with a unique RFID tag or card, granting them access to the premises. The system will be integrated with a secure database to manage access permissions effectively. This solution enhances security by eliminating the risks associated with lost or shared keys and passcodes, while also offering convenience and scalability for various access requirements.

ABOUT PROJECT:- HARDWARE REQUIREMENTS

1. Arduino UNO board
2. RFID reader module (e.g., MFRC522)
3. Servo motor
4. RFID tags or cards
5. Jumper wires
6. Power supply (a 9V battery)
7. Ultrasonic Sensor (HC-SR05)
8. Buzzer

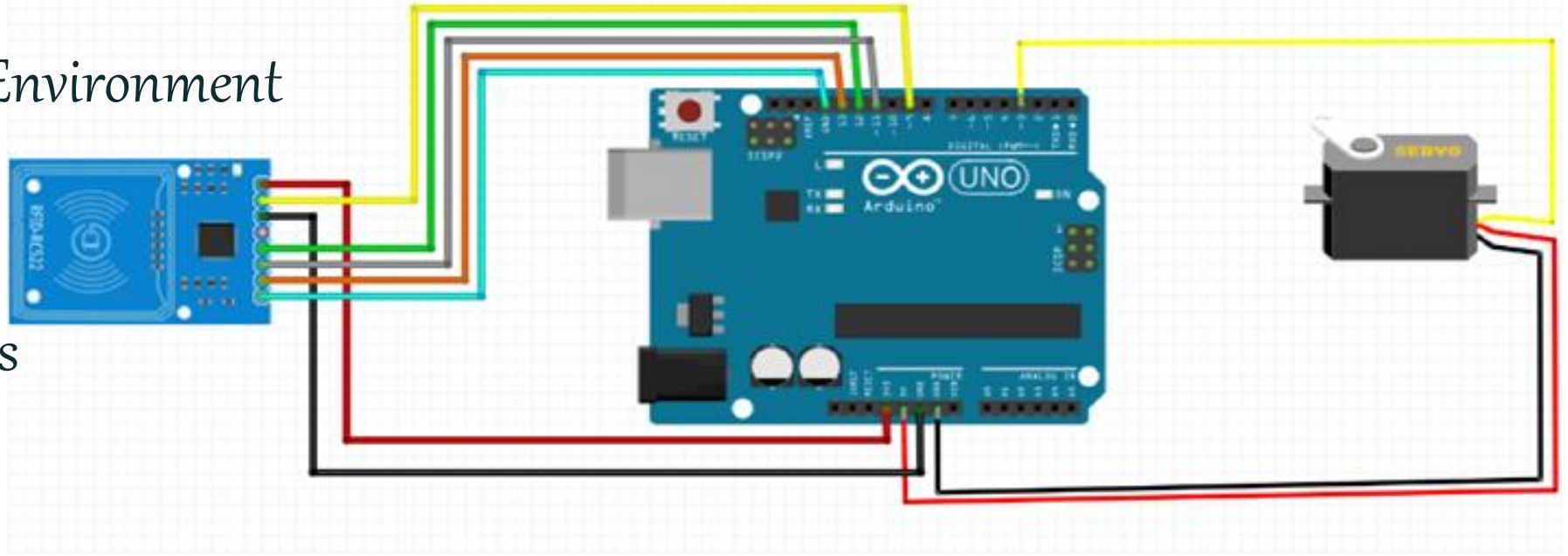







ABOUT PROJECT:- IMPLEMENTATION

1. Setting up the Arduino Environment
2. Installing Libraries
3. Connecting Components
4. Writing Arduino Code
5. Uploading Code to Arduino
6. Testing and Calibration
7. Assembling and Installing



ABOUT PROJECT:- ARDUINO CODE

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

#define SS_PIN 10
#define RST_PIN 9
#define SERVO_PIN 5
#define TRIG 7
#define ECHO 6
#define BUZZ 2
#define ACCESS_DELAY 2000
#define DENIED_DELAY 1000

// Define error codes
#define ERROR_NO_ECHO 0
#define ERROR_TIMEOUT -1

MFRC522 mfrc522(SS_PIN, RST_PIN);   // Create MFR
Servo myservo;
int distance = 0;

void setup() {
  Serial.begin(9600);   // Initiate a serial comm
  SPI.begin();          // Initiate SPI bus
  mfrc522.PCD_Init();   // Initiate MFRC522
  pinMode(TRIG, OUTPUT);    // Set TRIG for outpu
  pinMode(ECHO, INPUT);     // Set ECHO for input
  digitalWrite(TRIG, LOW);
  pinMode(BUZZ, OUTPUT);
  myservo.attach(SERVO_PIN);
  myservo.write(40);
  delay(2000);
  myservo.write(110);
  Serial.println("Put your card to the reader...");
  Serial.println();
}

int getDistance() {
  digitalWrite(TRIG, LOW);
  delayMicroseconds(2);
  digitalWrite(TRIG, HIGH);  // Transmit Ultrasonic waves
  delayMicroseconds(10);     // For 10 microsec
  digitalWrite(TRIG, LOW);   // Stop Transmitting Ultrasonic waves

  unsigned long pulseTime = pulseIn(ECHO, HIGH, 20000);  // Get the pulse time in microseconds
  // Check if the pulseTime is 0 or exceeds the timeout (indicating no echo received)
  if (pulseTime == 0 || pulseTime >= 20000) {
    // Return appropriate error code
    return (pulseTime == 0) ? ERROR_NO_ECHO : ERROR_TIMEOUT;
  }
  int distance = (float)pulseTime * 0.0343 / 2;  // Calculate distance using the pulse time
```

ABOUT PROJECT:- ARDUINO CODE

```
53    return distance;  // Return distance
54  }
55
56  inline bool isValidDistance(int distance) {
57    return (distance > 0) ? true : false;
58  }
59
60  void loop() {
61    distance = getDistance();
62    if (!isValidDistance(distance))  // Check if distan
63      distance = getDistance();
64    if (distance >= 10 && distance <= 18) {
65      digitalWrite(BUZZ, HIGH);
66      delay(500); // 1 Sec
67      digitalWrite(BUZZ, LOW);
68      delay(500); // 0.5 Sec
69    }
70
71    // Look for new cards
72    if (!mfrc522.PICC_IsNewCardPresent()) {
73      return;
74    }
75    // Select one of the cards
76    if (!mfrc522.PICC_ReadCardSerial()) {
77      return;
78    }
```

```
79    //Show UID on serial monitor
80    Serial.print("UID tag: ");
81    String uidString = "";
82    for (byte i = 0; i < mfrc522.uid.size; i++) {
83      Serial.print(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " ");
84      Serial.print(mfrc522.uid.uidByte[i], HEX);
85      uidString.concat(String(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " "));
86      uidString.concat(String(mfrc522.uid.uidByte[i], HEX));
87    }
88    Serial.println();
89    Serial.print("Message: ");
90
91    uidString.toUpperCase();  // Convert UID string to uppercase
92    if (uidString.substring(1) == "C0 40 B0 0E") { // Change here the UID of th
93      Serial.println("Authorized access");
94      Serial.println();
95      myservo.write(40);
96      delay(ACCESS_DELAY);
97      myservo.write(110);
98    } else {
99      Serial.println("Access denied");
100     delay(DENIED_DELAY);
101   }
102 }
```

RESULT

This RFID Access Door Lock system will allow authorized users to unlock the door with RFID tags/cards.

OUR LEARINING

- **Understanding RFID technology:** Learning about how RFID works, its components, and its applications.
- **Arduino Programming:** Learning about Arduino programming and respective libraries related to RFID technology.
  - MFRC522 library that facilitates communication between a microcontroller and the MFRC522 RFID reader module.
  - Servo library that can be utilized to control a servo motor that operates the locking mechanism.
- **Circuit design:** Learning about basic electronic components and circuitry required for interfacing RFID readers with microcontrollers.

PROBLEM FACED

- **Technical challenges:** We encounter difficulties in understanding and implementing the technical aspects of RFID technology, such as interfacing RFID readers with microcontrollers or processing RFID data.
- **Software bugs and debugging:** Debugging errors in the software code, such as syntax errors, logical errors, or compatibility issues between different software components.
- **Hardware issues:** Dealing with hardware-related problems, such as faulty connections, or compatibility issues between different hardware modules.

VIDEO PRESENTATION

FUTURE WORK

Potential enhancements for the project include:

- Adding multiple user support with different access levels.
- Implementing access logs and notifications for security monitoring.

THANK YOU