American International University- Bangladesh

Department of Computer Science

Lab Report Cover Sheet

Course Name	MICROPROCESSOR AND EMBEDDED SYSTEMS
Lab Report No.	04
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Semester	SUMMER 2021-22
Submission Date	23/06/2022
Section	O
Group No.	03

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Title: Taking external inputs in Arduino: Implementation of runway approach lights

Abstract

The main objective of this experiment is to use Arduino to construct runway approach lights using external input. Proteus simulation and the Arduino IDE were the programs utilized in this project. The first one was completed using the Arduino IDE software and equipment that was set up during the lab session. Proteus simulation software was used at home as an alternative way. The simulation was carried by with Proteus simulation software.

Objective

The objectives of this experiment are to-

1. Acquire knowledge about how to use external inputs in Arduino with this experiment.

2. Use timers to implement runway approach lights.

3. Acquainted

Apparatus:

1. Arduino board

2. Breadboard

3. LED lights (3 red, 3 green)

4. Jumper wires

5. Resistors (7)

6. Arduino IDE

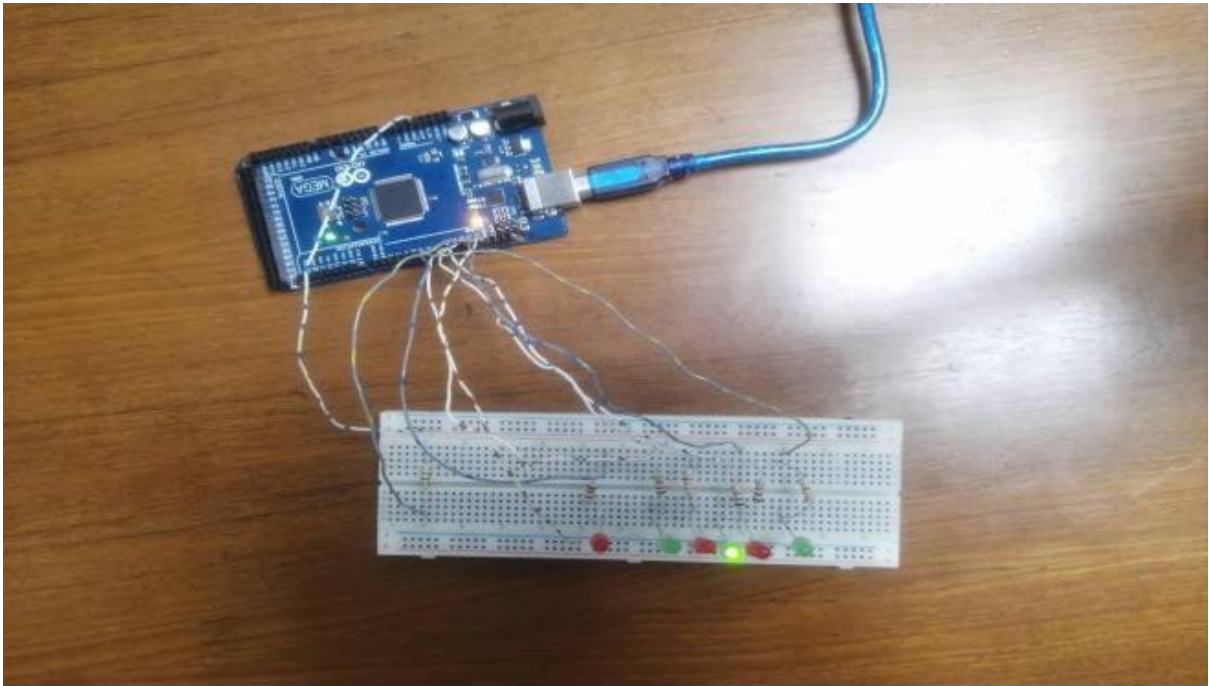7. Proteus simulation tool

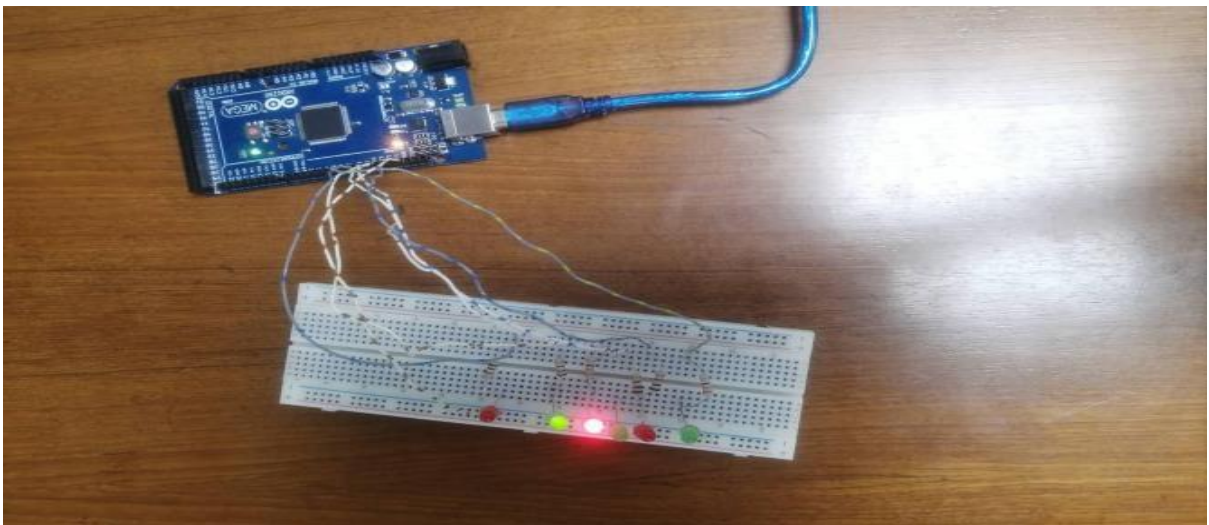**Experiment and Result:**

Figure 1: When Green light is ON

Figure 2: When Red light is ON

Code implementation:

```c
#define RED_1_PIN 13

#define GREEN_1_PIN 12

#define RED_2_PIN 11

#define GREEN_2_PIN 10

#define RED_3_PIN 9

#define GREEN_3_PIN 8

#define SWITCH 7

int LED_blink=700;

int switch_read;

int LED_sequence=0;

int delay_timer(int miliseconds)

{

int count = 0;

while (1)

{

if(TCNT0>=16)

{

 TCNT0 =0;

 count++;

 if(count==miliseconds)

 {

count=0; break;

 }

}

 }

return 0;

}

void setup()
```

```
{
 // put your setup code here, to run once:
pinMode(RED_1_PIN, OUTPUT);
pinMode(GREEN_1_PIN, OUTPUT);
pinMode(RED_2_PIN, OUTPUT);
pinMode(GREEN_2_PIN, OUTPUT);
pinMode(RED_3_PIN, OUTPUT);
pinMode(GREEN_3_PIN, OUTPUT);
pinMode(SWITCH, INPUT);
TCCR0A=0b00000000;
TCCR0B=0b00000101;
TCNT0=0;
}
void loop() {
switch_read=digitalRead(SWITCH);
if (switch_read==LOW){
LED_sequence=!LED_sequence;
}
if (LED_sequence==1){
//to turn red1 LED blink digitalWrite(RED_1_PIN, HIGH);
delay_timer(LED_blink);
digitalWrite (RED_1_PIN, LOW); //to make red1 LED blink
digitalWrite(GREEN_1_PIN, HIGH); delay_timer(LED_blink);
digitalWrite(GREEN_1_PIN, LOW);
//to turn red2 LED blink
digitalWrite(RED_2_PIN, HIGH); delay_timer(LED_blink);
digitalWrite(RED_2_PIN, LOW);
//green2 blink and so on
digitalWrite(GREEN_2_PIN, HIGH);
```

```
delay_timer(LED_blink);

digitalWrite(GREEN_2_PIN, LOW);

//to turn red3 LED blink

digitalWrite(RED_3_PIN, HIGH);

delay_timer(LED_blink);

digitalWrite(RED_3_PIN, LOW);

//green3 blink and so on

digitalWrite(GREEN_3_PIN, HIGH);

delay_timer(LED_blink);

digitalWrite(GREEN_3_PIN, LOW);

delay_timer(LED_blink);

}else {

digitalWrite(RED_1_PIN, HIGH);

delay_timer(LED_blink);

digitalWrite(RED_1_PIN, LOW);

delay_timer(LED_blink);

digitalWrite(GREEN_1_PIN, HIGH);

delay_timer(LED_blink);

digitalWrite(GREEN_1_PIN, LOW);

delay_timer(LED_blink);

digitalWrite(RED_2_PIN, HIGH);

delay_timer(LED_blink);

digitalWrite(RED_2_PIN, LOW);

delay_timer(LED_blink);

digitalWrite(GREEN_2_PIN, HIGH);

delay_timer(LED_blink);

digitalWrite(GREEN_2_PIN, LOW);

delay_timer(LED_blink);

digitalWrite(RED_3_PIN, HIGH);
```
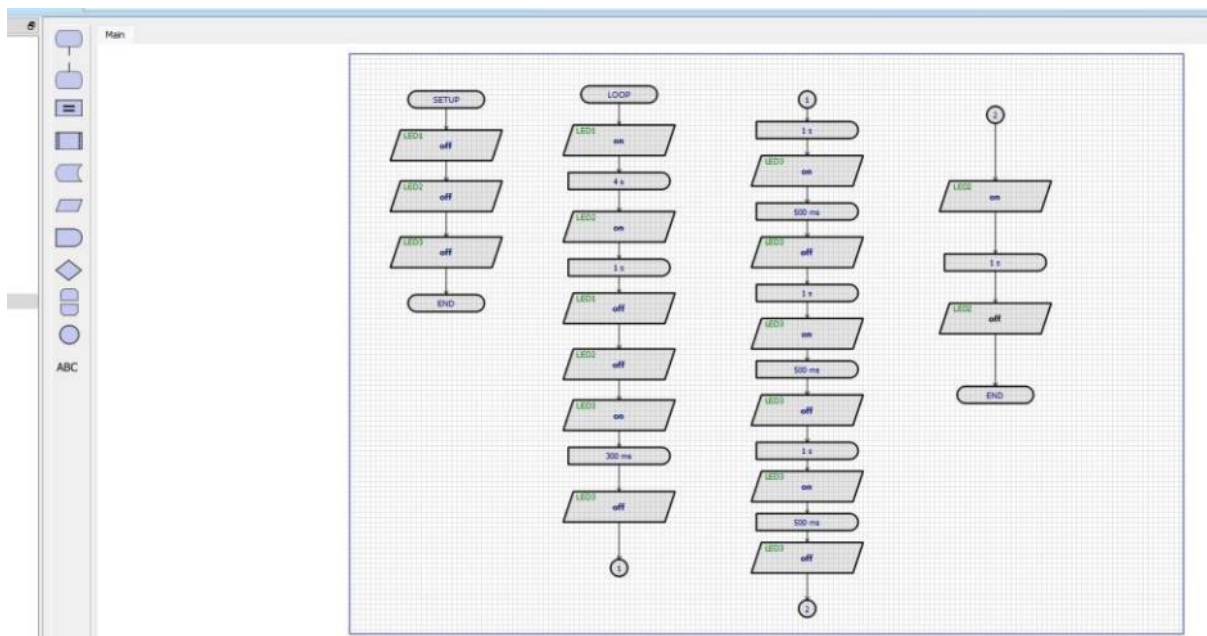
```
delay_timer(LED_blink);

digitalWrite(RED_3_PIN, LOW);

delay_timer(LED_blink);

digitalWrite(GREEN_3_PIN, HIGH);

delay_timer(LED_blink);

digitalWrite(GREEN_3_PIN, LOW);

delay_timer(LED_blink);

}

}
```

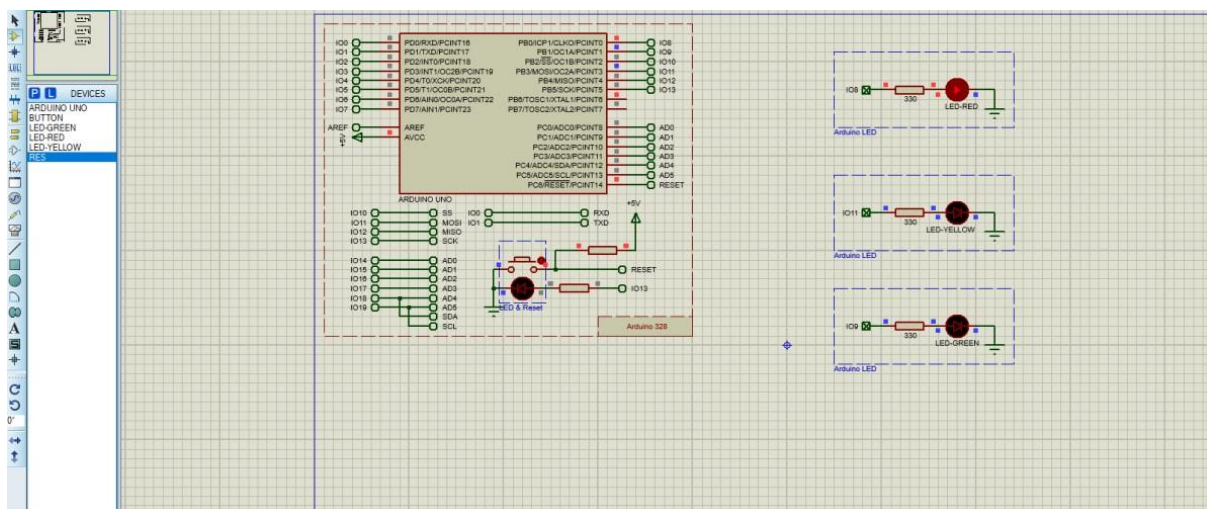**Flowchart:**

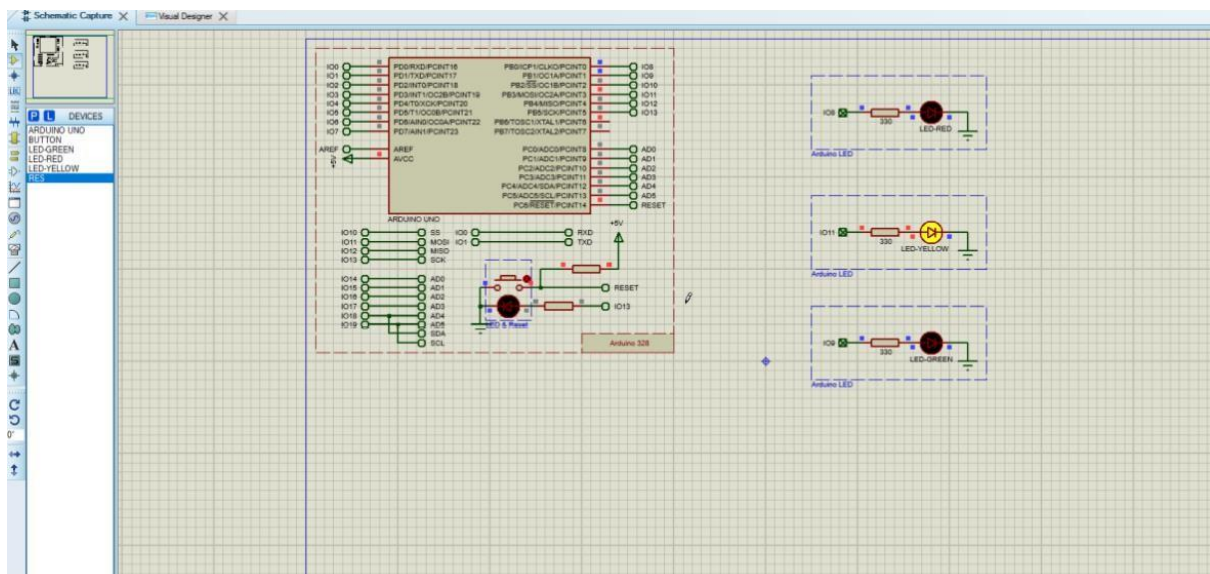**Using Proteus simulation tool:**

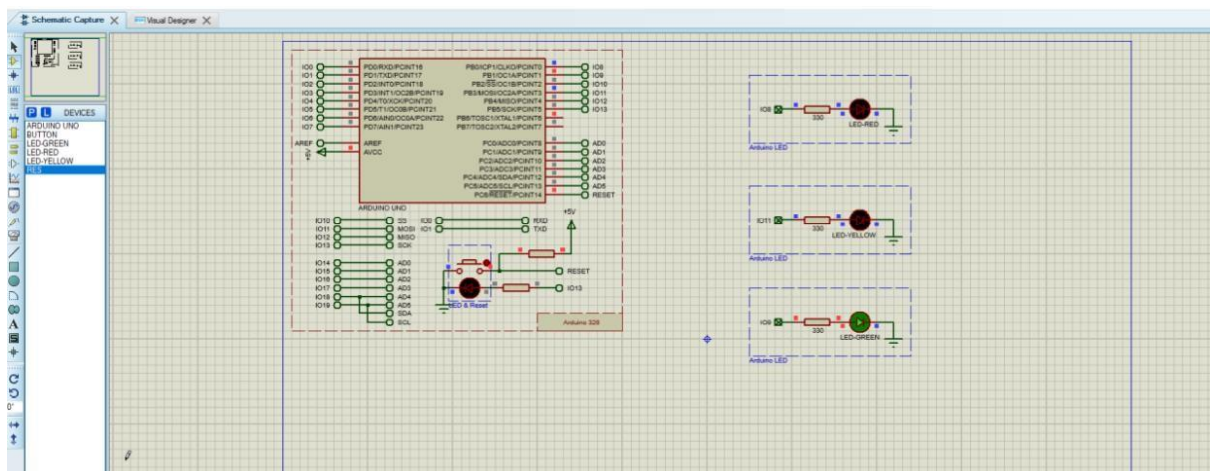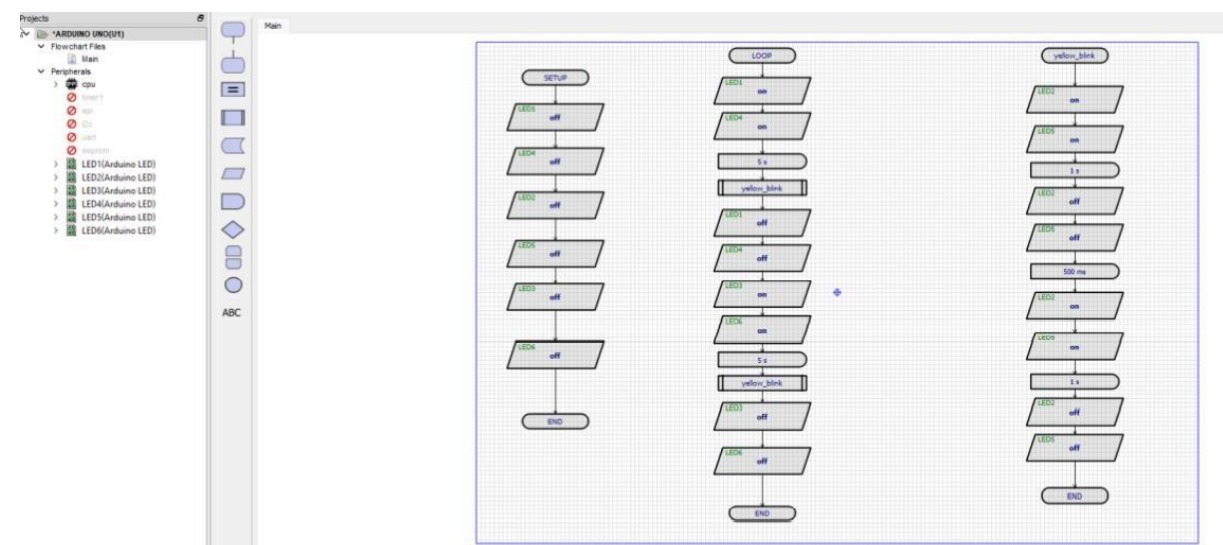Figure 1: When Red Light ON

Figure 2: When Yellow Light ON

Figure 3: When Green Light ON
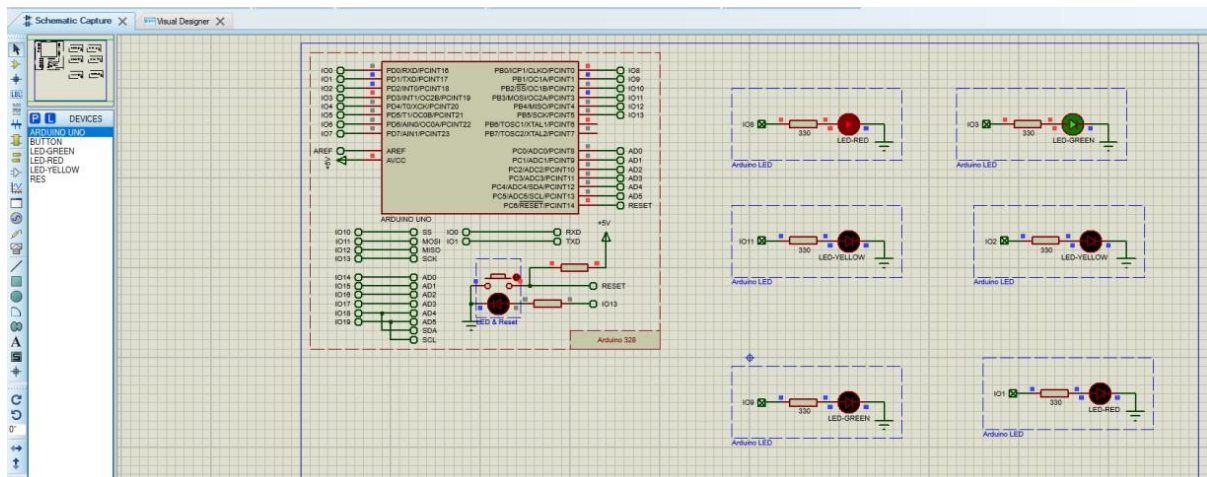
Flowchart:

Simulation:

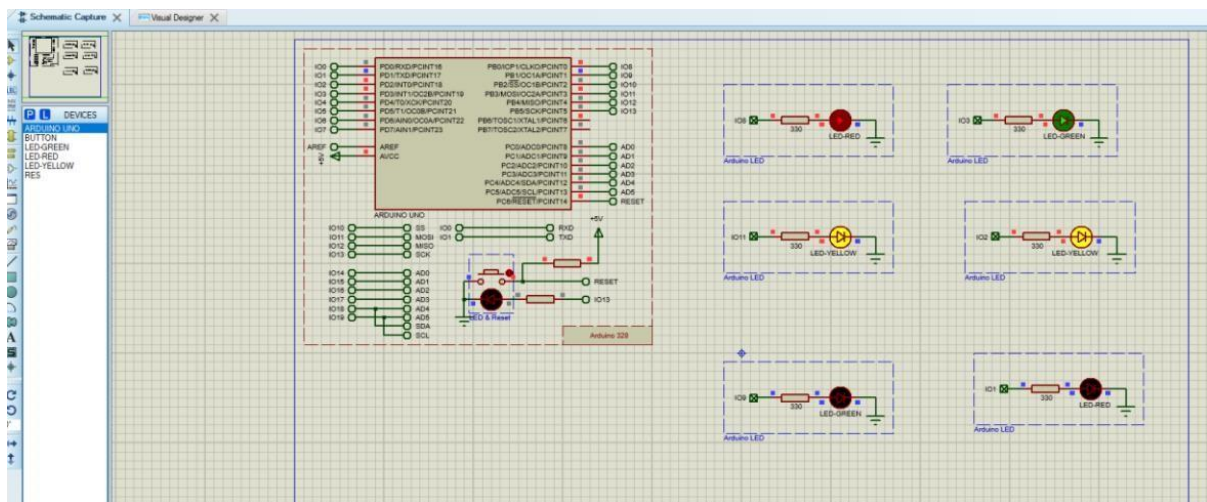Figure 4: Red and Green Light ON

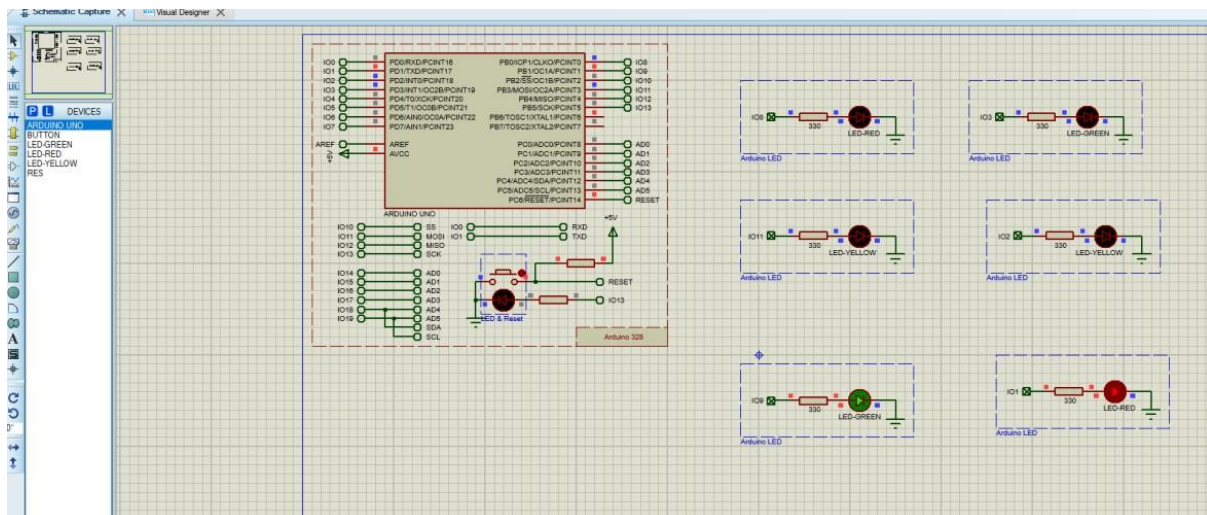Figure 55: Red and Green and Yellow Light ON

Figure 6: Green and Red Light ON

Discussion:

This experiment was run using two different approaches. First, an Arduino board, two animated red and green LED lights, seven resistors, a breadboard, and connecting wires were used to create the runway lights design. The three red LED lights and the three green LED lights, correspondingly, were connected to ports 12, 10, and 8. The switch just required one resistor. The switch was connected using port number 7. After that, some code employing timers for the runway lights was written on the Arduino IDE. The Arduino board was then connected to the computer and the code was run to get the desired result. This experiment employed the Proteus simulation tool in yet another way. While conducting this experiment, few issues came up. The issues

Reference(s):

1) https://www.arduino.cc/.

2) ATMega328 manual