University of Asia Pacific

Department of Computer Science and Engineering

CSE 316: Microprocessor and Microcontroller Lab

LAB REPORT

Experiment Number: 01

Experiment Title: Traffic Light Control using Servo Motor and LEDs

Date of Submission:17.08.2025

Submitted By:

Name: Nusrat Ahmmed Ekra

Student ID:22201251

Section: E2

Submitted To:

Zaima Sartaj Taheri

Lecturer

Department of Computer Science and Engineering

1.Experiment Name:

Traffic Light Control using Servo Motor and LEDs

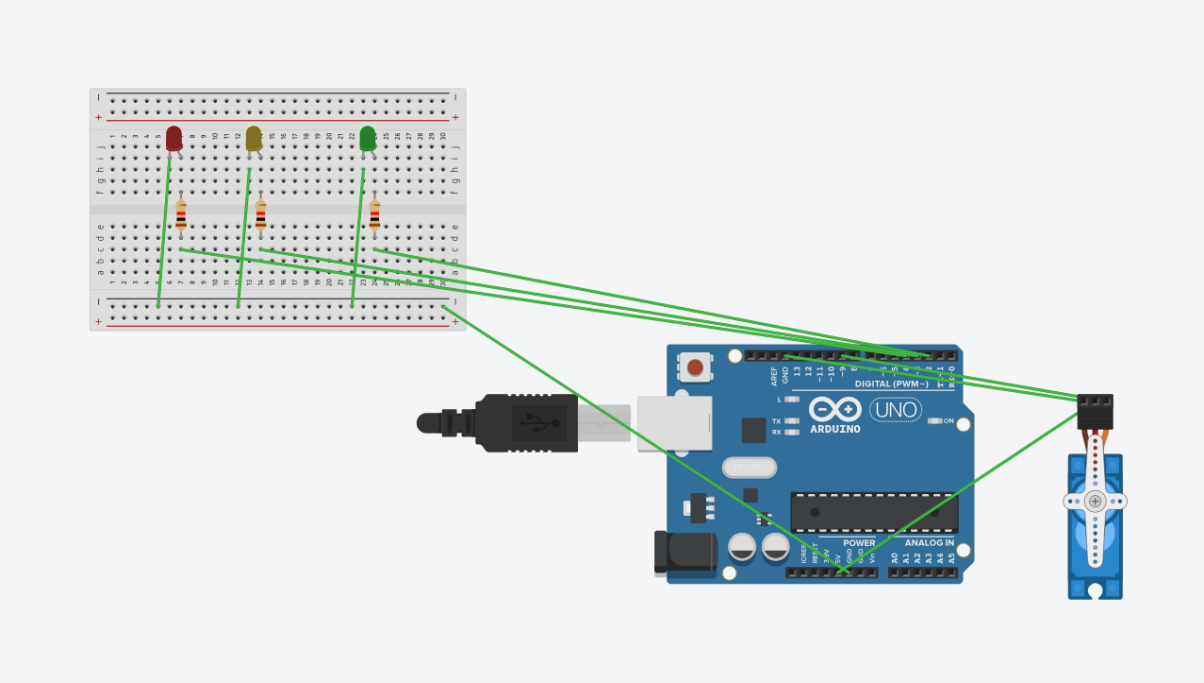
2.Objective:

1. To design and implement a traffic light control system using LEDs to represent green, yellow, and red signals.
2. To simulate a barrier operation using a servo motor that opens and closes according to the traffic light sequence.
3. To demonstrate sequential control of electronic components using Arduino programming.
4. To understand the timing and coordination between traffic signals and mechanical systems in real-world traffic management.

3.Apparatus:

i. Tinker CAD
ii. Arduino IDE
iii. Bread board
iv. Connecting wires
v. LEDs
vi. Servo motor
vii. Arduino
viii. Resistor

4.Circuit Diagram:

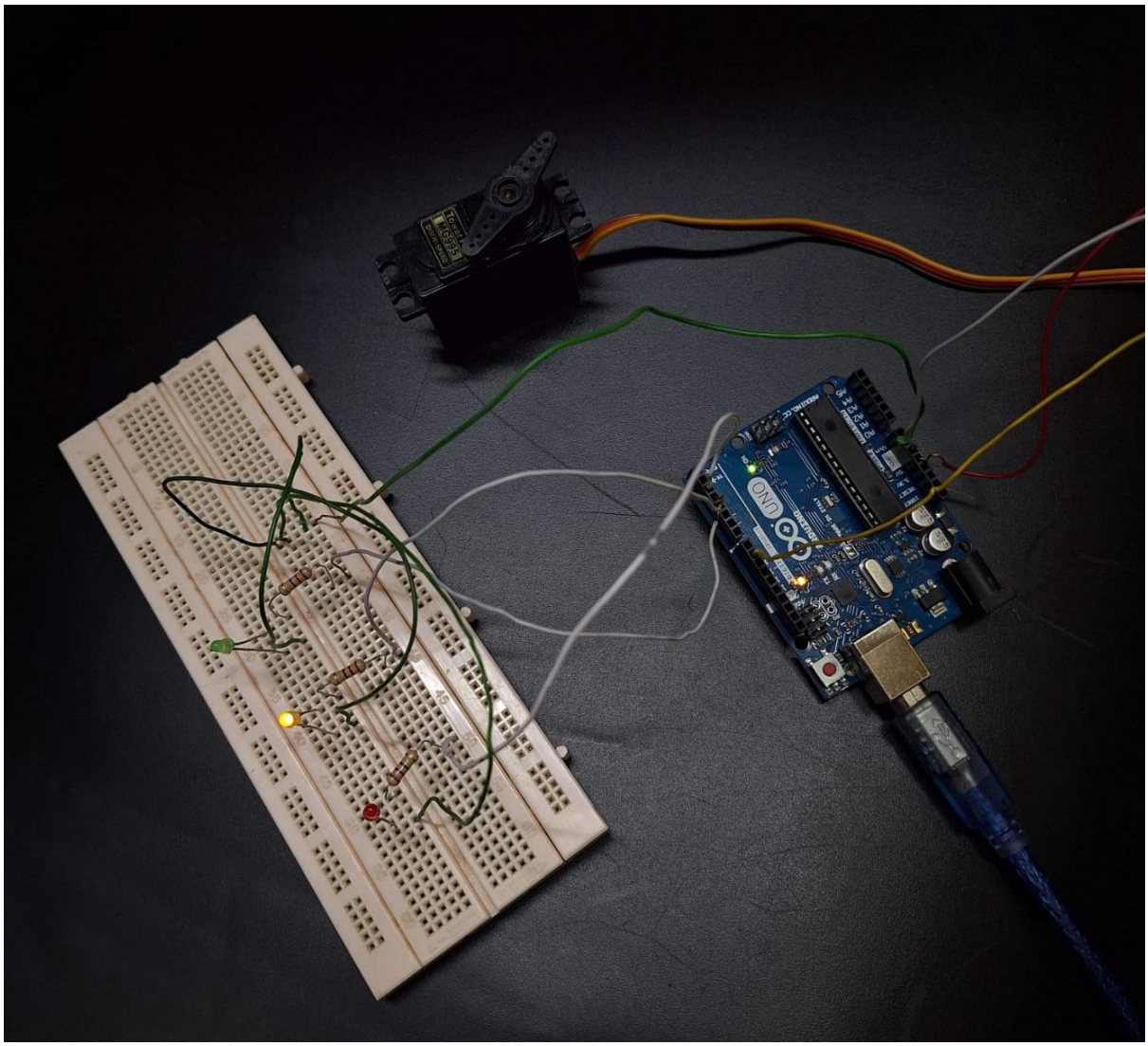


5.Code/ Assembly Program:

```
#include <Servo.h>
Servo barrierServo;
int redLED = 4;
int yellowLED = 3;
int greenLED = 2;
 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(0);
  delay(5000);
  // Yellow ON
  digitalWrite(greenLED, LOW);
  digitalWrite(yellowLED, HIGH);
  digitalWrite(redLED, LOW);
   barrierServo.write(90);
  delay(2000);
  // Red ON
  digitalWrite(greenLED, LOW);
  digitalWrite(yellowLED, LOW);
  digitalWrite(redLED, HIGH);
```

```
  barrierServo.write(180);
  delay(5000);
}
```

6. Output / Observations:



After execution, the lights turn on sequentially based on the time delays that were programmed. The servo motor rotates to 90° as specified by the code when the green light lights on first. The servo motor stays at 90° after 5000 ms, and the yellow light goes on. The servo motor rotates to 0° and the red light illuminates after another 2000 ms. The green light eventually goes on once more after 5000 ms, and this cycle continues until the simulation is terminated.

Summary Table:

Stage	Green LED	Yellow LED	Red LED	Servo Angle	Rotation?	Duration
Green	ON	OFF	OFF	90°	Rotates	5000 ms
Yellow	OFF	ON	OFF	90°	No Rotation	2000 ms
Red	OFF	OFF	ON	0°	Rotates	5000 ms

7.Result:

1. The traffic light system successfully operated according to the programmed sequence.
2. Green LED turned ON first, and the servo motor rotated to 90° to open the barrier.
3. Yellow LED turned ON next, and the servo motor remained at 90°.
4. Red LED then turned ON, and the servo motor rotated to 0° to close the barrier.
5. The cycle repeated continuously, demonstrating proper coordination between the LEDs and the servo motor.
6. The system operated as expected, showing accurate timing delays and correct rotation behavior of the servo motor.

8.Conclusion:

1. The traffic light system using LEDs and a servo motor was successfully implemented.
2. The LEDs switched sequentially according to the programmed time delays, and the servo motor rotated correctly in sync with the red and green signals.
3. The system demonstrated proper coordination between electronic signals (LEDs) and mechanical motion (servo barrier).
4. This experiment helped understand sequential control, timing, and synchronization in simple embedded systems and traffic management applications.