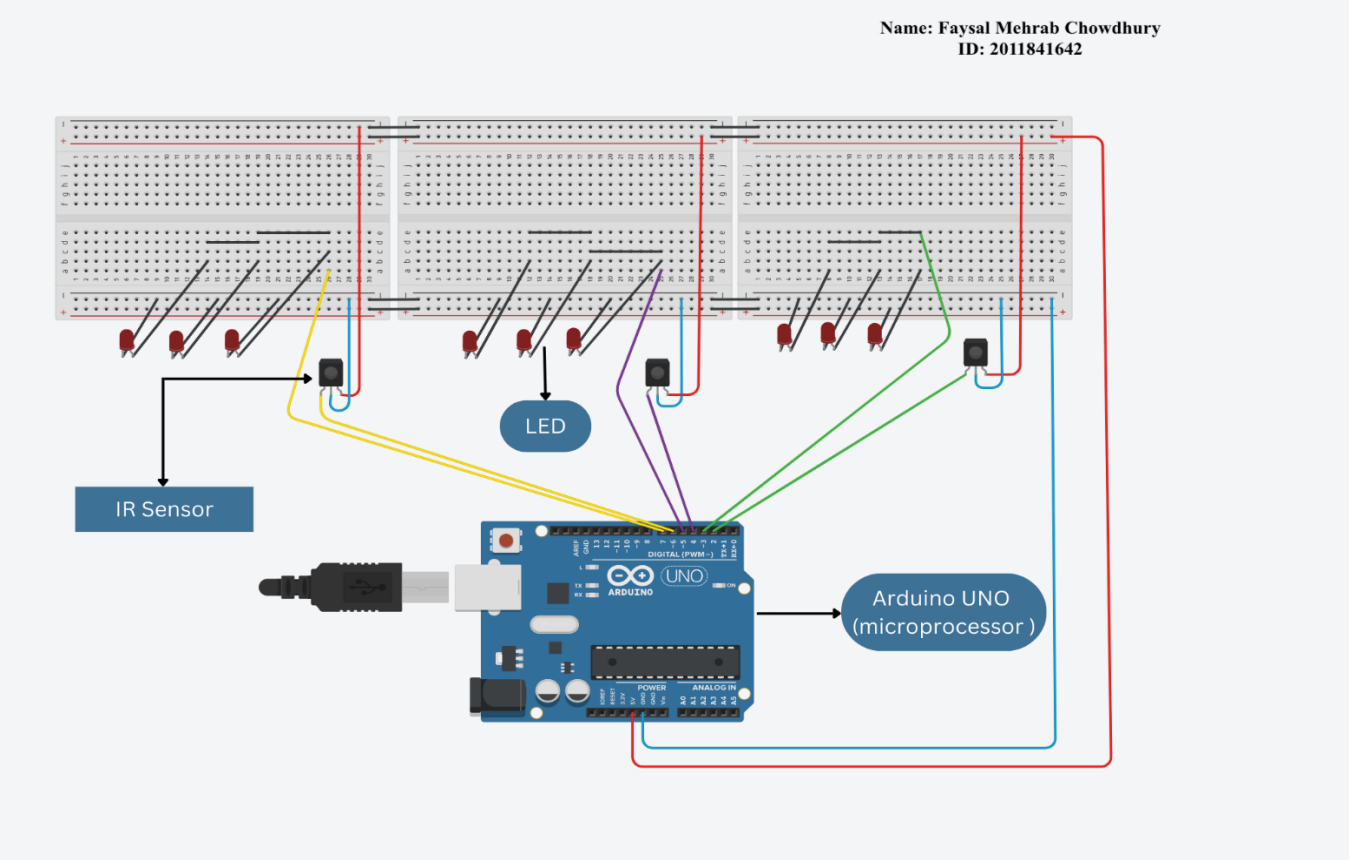
Title: Automated Street Light System

Objective:

- **To Learn How a Microprocessor Work**
- **To Learn How to Connect Software with Hardware**
- **To Learn How Operating System work**

Working Diagram:



Code:

```
int ir = 2;
int led1 = 3;

int ir1 = 4;
int led2 = 5;

int ir2 = 6;
int led3 = 7;

int x;
int y;
int z;

unsigned long previousMillis1 = 0;
unsigned long previousMillis2 = 0;
unsigned long previousMillis3 = 0;

const unsigned long interval = 2000;

bool led1On = false;
bool led2On = false;
bool led3On = false;

void setup() {
Serial.begin(9600);
pinMode(ir, INPUT);
pinMode(led1, OUTPUT);
pinMode(ir1, INPUT);
pinMode(led2, OUTPUT);
pinMode(ir2, INPUT);
pinMode(led3, OUTPUT);
}

void loop() {
x = digitalRead(ir);
y = digitalRead(ir1);
z = digitalRead(ir2);

unsigned long currentMillis = millis();
```

```
if (x == 0) {
if (!led1On) {
led1On = true;
previousMillis1 = currentMillis;
}
}

if (y == 0) {
if (!led2On) {
led2On = true;
previousMillis2 = currentMillis;
}
}

if (z == 0) {
if (!led3On) {
led3On = true;
previousMillis3 = currentMillis;
}
}

if (led1On && (currentMillis - previousMillis1 >= interval)) {
led1On = false;
}

if (led2On && (currentMillis - previousMillis2 >= interval)) {
led2On = false;
}

if (led3On && (currentMillis - previousMillis3 >= interval)) {
led3On = false;
}

digitalWrite(led1, led1On);
digitalWrite(led2, led2On);
digitalWrite(led3, led3On);
}
```

Result:

The implemented system successfully achieved the objective of providing independent control of segmented lights using Arduino and IR sensors. The code allowed each light segment to operate individually, turning on for a specific duration when an IR sensor detected an object.

The system demonstrated reliable functionality with accurate detection and activation of the LED segments. When an object was detected by an IR sensor, the corresponding LED segment turned on promptly and remained illuminated for the predetermined 2-second duration. The system effectively prevented simultaneous activation of multiple segments, ensuring sequential operation.

By using boolean flags (led1On, led2On, led3On) and timestamps (previousMillis1, previousMillis2, previousMillis3), the code manages the activation and deactivation of the LED segments. Each segment remains illuminated for a predefined duration of 2 seconds (interval) before automatically turning off.

By leveraging the Arduino platform and its flexible programming capabilities, the system offered a customizable and scalable solution for segmented lighting applications. It showcased the potential for creating dynamic lighting setups with enhanced control and responsiveness.

The IR sensor returns ‘0’ when it detects something otherwise returns ‘1’. The use of IR sensors proved to be a suitable choice for object detection, providing reliable and cost-effective sensing capabilities. The modular design of the system allowed for easy expansion and integration of additional sensors and LED segments.

Overall, the implemented system successfully demonstrated independent control of segmented lights, highlighting the versatility and effectiveness of Arduino-based solutions in creating responsive and tailored lighting systems.

Discussion:

The implemented code successfully addressed the issue of power consumption by controlling the segmented lights based on object detection using IR sensors. The code ensures that only those segments of light will turn on which are necessary, thereby saving electric power by eliminating unnecessary illumination.

This approach not only reduces power consumption but also enhances the overall efficiency of the lighting system. It ensures that the segments are activated only when required, eliminating wasteful energy consumption. Additionally, the system provides a clear visual indication of the presence of an object while conserving power during periods of inactivity.

The use of IR sensors for object detection proves to be an effective and reliable solution. It enables the system to respond promptly to detected objects, triggering the corresponding LED segment while keeping the other segments off. This targeted activation approach optimizes power usage while maintaining the intended functionality of the lighting system.

We faced some problem while doing the code that if one segment of light is turned on then other segments were not turning on. But we solve the problem by using boolean flags (led1On, led2On, led3On) and timestamps (previousMillis1, previousMillis2, previousMillis3).

Overall, the implemented code successfully achieves the goal of saving electric power by selectively controlling the segmented lights. It demonstrates a practical and efficient solution for applications where energy efficiency is a priority, providing both environmental and cost-saving benefits.