Team:-

The JoE Avengers

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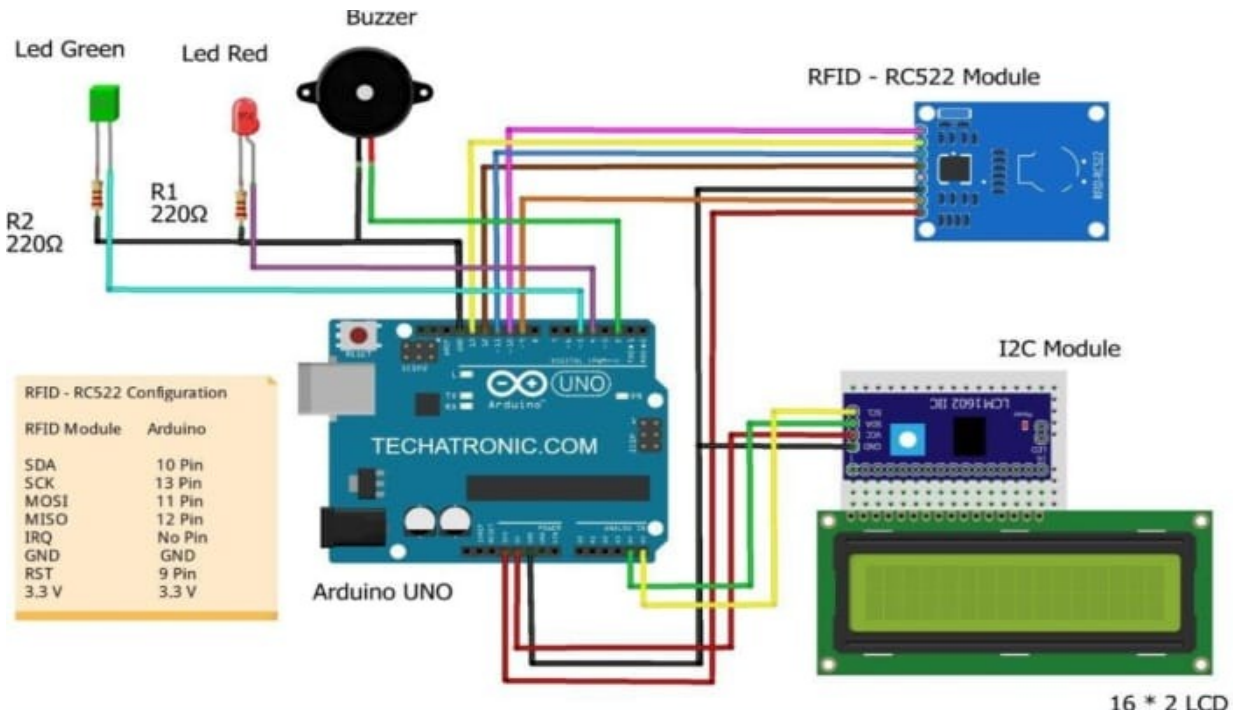
Major Project:-

RFID Automatic Toll Gate

Circuit Diagram



Components

Arduino board	-Rs.700
Arduino cable	-Rs.80
Servo motor	-Rs.130
Connecting wires	-Rs.70
Breadboard mini	-Rs.30
RFID reader and writer	-Rs.130
RFID cards and tags	-Rs.50
Buzzers	-Rs.30
LED'S	-Rs.30
LCD	-Rs.130
LCD I2C module	-Rs.80

Total Cost:-Rs.1460

Working of the circuit

When an RFID tag enters the range of the RFID reader, its unique identifier is detected. The system then communicates with the Arduino Uno to verify whether the tag is authorized for gate access. If the tag is authorized, the Arduino activates the green LED, indicating that the gate is ready to open.

Upon receiving the signal, the gate motor is triggered, allowing the authorized person or vehicle to pass through. The green LED remains lit during the gate opening process, providing a visual confirmation that the gate is in the open position. After a specific time or trigger condition, the Arduino initiates the gate closure.

In the event of an unauthorized RFID tag detection or a system error, the Arduino triggers the buzzer to emit a sound, accompanied by the glowing of the red LED. This combination of audible and visual feedback serves as an alert for unauthorized access attempts or system malfunctions.

Code of the Arduino Uno

```
/*Door lock system code
 * https://srituhobby.com
 */

#include <Servo.h>
#include <LiquidCrystal_I2C.h>
#include <SPI.h>
#include <MFRC522.h>

#define SS_PIN 10
#define RST_PIN 9
#define LED_G 5 //define green LED pin
#define LED_R 4 //define red LED
#define LED_B 6
#define BUZZER 2 //buzzer pin
String UID1 = "73 B1 79 AC";
String UID2 = "C4 8C 44 64";
byte lock = 0;

Servo servo;
LiquidCrystal_I2C lcd(0x27, 16, 2);
MFRC522 rfid(SS_PIN, RST_PIN);



void setup() {
  Serial.begin(9600);
```

```
  servo.write(0);
  pinMode(LED_G, OUTPUT);
  pinMode(LED_R, OUTPUT);
  pinMode(LED_B, OUTPUT);
  pinMode(BUZZER, OUTPUT);
  noTone(BUZZER);
  lcd.init();
  lcd.backlight();
  servo.attach(3);
  SPI.begin();
  rfid.PCD_Init();

}



void loop() {
  lcd.setCursor(0, 0);
  lcd.print("Welcome! To HYD>");
  lcd.setCursor(1, 1);
  lcd.print("Put your card");

  if ( ! rfid.PICC_IsNewCardPresent())
    return;
  if ( ! rfid.PICC_ReadCardSerial())
    return;

  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Scanning");
```

```
  String ID = "";
  for (byte i = 0; i < rfid.uid.size; i++) {
    lcd.print(".");
    ID.concat(String(rfid.uid.uidByte[i] < 0x10 ? " 0" : " "));
    ID.concat(String(rfid.uid.uidByte[i], HEX));
    delay(300);
  }
  ID.toUpperCase();


  if (ID.substring(1) == UID1 && lock == 0 ) {
    digitalWrite(LED_G, HIGH);
    tone(BUZZER, 500);
    delay(300);
    noTone(BUZZER);
    digitalWrite(LED_G, LOW);
    lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print("TS 09 HC 6359");
    lcd.setCursor(0, 1);
    lcd.print(" Access Granted!");
    Serial.print("vechile no: 'TS 09 HC 6359' PASSED!!\n");
    Serial.print("---------------------------------------\n");
    delay(1500);
    servo.write(70);
    delay(3000);
    servo.write(0);
    lcd.clear();
    lock = 0;
  }
```

```
  else if(ID.substring(1) == UID2 && lock == 0 ) {
    digitalWrite(LED_G, HIGH);
    tone(BUZZER, 500);
    delay(300);
    noTone(BUZZER);
    digitalWrite(LED_G, LOW);
    lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print("TS 26 AG 2622");
    lcd.setCursor(0, 1);
    lcd.print(" Access Granted!");
    Serial.print("vechile no: 'TS 26 AG 2622' PASSED!!\n");
    Serial.print("---------------------------------------\n");
    delay(1500);
    servo.write(70);
    delay(3000);
    servo.write(0);
    lcd.clear();
    lock = 0;
    }
  else {
    digitalWrite(LED_R, HIGH);
    tone(BUZZER, 300);
    delay(2000);
    digitalWrite(LED_R, LOW);
    noTone(BUZZER);
    lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print("Insufficient");
```

```
    lcd.setCursor(0, 1);
    lcd.print("Balance!");
    Serial.print("vechile no: 'TS 86 AR 8877' NOT PASSED!!- NO BALANCE
!!\n");
    Serial.print("----------------------------------------\n");
    delay(1500);
    lcd.clear();
  }
}
```

Applications

The RFID automatic gate opening circuit offers secure access control and efficient gate operation in various applications. In residential settings, it automates gate access control for convenient entry and exit, ensuring the security of the premises. Similarly, in commercial buildings and gated communities, the circuit enables secure access control for authorized personnel, simplifying the entry process and enhancing overall security measures.

Parking lots benefit from the circuit's ability to automate entry and exit processes. This allows for smooth and controlled access for vehicles with authorized RFID tags, improving traffic flow and providing a hassle-free parking experience. Additionally, industrial facilities, factories, and warehouses can implement the circuit to manage access to restricted areas within their premises. By utilizing RFID tags, the circuit enhances security measures and ensures that only authorized personnel can enter specific zones, safeguarding valuable assets and sensitive information.

In summary, the RFID automatic gate opening circuit finds versatile applications in residential, commercial, parking, and industrial settings. Its secure access control and efficient gate operation features enhance convenience, streamline entry processes, and bolster security measures.

Completed Circuit Setup