

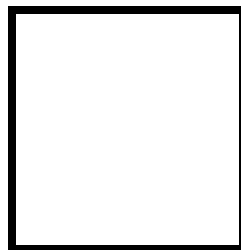


**PAMANTASAN NG LUNGSOD NG MAYNILA**  
(University of the City of Manila)  
Intramuros, Manila

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**Microprocessor Lab**

Laboratory Activity No. 2  
**Arduino and Tinkercad Interface**



Score

*Submitted by:*  
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**S 7:00 am – 1:00 pm / CPE 0412**

*Date Submitted*  
**09-30-2023**

*Submitted to:*  
**Engr. Maria Rizette H. Sayo**

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## I. Objectives

This laboratory activity aims to implement the principles and techniques of hardware programming using Arduino through:

- creating an Arduino programming and circuit diagram.

## II. Method/s

- Perform a task problem given in the presentation.
- Write a code and perform an Arduino circuit diagram of a ring counter that display eight (8) LEDs starting from left.

## III. Results

**TinkerCad-** <https://www.tinkercad.com/things/6Di4Ugim4rD-magnificent-wluff/editel?tenant=circuits>

**Exercise 1: Write a code that does a ring counter display for eight (8) LEDs starting from left.**

### Components Used

1. 8 LEDs
2. Resistor
3. Breadboard

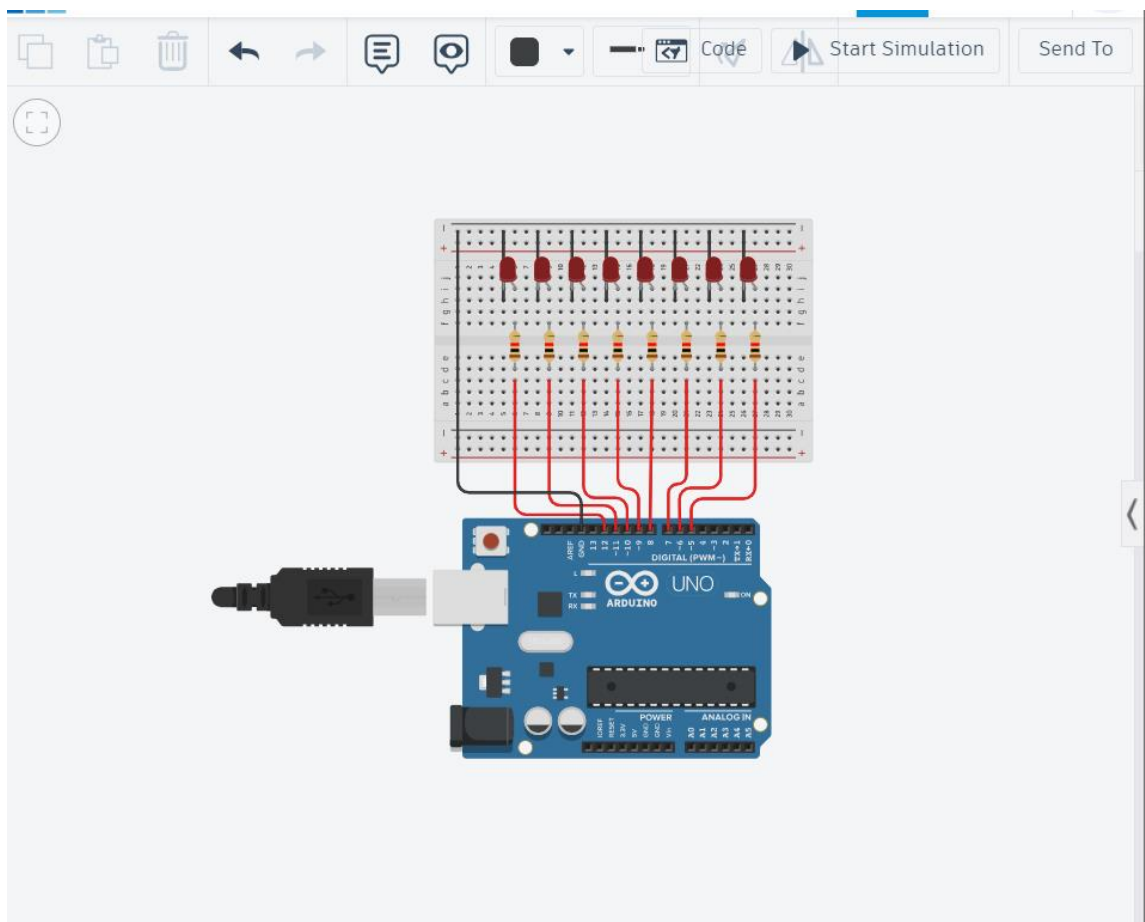


Figure No.1 Ring Counter Display Circuit Diagram

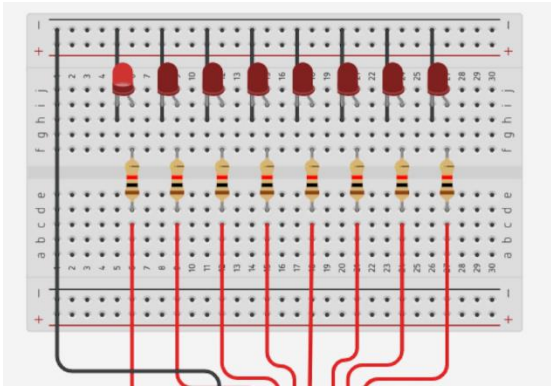


Figure No. 2 LED 1 On

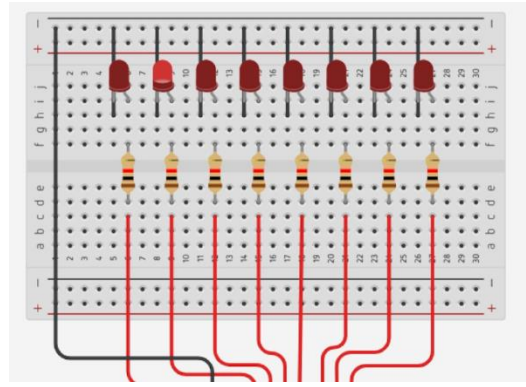


Figure No. 3 LED 2 On

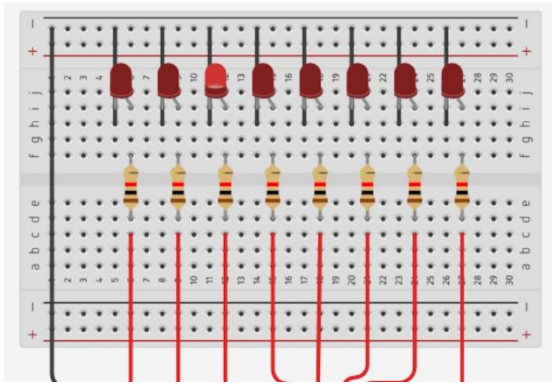


Figure No. 4 LED 3 On

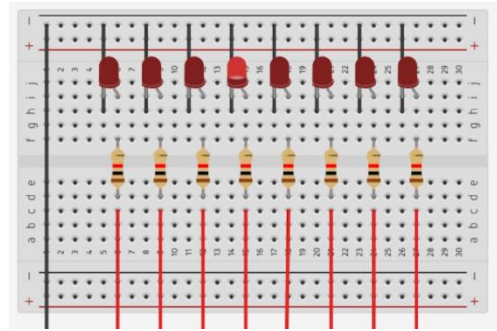


Figure No. 5 LED 4 On

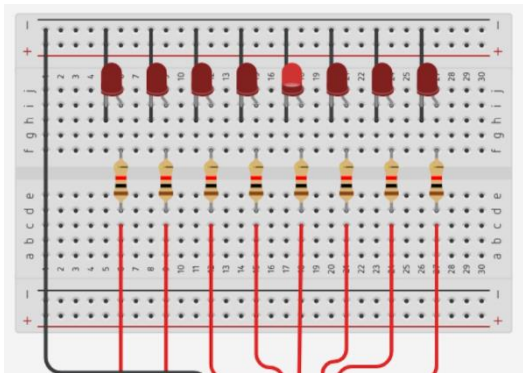


Figure No. 6 LED 5 On

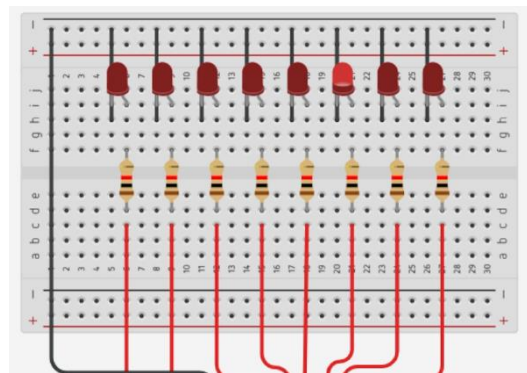


Figure No. 7 LED 6 On

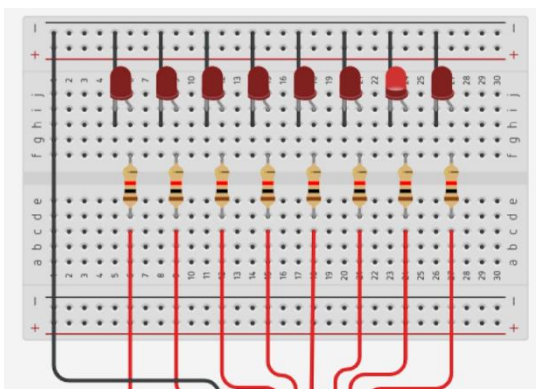


Figure No. 8 LED 7 On

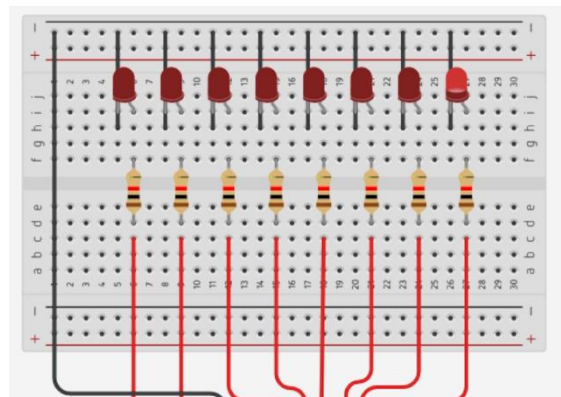


Figure No. 9 LED 8 On

## CODE:

```
1 // C++ code
2 //
3 /*
4  * Ring counter display for eight (8) LEDs starting from left.
5  */
6
7 void setup()
8 {
9     Serial.begin(9600);
10    pinMode(5, OUTPUT);
11    pinMode(6, OUTPUT);
12    pinMode(7, OUTPUT);
13    pinMode(8, OUTPUT);
14    pinMode(9, OUTPUT);
15    pinMode(10, OUTPUT);
16    pinMode(11, OUTPUT);
17    pinMode(12, OUTPUT);
18 }
19
20 void loop()
21 {
22     digitalWrite(12, HIGH);
23     delay(500);
24     Serial.println("The LED1 is HIGH");
25     digitalWrite(12, LOW);
26     delay(500);
27     Serial.println("The LED1 is LOW");
28
29     digitalWrite(11, HIGH);
30     delay(500);
31     Serial.println("The LED2 is HIGH");
32     digitalWrite(11, LOW);
33     delay(500);
34     Serial.println("The LED2 is LOW");
35
36     digitalWrite(10, HIGH);
37     delay(500);
38     Serial.println("The LED3 is HIGH");
39     digitalWrite(10, LOW);
40     delay(500);
41     Serial.println("The LED3 is LOW");
42
43     digitalWrite(9, HIGH);
44     delay(500);
45     Serial.println("The LED4 is HIGH");
46     digitalWrite(9, LOW);
47     delay(500);
48     Serial.println("The LED4 is LOW");
49
50     digitalWrite(8, HIGH);
51     delay(500);
52     Serial.println("The LED5 is HIGH");
53     digitalWrite(8, LOW);
54     delay(500);
55     Serial.println("The LED5 is LOW");
56
57     digitalWrite(7, HIGH);
58     delay(500);
59     Serial.println("The LED6 is HIGH");
60     digitalWrite(7, LOW);
61     delay(500);
62     Serial.println("The LED6 is LOW");
63
64     digitalWrite(6, HIGH);
65     delay(500);
66     Serial.println("The LED7 is HIGH");
67     digitalWrite(6, LOW);
68     delay(500);
69     Serial.println("The LED7 is LOW");
70
71     digitalWrite(5, HIGH);
72     delay(500);
73     Serial.println("The LED8 is HIGH");
74     digitalWrite(5, LOW);
75     delay(500);
76     Serial.println("The LED8 is LOW");
77
78 }
```

```

// C++ code
//
void setup()
{
    Serial.begin(9600);
    pinMode(5, OUTPUT);
    pinMode(6, OUTPUT);
    pinMode(7, OUTPUT);
    pinMode(8, OUTPUT);
    pinMode(9, OUTPUT);
    pinMode(10, OUTPUT);
    pinMode(11, OUTPUT);
    pinMode(12, OUTPUT);

}

void loop()
{
    digitalWrite(12, HIGH);
    delay(500); // Wait for 500 millisecond(s)
    Serial.println("The LED1 is HIGH");
    digitalWrite(12, LOW);
    delay(500); // Wait for 500 millisecond(s)
    Serial.println("The LED1 is LOW");

    digitalWrite(11, HIGH);
    delay(500); // Wait for 500 millisecond(s)
    Serial.println("The LED2 is HIGH");
    digitalWrite(11, LOW);
    delay(500); // Wait for 500 millisecond(s)
    Serial.println("The LED2 is LOW");

    digitalWrite(10, HIGH);
    delay(500); // Wait for 500 millisecond(s)
    Serial.println("The LED3 is HIGH");
    digitalWrite(10, LOW);
    delay(500); // Wait for 500 millisecond(s)
    Serial.println("The LED3 is LOW");

    digitalWrite(9, HIGH);
    delay(500); // Wait for 500 millisecond(s)
    Serial.println("The LED4 is HIGH");

```

```
digitalWrite(9, LOW);  
delay(500); // Wait for 500 millisecond(s)  
Serial.println("The LED4 is LOW");
```

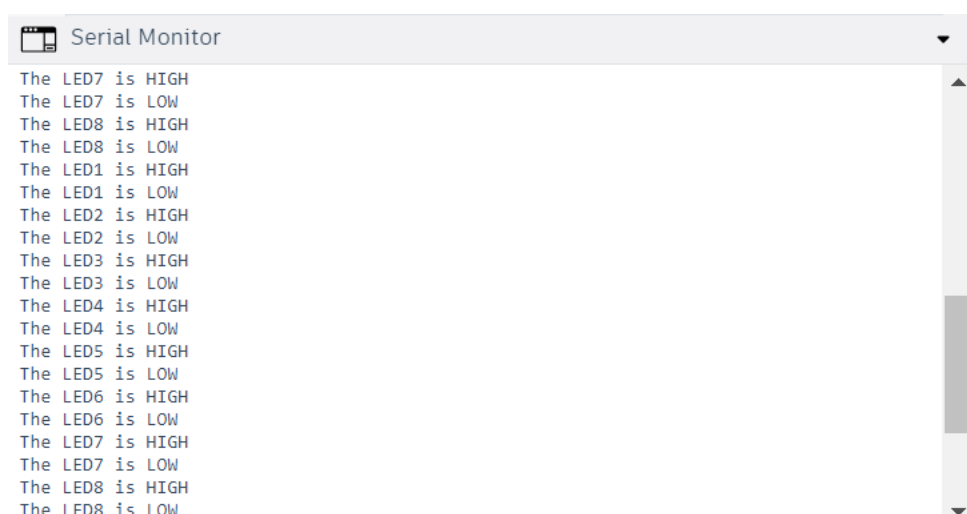
```
digitalWrite(8, HIGH);  
delay(500); // Wait for 500 millisecond(s)  
Serial.println("The LED5 is HIGH");  
digitalWrite(8, LOW);  
delay(500); // Wait for 500 millisecond(s)  
Serial.println("The LED5 is LOW");
```

```
digitalWrite(7, HIGH);  
delay(500); // Wait for 500 millisecond(s)  
Serial.println("The LED6 is HIGH");  
digitalWrite(7, LOW);  
delay(500); // Wait for 500 millisecond(s)  
Serial.println("The LED6 is LOW");
```

```
digitalWrite(6, HIGH);  
delay(500); // Wait for 500 millisecond(s)  
Serial.println("The LED7 is HIGH");  
digitalWrite(6, LOW);  
delay(500); // Wait for 500 millisecond(s)  
Serial.println("The LED7 is LOW");
```

```
digitalWrite(5, HIGH);  
delay(500); // Wait for 500 millisecond(s)  
Serial.println("The LED8 is HIGH");  
digitalWrite(5, LOW);  
delay(500); // Wait for 500 millisecond(s)  
Serial.println("The LED8 is LOW");
```

```
}
```



#### IV. Conclusion

The 8-LED ring counter display starting from the left has introduced the concept of a ring counter. The utilization of TinkerCad offered a practical platform for experimenting with electrical circuits and Arduino projects. This activity has provided a tangible and effective means of bridging theoretical knowledge with practical application.

The components used in the simulation are Arduino board, breadboard, LEDs, and wires. The circuit works by the LEDs lighting up one at a time and move from left to right continuously. The code used in the simulation is designed to create a repeating sequence where each LED alternates between being turned on and off. It also shows the status of each LED (high or low) to the serial monitor. Thus, it serves as a straightforward illustration of how to manage multiple LEDs with an Arduino while simultaneously keeping track of their states through serial communication.

## References

- [1] D.J.D. Sayo. “University of the City of Manila Computer Engineering Department Honor Code,” PLM-CpE Departmental Policies, 2020.
- [2] Ring Counter in Digital Logic. (2023). Retrieved from <https://www.geeksforgeeks.org/ring-counter-in-digital-logic/>