

# **Smart Security & Light Control System**

## **Aim:**

To simulate a smart home automation system that detects human presence in low-light conditions using a PIR and LDR sensor, and controls an LED light while sending alerts.

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## **Problem Statement:**

Design and implement a system that automatically:

- Detects motion using a PIR sensor.
  - Detects ambient light using an LDR sensor.
  - Turns ON a light (LED) and sends an alert when motion is detected in darkness.
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## **Scope of the Solution:**

- Useful in smart home security and automation.
  - Can be extended to IoT-based real-time alerting systems.
  - Low-cost, easy-to-simulate project using Wokwi.
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## **Required Components:**

### **Hardware:**

- Arduino Uno
- PIR Motion Sensor
- LDR Module (A0, VCC, GND)

- LED
- 10k resistor (if using raw LDR)
- Jumper Wires

### **Software:**

- Wokwi (Arduino Simulator) - Arduino IDE (for offline testing)

Cloud (Optional):

- Can be extended to use Blynk/IFTTT/Thingspeak for alerts (not used in basic simulation)
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### **Circuit Connections:**

PIR Sensor:

- VCC Arduino 5V
- GND Arduino GND
- OUT Arduino D2

LDR Module:

- VCC Arduino 5V
- GND Arduino GND
- A0 Arduino A0

LED:

- Anode (+) D13
  - Cathode (-) GND
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**Flowchart:**

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Start

|

Read PIR sensor --> Is Motion Detected?

|

No --> Loop Again

|

Yes --> Read LDR sensor

|

Is Light < Threshold?

|

No --> Loop Again

|

Yes --> Turn ON LED, Print "Alert: Motion in Darkness!"

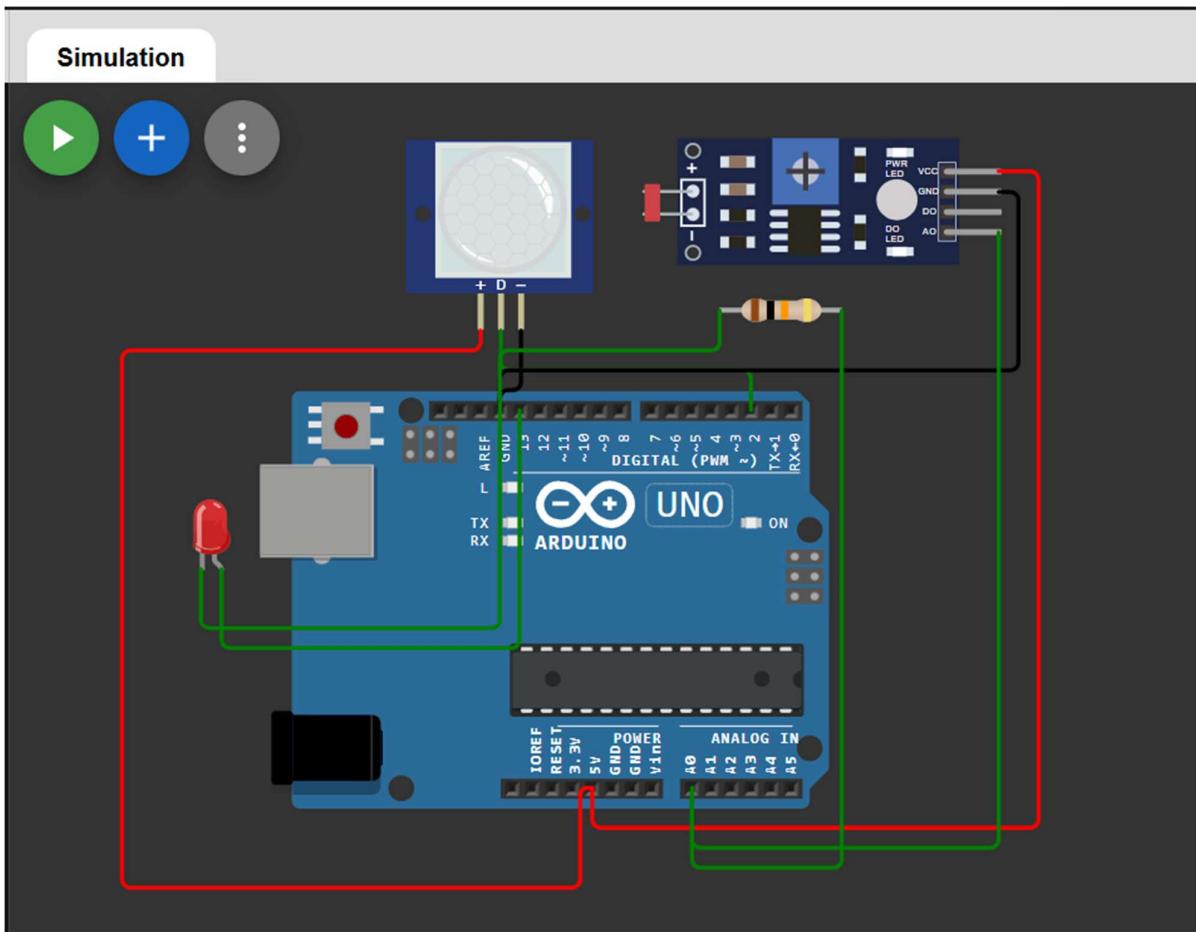
--> Wait 5 seconds

--> Turn OFF LED

...

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**Wokwi Circuit Simulation:**



### Code:-

```
int pirPin = 2;  
  
int ldrPin = A0;  
  
int ledPin = 13;  
  
int threshold = 600; // Change this if needed
```

```
void setup() {  
  
pinMode(pirPin, INPUT);  
  
pinMode(ledPin, OUTPUT);  
  
Serial.begin(9600);  
  
}  

```

```
void loop() {  
  
int motion = digitalRead(pirPin);  
  
int light = analogRead(ldrPin);  
  
Serial.print("Motion: "); Serial.print(motion);  
  
Serial.print(" | Light: "); Serial.println(light);  

```

```
if (motion == HIGH && light < threshold) {  
  
    digitalWrite(ledPin, HIGH);  
  
    Serial.println("☒ ALERT: Motion in DARKNESS!");  
  
    delay(5000);  
  
    digitalWrite(ledPin, LOW);  
  
}  
  
delay(200);  
  
}
```

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[Click here for live simulation]( <https://com/projects/435720051187752961> )

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### **Demo Instructions:**

1. Start simulation on Wokwi.
  2. Slide LDR to simulate darkness (< 600).
  3. Click "Simulate motion" on PIR.
  4. Show LED turning ON and Serial Monitor printing: " ALERT: Motion in DARKNESS!"
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