

SMART PUBLIC RESTROOM

Phase-3 :DEVELOPMENT (PART 1)

INTRODUCTION:

Smart washrooms are among recent IoT solutions that are very soon to be implemented here and there. Such new generation restrooms are expected to significantly improve customer experience and employee well-being while also lower costs allocated to maintain equipment.

Components required:

1. arduino
2. Rfid
3. Servo motor
4. Humidity sensor

HARDWARE DEVELOPEMNET:

1.ARDUINO:

Choose an appropriate Arduino board based on your project's requirements. Popular choices include the Arduino Uno, Arduino Mega, or Arduino Nano. The selection depends on factors like the number of sensors and peripherals you plan to connect and the power requirements.

2.RFID:(TRACKING A PERSON)

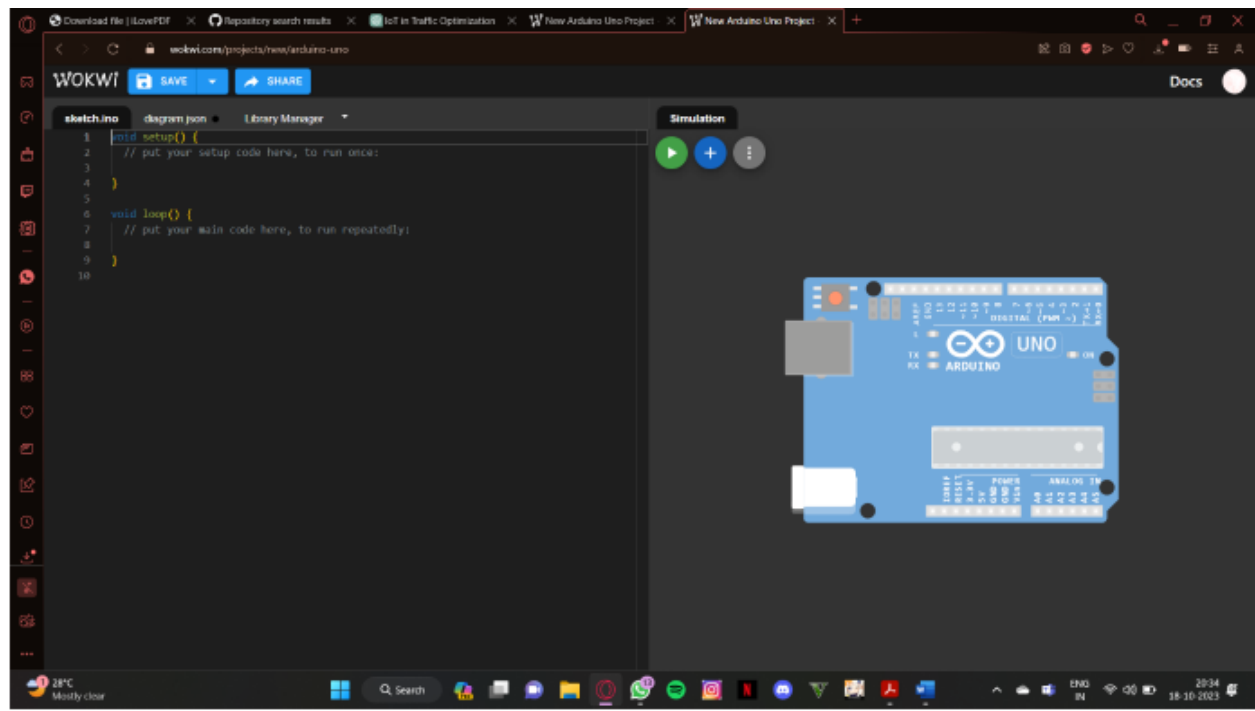
to identify the specific person to enter the room for the usage of the restroom and it will be stored in the storage device and the time allocation for the process.

3.SERVO:

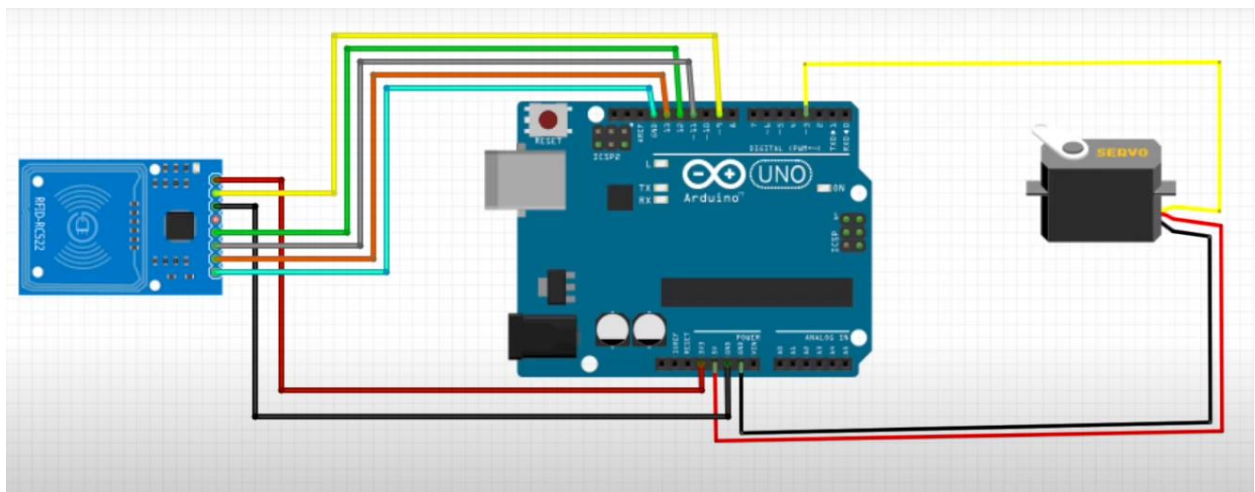
the servo is used in the opening of restroom door .it will operate the door manually after the permission is allocated by the RFID reader.

STIMULATION:

Step 1:



Step 2:



SOFTWARE DEVELOPMENT:

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

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

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

```
#include <DHT.h>
```

```
#define DHTPIN 2 // Pin connected to the data pin of the DHT sensor
```

```
#define DHTTYPE DHT11 // Change this to DHT22 if you're using a DHT22 sensor
```

```
#define SS_PIN 10
```

```
#define RST_PIN 9
```

```
#define SERVO_PIN 3
```

```
Servo myservo;
```

```
DHT dht(DHTPIN, DHTTYPE);
```

```
#define ACCESS_DELAY 2000
```

```
#define DENIED_DELAY 1000
```

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

```
void setup()
```

```
{
```

```
  Serial.begin(9600); // Initiate a serial communication
```

```
  SPI.begin(); // Initiate SPI bus
```

```
  mfrc522.PCD_Init(); // Initiate MFRC522
```

```
dht.begin();
```

```
  myservo.attach(SERVO_PIN);
```

```
  myservo.write( 70 );
```

```
  delay(7500);
```

```
  myservo.write( 0 );
```

```
  Serial.println("Put your card to the reader...");
```

```
  Serial.println();
```

```
}
```

```
void loop()
```

```
{
```

```
  // 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;
float humidity = dht.readHumidity(); // Read humidity value

if (isnan(humidity)) {
    Serial.println("Failed to read humidity from the sensor!");
    return;
}

Serial.print("Humidity: ");
Serial.print(humidity);
Serial.println("%");
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) == "69 C8 E2 2A") //change here the UID of the card
{
    Serial.println("Authorized access");
    Serial.println();
    myservo.write( 70 );
    delay(7500);
    myservo.write( 0 );

}

else {
    Serial.println(" Access denied");

    delay(DENIED_DELAY);

}
}
}

```

CONCLUSION:

The restroom entrance is equipped with automatic sliding or swinging doors that open upon detecting an approaching user. Occupancy sensors near the entrance monitor the number of people inside. This will prevent the spread of germs and allergies from one person to the other person.

These sensors are used to monitor handwashing compliance in healthcare settings. They can be worn as wearable devices or installed in or near handwashing stations, and they track healthcare workers' hand hygiene practices.

Surface and Air Quality Sensors: Sensors are used to monitor the cleanliness of surfaces and the quality of air in indoor environments. They can detect pathogens, allergens, pollutants, or other contaminants in the air or on surfaces.