Smart Home Security and RGB Control System using Arduino

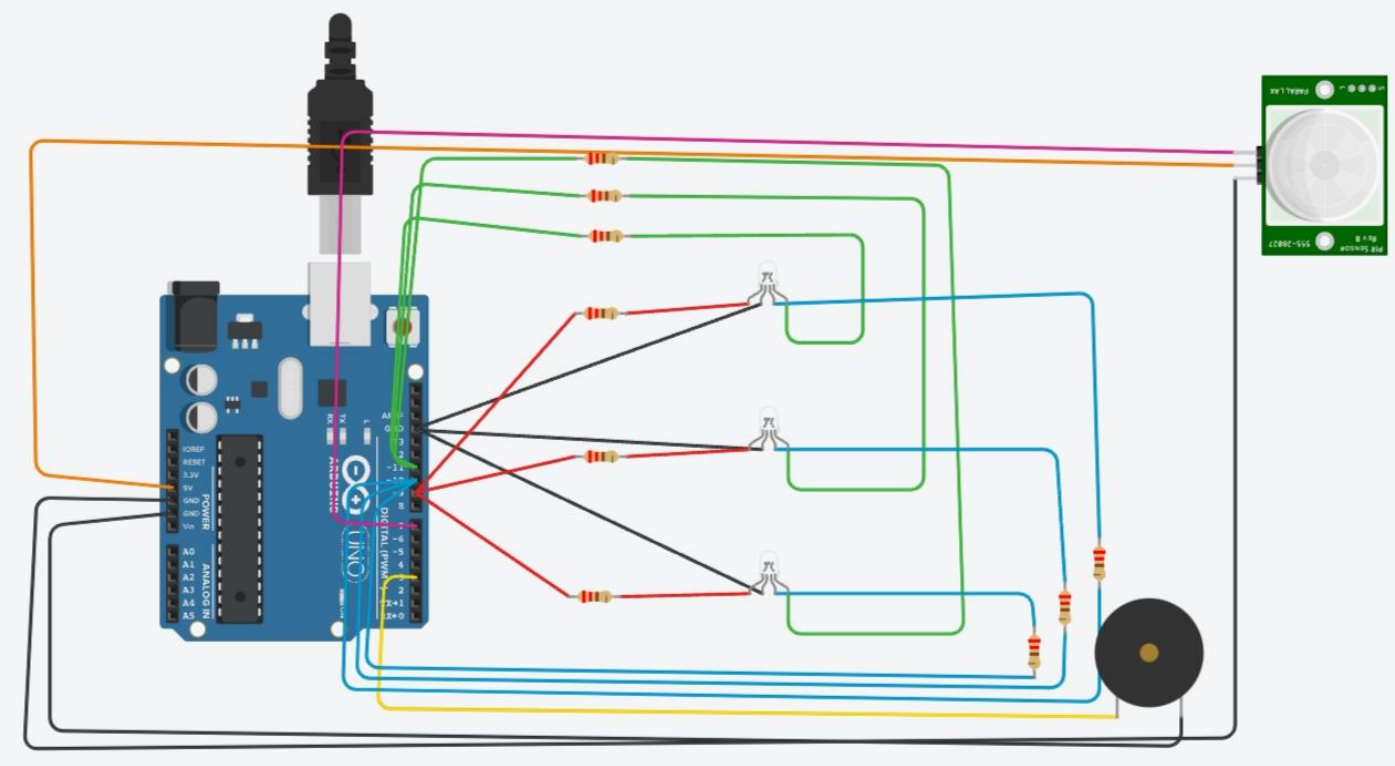
Key Components:

1. **Arduino Uno** – Core microcontroller to control the system.
2. **IR Motion Sensor (PIR Sensor)** – Detects movement and triggers alarm or light.
3. **RGB LED** – Indicates different statuses or ambiance using colored light.
4. **Buzzer / Alarm Module** – Alerts when unauthorized motion is detected.
5. **Relay Module** – To control AC appliances or external alarms.
6. **Power Supply / Battery** – To power the circuit.
7. **Resistors & Jumpers** – For circuit stability.

Working Principle:

- The **PIR sensor** detects motion within its range.
- Upon motion detection:
    - The **RGB LED** lights up with specific colors indicating the state (e.g., red for alert, green for safe).
    - The **buzzer** or **alarm system** gets triggered.
    - A relay can be activated to power on external devices like lights or sirens.
- The system is designed for **home automation and intrusion alert**, ideal for smart homes.

Circuit Overview:



- **PIR Sensor:**
  - VCC → 5V (Arduino)
  - GND → GND
  - OUT → Digital Pin 7 (Arduino)
- **RGB LED:**
  - R → Pin 9 (with resistor)
  - G → Pin 10
  - B → Pin 11
  - Common Cathode → GND
- **Buzzer:**
  - +ve → Digital Pin 8
  - −ve → GND
- **Relay Module:**
  - IN → Digital Pin 6
  - VCC → 5V
  - GND → GND

Arduino Code (Sample):

```
int pirPin = 7;
int buzzer = 8;
int redPin = 9;
int greenPin = 10;
int bluePin = 11;
int relayPin = 6;
void setup() {
  pinMode(pirPin, INPUT);
  pinMode(buzzer, OUTPUT);
  pinMode(redPin, OUTPUT);
  pinMode(greenPin, OUTPUT);
  pinMode(bluePin, OUTPUT);
  pinMode(relayPin, OUTPUT);
  Serial.begin(9600);}
void loop() {
```

```
  int motionDetected = digitalRead(pirPin);
  if (motionDetected == HIGH) {
    // Alert Mode
    digitalWrite(buzzer, HIGH);
    digitalWrite(relayPin, HIGH);
    setColor(255, 0, 0); // Red - Alert
    Serial.println("Motion Detected!");
    delay(5000); // Alarm duration
  } else {
    // Safe Mode
    digitalWrite(buzzer, LOW);
    digitalWrite(relayPin, LOW);
    setColor(0, 255, 0); // Green - Safe  }}

void setColor(int red, int green, int blue) {
  analogWrite(redPin, red);
  analogWrite(greenPin, green);
  analogWrite(bluePin, blue);}
```

Code Explanation:

- **PIR sensor** input is read on digital pin 7.
- If motion is detected:
    - **Buzzer** and **relay** are turned ON.
    - RGB LED shows **red**.
- If no motion:
    - RGB LED shows **green**.
    - Alarm and relay remain OFF.
- setColor() function controls RGB LED output based on input color values.

Conclusion:

- This project demonstrates a **simple and effective smart home system**.
- It includes **motion detection**, **RGB lighting control**, and **alarm triggering**.
- You can expand it with features like **SMS alerts**, **WiFi/Bluetooth control**, or **mobile notifications** for real-time updates.