MOTION-BASED SMART LIGHT SYSTEM

Introduction

01

Motion-based Smart Light System is an energy- efficient automation setup

02

Uses motion Sensor to detect movement

03

Light turn ON when Motion is detected and Off when no movement is sensed for set time

WHY SMART LIGHT SYSTEM

Reduces electricity consumption

Enhances convenience and safety

Part of modern IoT-based automation

Components Required

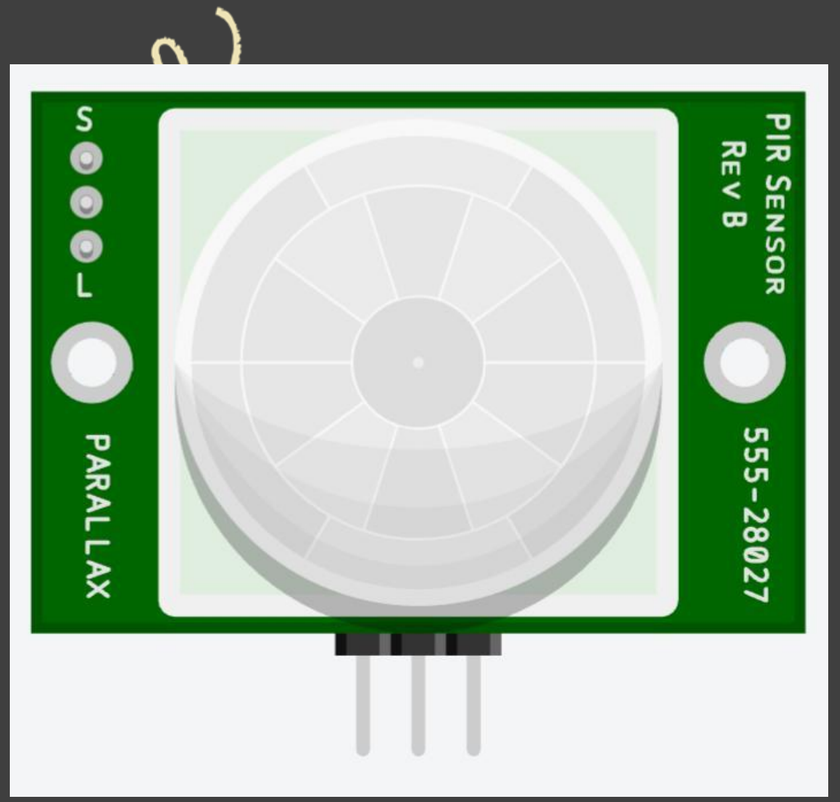
- Arduino Uno
- Display LCD 2x16
- Resistor
- Breadboard
- LED
- PIR sensor

About PIR sensor

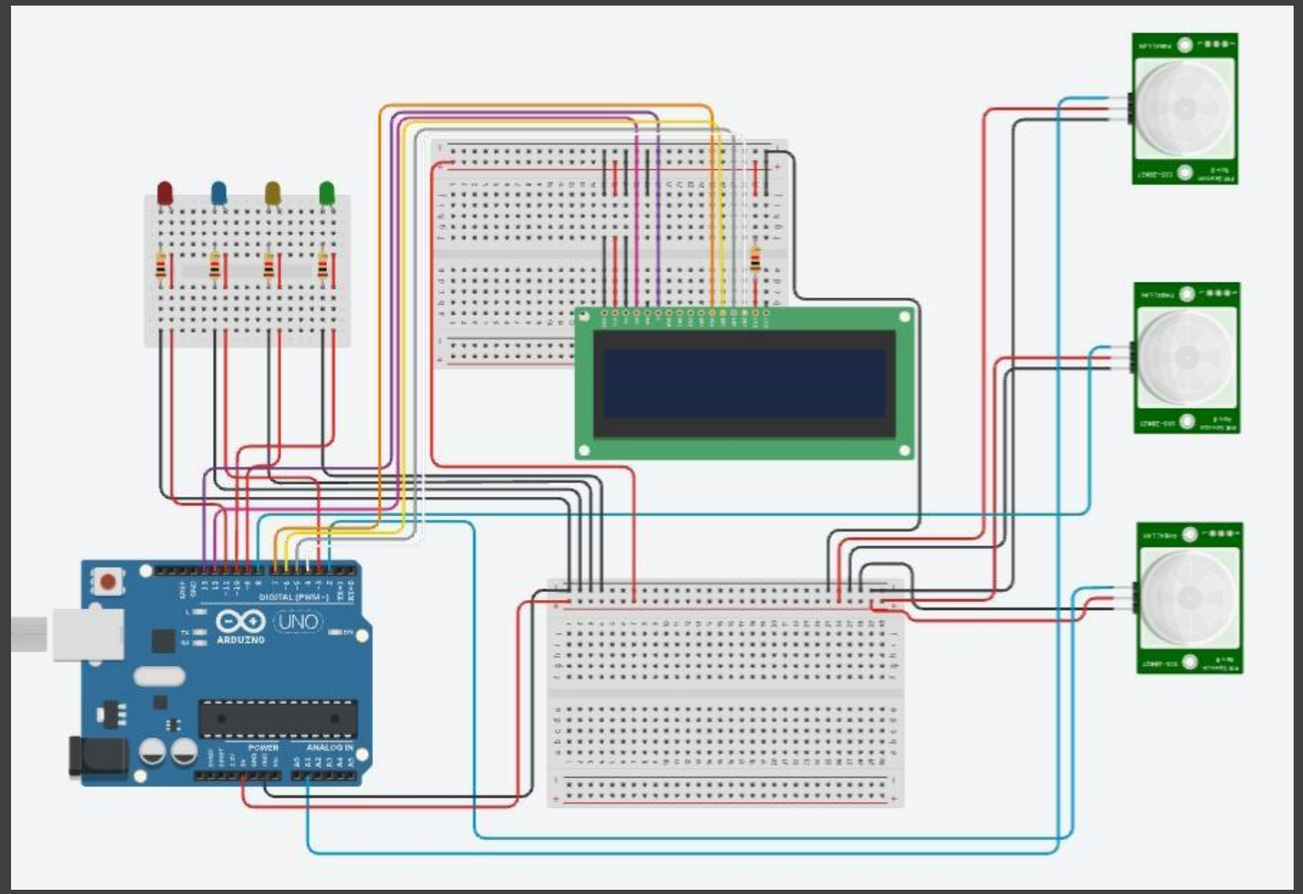
PIR (Passive Infrared) Sensor detects infrared radiation from human bodies.

Identifies motion without physical contact.

Common in automatic Lights and security systems.



CIRCUIT DIAGRAM



Shows connection of Arduino, PIR sensor, LED and LCD

Working Principle

PIR sensor detect heat emitted by moving objects (humans)

Arduino processes the signal

Sends signal to arduino microcontroller

Activates relay or directly power LEDs light

If no motion is detected for specific time, light turns off

CODE

```
#include <LiquidCrystal.h>

// LCD pins: RS, E, D4, D5, D6, D7
LiquidCrystal lcd(12, 13, 7, 6, 5, 4);

#define led_1 11
#define led_2 3
#define led_3 9
#define led_4 10

const int pir_1 = 2;
const int pir_2 = 8;
const int pir_3 = A1;

String lastMessage = “”; // To prevent flickering

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

  pinMode(pir_1, INPUT);
  pinMode(pir_2, INPUT);
  pinMode(pir_3, INPUT);
  pinMode(led_1, OUTPUT);
  pinMode(led_2, OUTPUT);
  pinMode(led_3, OUTPUT);
  pinMode(led_4, OUTPUT);

  lcd.begin(16, 2);
  lcd.setCursor(0, 0);
  lcd.print(“System Ready”);
  delay(1000);
  lcd.clear();
}

void loop() {
  int control = analogRead(A0);
  Serial.println(control);

  if (control > 800) {
    bool motion1 = digitalRead(pir_1);
    bool motion2 = digitalRead(pir_2);
    bool motion3 = digitalRead(pir_3);
```

CODE

```
String currentMessage = “”;

if (motion1) {
  digitalWrite(led_1, HIGH);
  digitalWrite(led_2, HIGH);
  currentMessage = “Sensor 1: LED1&2”;
} else {
  digitalWrite(led_1, LOW);
}

if (motion2) {
  digitalWrite(led_2, HIGH);
  digitalWrite(led_3, HIGH);
  currentMessage = “Sensor 2: LED2&3”;
} else {
  digitalWrite(led_2, LOW);
}

if (motion3) {
  digitalWrite(led_3, HIGH);
  digitalWrite(led_4, HIGH);
  currentMessage = “Sensor 3: LED3&4”;
} else {
  digitalWrite(led_3, LOW);
  digitalWrite(led_4, LOW);
}

if (!motion1 && !motion2 && !motion3) {
  currentMessage = “No Motion”;
}

// Only When update LCD if message is change
if (currentMessage != lastMessage) {
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print(“Motion Status:”);
  lcd.setCursor(0, 1);
  lcd.print(currentMessage);
  lastMessage = currentMessage;
}
```

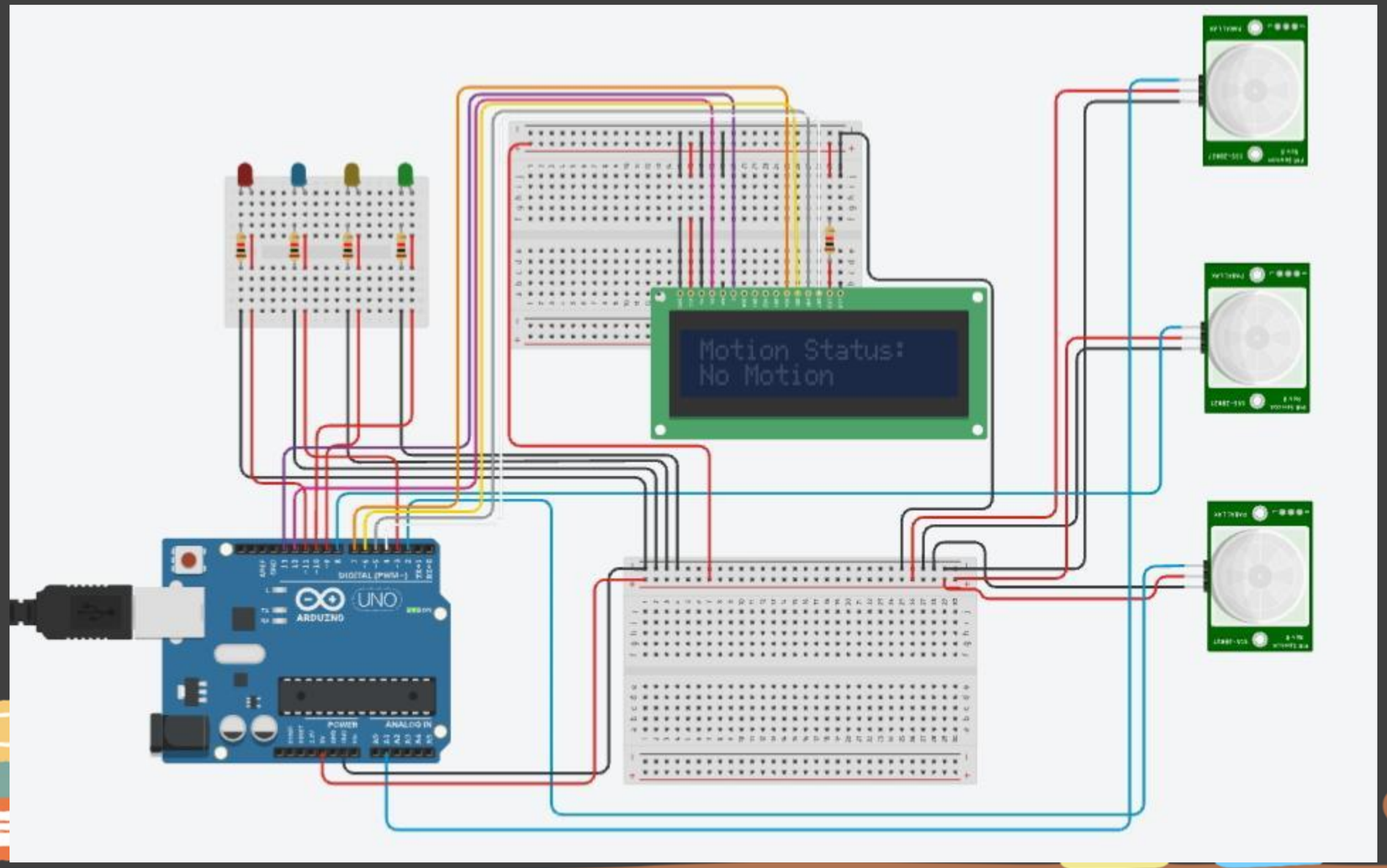
CODE

```
  } else {
    // System disabled
    digitalWrite(led_1, LOW);
    digitalWrite(led_2, LOW);
    digitalWrite(led_3, LOW);
    digitalWrite(led_4, LOW);

    if (lastMessage != “Disabled”) {
      lcd.clear();
      lcd.setCursor(0, 0);
      lcd.print(“System Disabled”);
      lcd.setCursor(0, 1);
      lcd.print(“A0 < 800”);
      lastMessage = “Disabled”;
    }
  }

  delay(200);
}
```

After Simulation



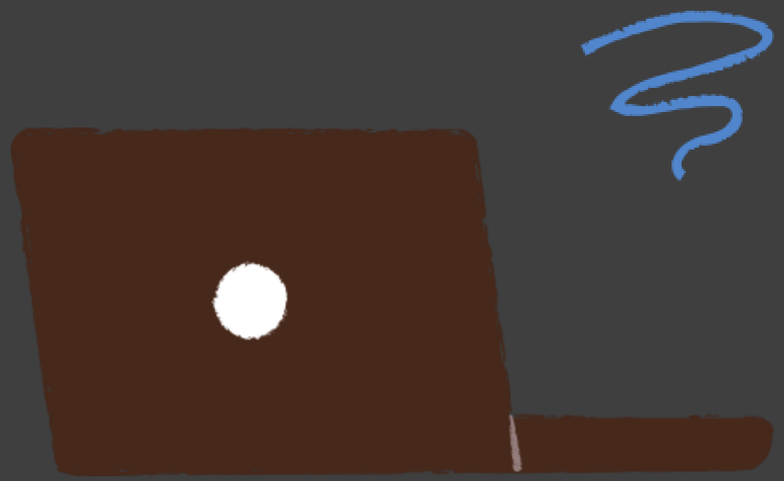
Application

01 AUTOMATIC ROOM, HALLWAY, BATHROOM LIGHTING

02 Reduces Electricity cost by ensuring lights only when needed

03 Smart Streetlights

Turn on with the vehicle movement



Advantage

Simple and low cost implementation

Energy efficient

Easy integration with IoT System

Limitation

Sensor range Limitations

May trigger false positive with pets or heat changes

Requires proper installation angle and position

Conclusion

Motion-Based Smart Light System is a practical, effective solution for modern needs.

Promotes automation, energy saving, and smart Living.

Widely adaptable for homes, offices, public and industrial spaces

Thank you!