



University of Asia Pacific

Department of Computer Science and Engineering

CSE 316: Microprocessors and Microcontrollers Lab

LAB REPORT

Experiment Number: 01

Experiment Title: Mini Project 1: Traffic Light Control using Servo Motor and LEDs

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Submitted by:

Name : H. M. Tahsin Sheikh

Student ID : 22201243

Section : E-1

Submitted to:

Zaima Sartaj Taheri

Lecturer,

**Department of Computer Science and
Engineering**

1. Experiment Name

Mini Project 1: Traffic Light Control using Servo Motor and LEDs

2. Objective

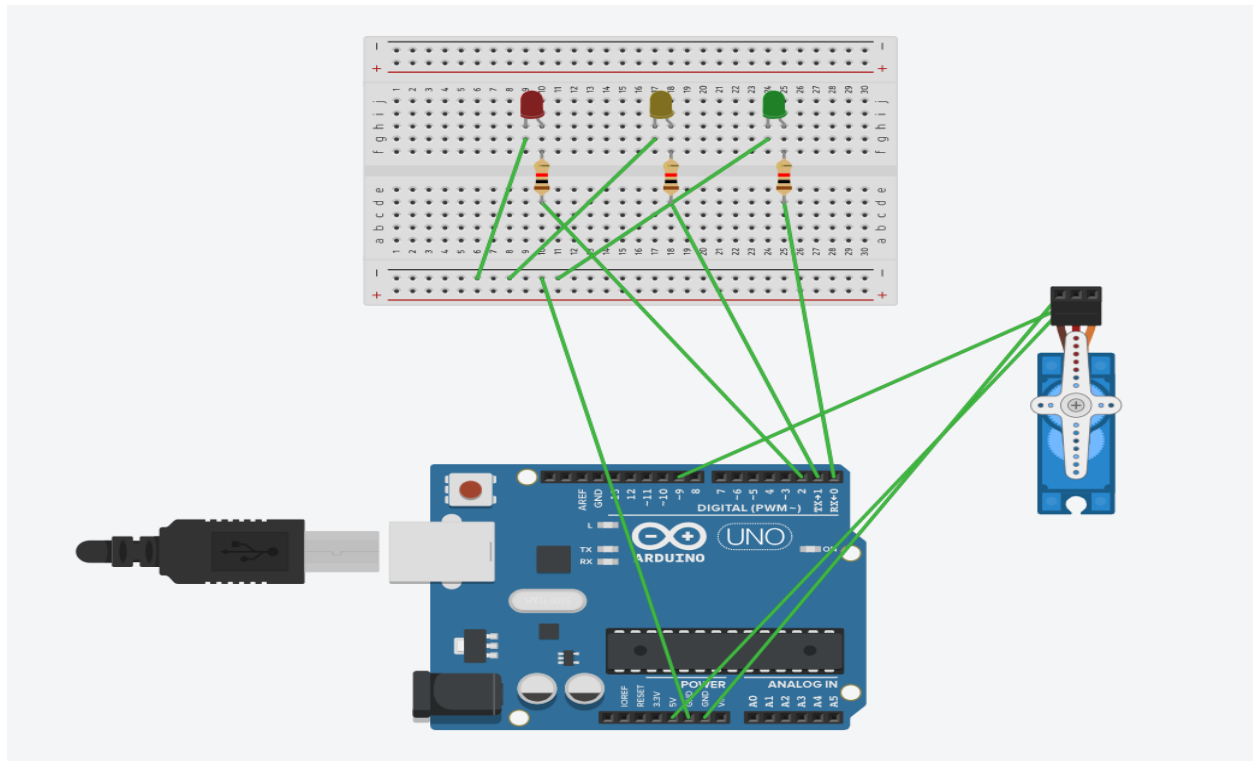
The goal of this experiment is to design and implement a traffic light control system using an Arduino Uno, LEDs, and a servo motor. The project simulates a real-world traffic signal where LEDs indicate traffic status (Red = Stop, Yellow = Wait, Green = Go), while a servo motor acts as a barrier that opens and closes according to the signal.

3. Apparatus / Hardware & Software Requirements

All required tools and components:

- Microcontroller (Arduino Uno, ESP8266 etc.)
- USB port
- Software (e.g., Arduino IDE)
- Servo Motor
- LED light- 3 piece
- Resistors- 3 piece
- Breadboard, Connecting Wires, Power Source etc

4. Circuit Diagram / Schematic



5. Code / Assembly Program

```
#include <Servo.h>
Servo barrierServo;

int redLED = 2;
int yellowLED = 3;
int greenLED = 4;

void setup() {
  barrierServo.attach(9);
  pinMode(redLED, OUTPUT);
  pinMode(yellowLED, OUTPUT);
  pinMode(greenLED, OUTPUT);
}

void loop() {
  // Green ON
```

```

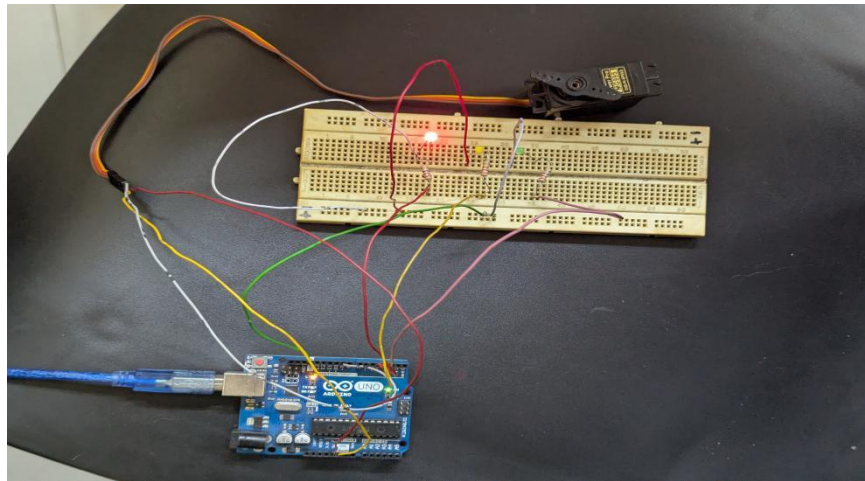
digitalWrite(greenLED, HIGH);
digitalWrite(yellowLED, LOW);
digitalWrite(redLED, LOW);
barrierServo.write(90);    // Barrier Open
delay(5000);

// Yellow ON
digitalWrite(greenLED, LOW);
digitalWrite(yellowLED, HIGH);
digitalWrite(redLED, LOW);
delay(2000);

// Red ON
digitalWrite(greenLED, LOW);
digitalWrite(yellowLED, LOW);
digitalWrite(redLED, HIGH);
barrierServo.write(0);    // Barrier Closed
delay(5000);
}

```

6. Output / Observations



The following sequence was observed from the system:

Signal State	LED Status	Servo Position	Duration
Green	Green ON, others OFF	90° (Open)	5 sec
Yellow	Yellow ON, others OFF	No change	2 sec
Red	Red ON, others OFF	0° (Closed)	5 sec

The LEDs change in the correct order: Green → Yellow → Red → Green.

The servo motor responds accordingly: barrier opens during Green, closes during Red.

The timing of delays matches real-world traffic light intervals.

7. Result

The traffic light control system was successfully designed and simulated. The LEDs worked in sequence with defined time intervals, and the servo motor rotated to open/close the barrier at appropriate stages. The system functioned exactly as intended, demonstrating effective traffic light automation.

8. Conclusion

This experiment demonstrated how to control multiple actuators (LEDs and servo motor) with an Arduino Uno to replicate a traffic control system. The sequence logic was implemented using digital outputs and delays, while the servo motor movement was synchronized with traffic signals. The circuit connections were correct and worked as expected. However, while uploading the code using Arduino IDE to the Arduino Uno, we encountered an issue where the IDE failed to load the program properly. We informed our teacher about this problem. Overall, this project enhanced our understanding of microcontroller-based traffic systems, servo motor control, and real-time signal sequencing.