

Polytechnic University of Puerto Rico
Electrical & Computer Engineering and Computer Sciences Department



COE 4341 Microcomputer Interfacing Laboratory

**Laboratory No 2: Basic I/O: Traffic Light System
Design (North-South, East-West)**

ID	LAST NAME	FIRST NAME
130541	Sierra Bello	Gabriel
109648	Salgado Rivera	Daniel E.
103733	Meléndez Nieves	Josué
116762	Madera Torres	Elian F.

SUPERVISOR SIGNATURE _____

DATE: **March 21, 2022**

March 28, 2022

Table of Contents

<i>Introduction</i>	3
<i>Objective</i>	4
<i>Methods</i>	5
Procedure C Language Program	5
Source Code for the C Language Program	6
<i>Results</i>	11
<i>Conclusion</i>	12

Introduction

In this experiment, we will be using the Arduino Ide and the Arduino MEGA Board to create a simulation of an intersection with traffic going from North to South and from West to East. This simulation will include traffic light for vehicles and pedestrians and a push button that will indicate that there are people waiting to cross the road.

Objective

- Learn the use and necessity to pause programs in some applications.
- Learn how to input digital signals to the microcontroller and how to use delay, interrupts, and timing.
- Simulate an intersection with traffic light for vehicles and pedestrians.

Methods

Procedure C Language Program

Write a sketch to simulate a traffic light system. The first stage of the simulation must turn ON the green LED for pedestrians and the red LED1 for all vehicles for 4 seconds. The second stage will turn on the green LED1 for vehicles and the red LED2 for pedestrians for 5 seconds. After the 5 seconds pass by the orange LED will turn on for 1 second. Finally, the green LED2 for pedestrian and the red LED1 for vehicles will turn ON for 4 seconds. The program must stop after 3 cycles and activate after another button press and release has been made.

Source Code for the C Language Program

```
#define cross1 25
#define cross2 29
#define red1 22
#define red2 26
#define yellow1 23
#define yellow2 27
#define green1 24
#define green2 28
#define button1 2
#define button2 3

int start1 = 22;
int start2 = 26;

int i = 0;
int Flag1;
int Flag2;
int Light_State;
int current;
int back;

void setup() {
  pinMode(cross1, OUTPUT);
  pinMode(cross2, OUTPUT);
  pinMode(red1, OUTPUT);
  pinMode(red2, OUTPUT);
  pinMode(yellow1, OUTPUT);
  pinMode(yellow2, OUTPUT);
  pinMode(green1, OUTPUT);
  pinMode(green2, OUTPUT);
  pinMode(button1, INPUT);
  pinMode(button2, INPUT);

  attachInterrupt (0,SetFlag1,CHANGE);
  attachInterrupt (1,SetFlag2,CHANGE);

  Serial.begin (9600);
  Flag1 = 0;
  Flag2 = 0;
  back = 0;
}

void loop() {
```

```

LOOP1:
//Green state 1
digitalWrite(green2, LOW);
digitalWrite(cross2, LOW);
digitalWrite(red2, HIGH);
greenState(start1);
waitClick(1, 3000, start1);
if (back == 1){
    back = 0;
    goto LOOP2;
}
else if (back ==2){
    back = 0;
    goto LOOP1;
}
//Yellow state 1
yellowState(start1);
waitClick(2, 2000, start1);
if (back == 1){
    back = 0;
    goto LOOP2;
}
else if (back ==2){
    back = 0;
    goto LOOP1;
}

//Red State 1
redState(start1);
waitClick(3, 3000, start1);
if (back == 1){
    back = 0;
    goto LOOP2;
}
else if (back ==2){
    back = 0;
    goto LOOP1;
}

LOOP2:
//Green state 2
greenState(start2);
waitClick(1, 3000, start2);
if (back == 1){
    back = 0;
    goto LOOP2;
}
else if (back ==2){
    back = 0;

```

```

    goto LOOP1;
}

//Yellow state 2
yellowState(start2);
waitClick(2, 2000, start2);
if (back == 1){
    back = 0;
    goto LOOP2;
}
else if (back ==2){
    back = 0;
    goto LOOP1;
}

//Red State 2
redState(start2);
waitClick(3, 3000, start2);
if (back == 1){
    back = 0;
    goto LOOP2;
}
else if (back ==2){
    back = 0;
    goto LOOP1;
}
}

void SetFlag1 (){
    Flag1 = 1;
}

void SetFlag2 (){
    Flag2 = 1;
}

void greenState(int pin){
    digitalWrite(pin,LOW);
    digitalWrite(pin +1,LOW);
    digitalWrite(pin +2,HIGH);
    digitalWrite(pin +3,LOW);
}

void yellowState(int pin){
    digitalWrite(pin +2,LOW);
    digitalWrite(pin + 1,HIGH);
}

void redState(int pin){
    digitalWrite(pin + 1,LOW);

```



```

digitalWrite(pin,HIGH);
}

void waitClick(int light, int onTime, int pin){
for (i=0;i<=(onTime/1000);i++)
    {delay(1000);
    if(Flag1==1 and pin ==22) {
        Light_State =light;
        Pedestrian(pin);
        back = 2;
    }
    else if(Flag1==1 and pin !=22) {
        if(light != 3){
            yellowState(26);
            delay(1000);
        }
        redState(26);
        greenState(22);
        Light_State =1;
        Pedestrian(22);
        back = 2;
    }
    else if(Flag2==1 and pin ==26) {
        Light_State =light;
        Pedestrian(pin);
        back = 1;
    }
    else if(Flag2==1 and pin !=26) {
        if(light != 3){
            yellowState(22);
            delay(1000);
        }
        redState(22);
        greenState(26);
        Light_State =1;
        Pedestrian(26);
        back = 1;
    }
    }
}

void Pedestrian(int pin){
switch (Light_State){
case 1: {
    digitalWrite(pin + 2,HIGH);
    digitalWrite(pin + 3,HIGH);
    delay(3000);
    break;
}
}
}

```

```

}
case 2:{
    delay (500);
    delay(1000);
    digitalWrite(pin + 1,LOW);
    digitalWrite(pin + 2,HIGH);
    digitalWrite(pin + 3,HIGH);
    delay(3000);
    break;
}
case 3:{
    digitalWrite(pin,LOW);
    digitalWrite(pin + 1,HIGH);
    delay(2000);
    digitalWrite(pin + 1,LOW);
    digitalWrite(pin + 2,HIGH);
    digitalWrite(pin + 3,HIGH);
    delay(3000);
    break;
}
default:{};
}

for(i = 0; i < 5; i++){
    digitalWrite(pin + 3,LOW);
    delay(1000);
    digitalWrite(pin + 3,HIGH);
    delay(1000);
}

Flag1 = 0;
Flag2 = 0;
}

```

Results

<https://youtube.com/shorts/MoDB540iqdE?feature=share>

Conclusion

In this experiment we create a sketch to simulate a traffic light system. We did the three stages that the report said and created the pedestrian LED. Since we know how to code in C, the task was so simpler than using C language. To demonstrate what we do, we have attached the video following each step taken.