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TITLE:

IOT Based Home Automation

School of Computer Science And Engineering

M-Tech Integrated with

Specialization in Data Science

CSI3008- Internet Of Everything

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ABSTRACT:

The Internet of Things (IoT) based home automation systems are becoming increasingly popular for managing and controlling various home appliances. This technology utilizes connected devices and smart appliances that interact with one another through wireless networks and automated processes. With the help of this technology, homeowners can easily monitor, control, and automate their home environment from the convenience of their smartphone, tablet, or computer. IoT home automation systems can help to improve energy efficiency, reduce costs, and provide greater convenience and comfort. This paper provides an overview of the various components of IoT-based home automation systems, their advantages, and potential applications.

We have physically implemented an automatic door component that utilizes sensor technology to detect the presence of individuals approaching or leaving the house. By integrating these sensors with a microcontroller and a motorized mechanism, the door can be opened or closed automatically, eliminating the need for manual operation. This feature ensures a hands-free and effortless access experience, enhancing accessibility and convenience for the occupants.

Furthermore, the automatic air conditioner component optimizes energy consumption and creates a comfortable indoor environment. By utilizing a temperature sensor, the system intelligently regulates the air conditioner based on the current temperature. The system adjusts the temperature or switches off the air conditioner, thus conserving energy.

These systems allow you to remotely control and monitor various devices and appliances in your home from anywhere using your smartphone, tablet, orcomputer. You can use these systems to control lighting, heating and cooling, security, audio and visual, and other connected devices. It’s also possible to receive alerts when certain conditions are met, such as when a door is opened or when the temperature drops to a certain level. With an IoT-based home automation system, you can enjoy a smart, automated home that’s easier and more efficient to manage.

COMPONENTS REQUIRED:

IR sensor

TMP36 Temperature Sensor

MQ2 Smoke Sensor

LDR Sensor

Servo motor

Arduino-UNO

Jumper wires

Buzzer

5V Relay Module

16*2 LCD display

TMP36 Temperature Sensor

Light Bulb/Fan/Cooler

Connecting wires

SOFTWARE REQUIREMENTS:

Tinkercad (Language Used: C++)

SENSORS USED:

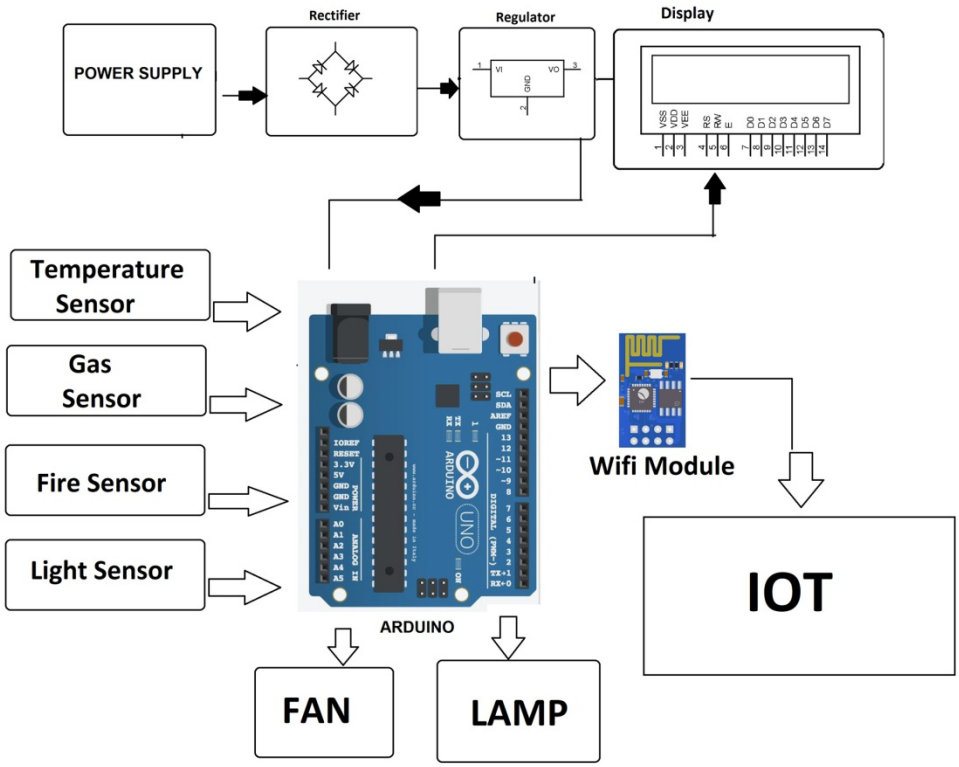
1. IR Sensor
   An infrared sensor (IR sensor) is a radiation-sensitive optoelectronic component with a spectral sensitivity in the infrared wavelength range 780 nm … 50 µm. IR sensors are now widely used in motion detectors, which are used in building services to switch on lamps or in alarm systems to detect unwelcome guests. In a defined angle range, the sensor elements detect the heat radiation (infrared radiation) that changes over time and space due to the movement of people. Such infrared sensors only have to meet relatively low requirements and are low-cost mass-produced items.

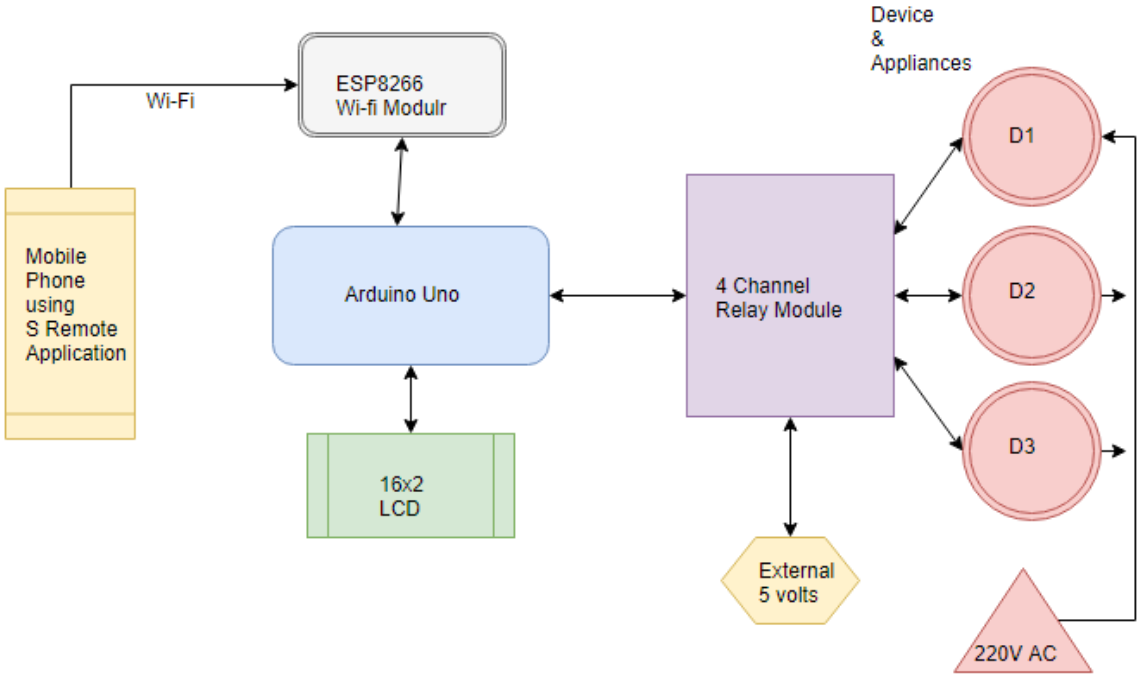
2. TMP36 Temperature Sensor
   The TMP36 is a low voltage, precision centigrade temperature sensor manufactured by Analog Devices. It is a chip that provides a voltage output that is linearly proportional to the temperature in °C and is, therefore, very easy to use with an Arduino.
   The TMP36 temperature sensor is fairly precise, never wears out, works under many environmental conditions and requires no external components to work. In addition, the TMP36 sensor does not require calibration and provides a typical accuracy of ±1°C at +25°C and ±2°C over the −40°C to +125°C temperature range.

3. MQ2 Smoke Sensor
   In addition to smoke and carbon monoxide, smart smoke sensors can also monitor the air quality in your home for pollen, dust or other particulates. Some smart smoke detector models can even differentiate between burnt toast and an actual house fire, giving you a chance to cancel the alarm before it goes off. The MQ-2 is a smoke and combustible gas sensor from Winsen. It can detect flammable gas in a range of 300 - 10000ppm. It's most common use is domestic gas leakage alarms and detectors with a high sensitivity to propane and smoke.

4. LDR Sensor
   Light sensing smart devices can turn off the light switch when you don’t remember to and smart bulbs let you set lighting schedules. So, even if you forget to turn the basement light off, a light sensor will do it for you. If you’re on vacation, you can set smart bulb timers to go off and on to give the impression someone is home. Or, you can control them manually with your smartphone.
   An LDR is a component that has a (variable) resistance that changes with the light intensity that falls upon it. This allows them to be used in light sensing circuits.

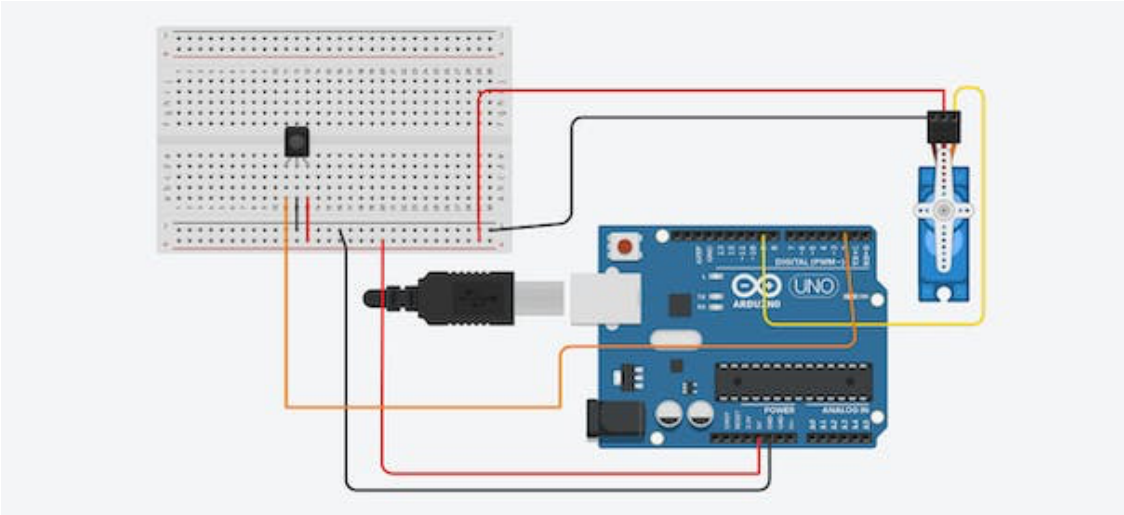
BLOCK DIAGRAM

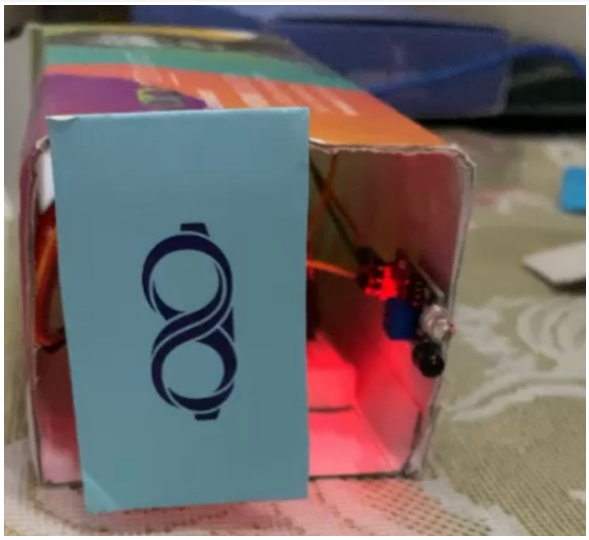




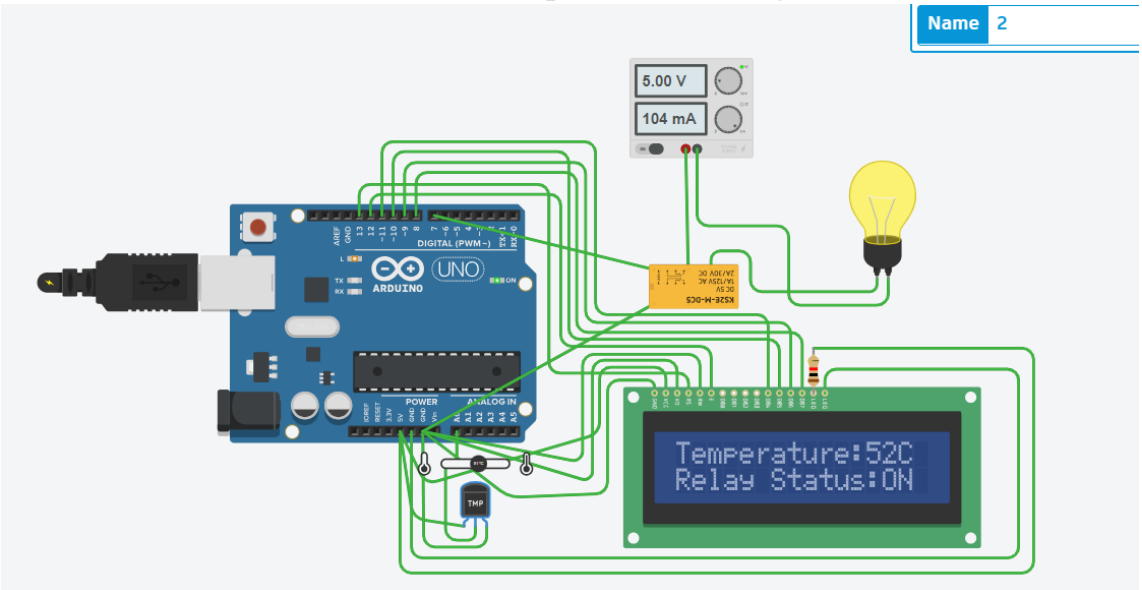
CONNECTIONS

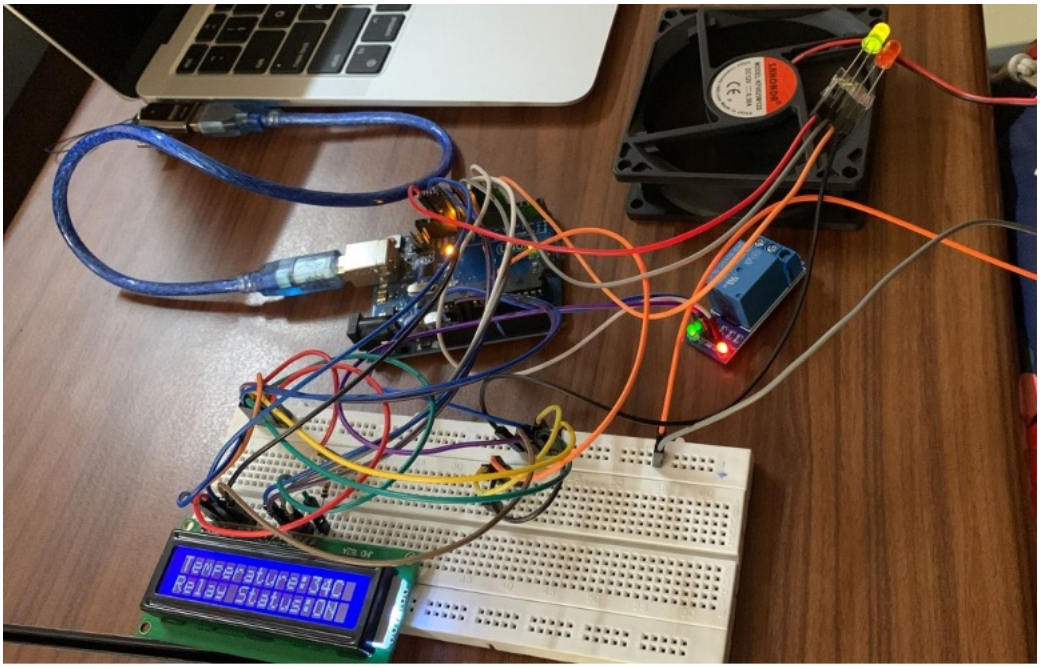
1. Automatic Door Opener



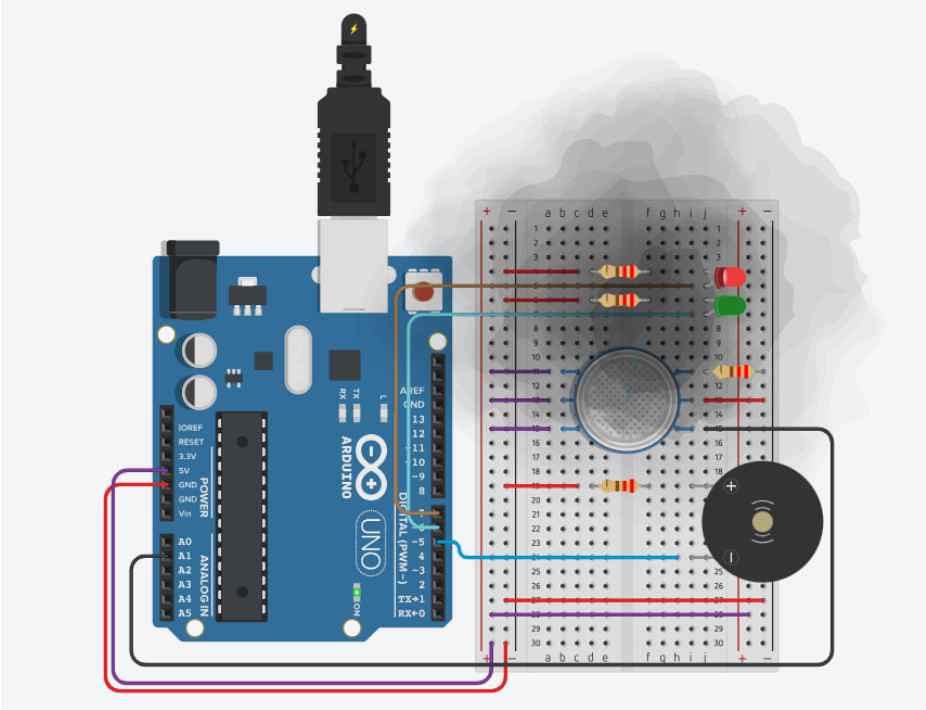


2. Automatic Air Conditioner with temperature sensing

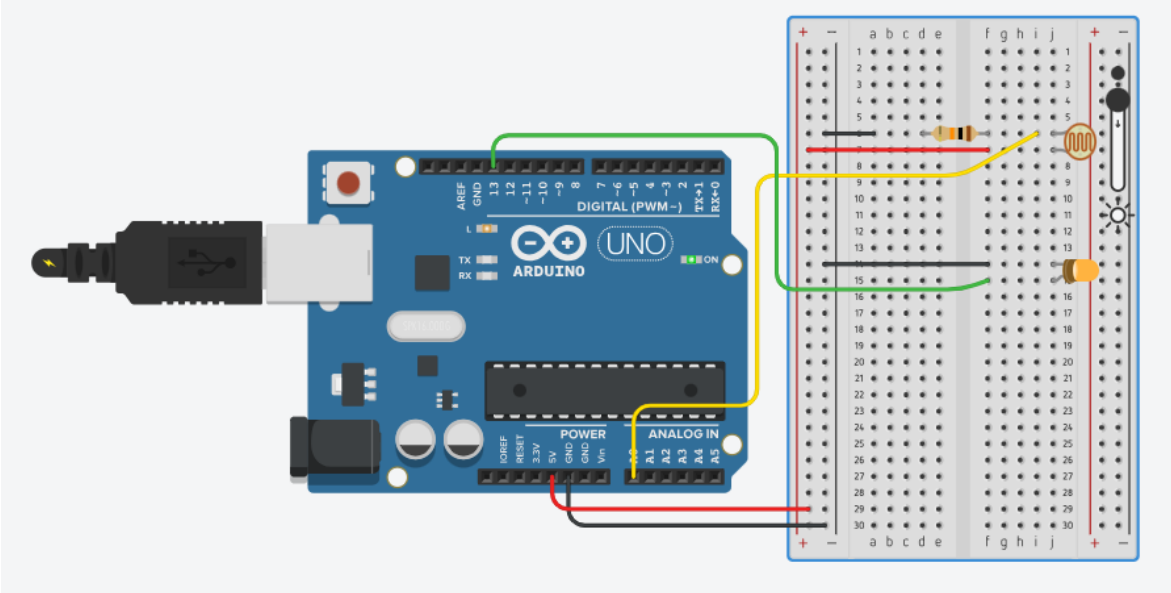




3. Smoke Detection



4. Light Sensing



CODES:

1. AUTOMATED DOOR OPENER

```
#include <Servo.h>

Servo tap_servo;

int sensor_pin = 2;
int tap_servo_pin =9;
int val;

void setup(){
pinMode(sensor_pin,INPUT);
tap_servo.attach(tap_servo_pin);

}

void loop(){
val = digitalRead(sensor_pin);

 if (val==0)
 {tap_servo.write(0);
 }
 if (val==1)
 {tap_servo.write(180);
  }
}
```

2. AUTOMATIC AIR CONDITIONER WITH TEMPERATURE SENSING

```
#include <LiquidCrystal.h>
LiquidCrystal lcd(13, 12, 11, 10, 9, 8);
int tempin = A0; // the output pin of TMP36
int cel;
int led = 6;
int tempmin = 30;
int relay = 7;
void setup() {
  pinMode(tempin, INPUT);
  Serial.begin(9600);
  lcd.begin(16, 2);
  pinMode(relay, OUTPUT);
  pinMode(led, OUTPUT);

}

void loop() {
  cel = map(((analogRead(A0) - 20) * 3.04), 0, 1023, -40, 125);
  Serial.print(cel);
  Serial.println();
  if (tempmin < cel) {
    lcd.setCursor(0, 1);// move cursor to next line
    lcd.print("Relay Status:");
    lcd.print("ON"); // display the temperature
    digitalWrite(relay, LOW);
    digitalWrite(led, HIGH);
  }
  else {
    lcd.setCursor(0, 1);// move cursor to next line
    lcd.print("Relay Status:");
    lcd.print("OFF"); // display the temperature
    digitalWrite(relay, HIGH);
    digitalWrite(led, LOW);
  }
  lcd.setCursor(0, 0);
  lcd.print("Temperature:");
  lcd.print(cel); // display the temperature
  lcd.print("C ");
  delay(3000);
  lcd.clear();

}
```

3. SMOKE DETECTION

```
int buzzer = 5;
int ledgreen = 6;
int ledred = 7;

int sensorThreshold = 40;

void setup()
{
 pinMode (ledred, OUTPUT);
 pinMode (ledgreen, OUTPUT);
 pinMode (buzzer, OUTPUT);
 pinMode (A1, INPUT);
 Serial.begin(9600);
}
void loop()
{
 int sensorValue = analogRead(A1);
 Serial.print("SENSOR: ");
 Serial.println(sensorValue);

 if (sensorValue > sensorThreshold)
 {
  digitalWrite (ledred, HIGH);
  digitalWrite (ledgreen, LOW);
  digitalWrite (buzzer, HIGH);
 }

 else
 {
  digitalWrite(ledred, LOW);
  digitalWrite (ledgreen, HIGH);
  digitalWrite (buzzer, LOW);
 }

 delay(100);
}
```

4. **LIGHT SENSING**

```
const int ledPin=13; //the code will flash the LED connected to pin 13
const int sensorPin= 0; //Sensor pin connects to analog pin A0

int level; //the variable that will hold the light level reading

const int threshold=500; //this represents the threshold voltage. If voltage is below
150, this triggers the LED to turn on

void setup() {
pinMode (ledPin, OUTPUT); //sets digital pin 13 as output
Serial.begin(9600); //sets the baud rate at 9600 so we can check the values the sensor
is obtaining on the Serial Monitor
}

void loop(){
level= analogRead(sensorPin); //the sensor takes readings from analog pin A0
Serial.println(level);
if (level < threshold){
digitalWrite(ledPin, HIGH); //if the light level is below the threshold level, the LED
turns on
}
else{
digitalWrite(ledPin, LOW); //otherwise, if the light level is above the threshold level,
the LED is off
}
}
```

CONCLUSION:

In conclusion, the implementation of Arduino Uno in our home automation project has successfully demonstrated the integration of four essential components: automatic door, automatic air conditioner, smoke detection, and light sensing. This system showcases the potential of Arduino Uno in creating a seamless and efficient home automation experience, enhancing convenience, safety, and energy efficiency in our daily lives.

REFERENCES:

1. https://srrobotics.in/
2. https://www.electronicshub.org/