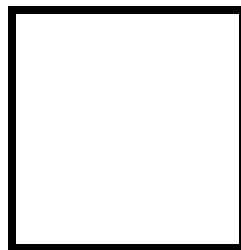




PAMANTASAN NG LUNGSOD NG MAYNILA
(University of the City of Manila)
Intramuros, Manila

Microprocessor Lab

Laboratory Activity No. 2
Arduino and Tinkercad Interface



Score

Submitted by:
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Saturday 1pm-4pm / CPE 0412.1-2

Date Submitted
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Submitted to:
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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

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

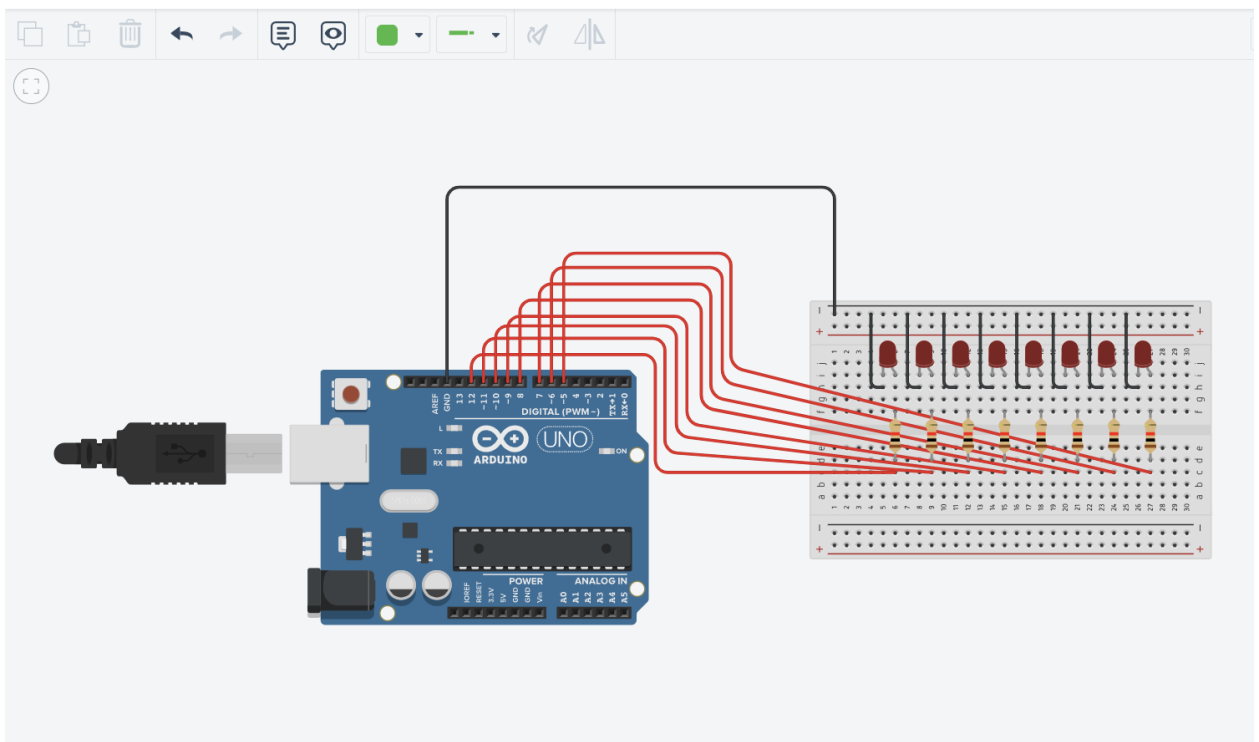


Figure No.1 Ring Counter Display Circuit Diagram

Components Used

1. 8 LEDs
2. Resistor
3. Breadboard

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 }
```

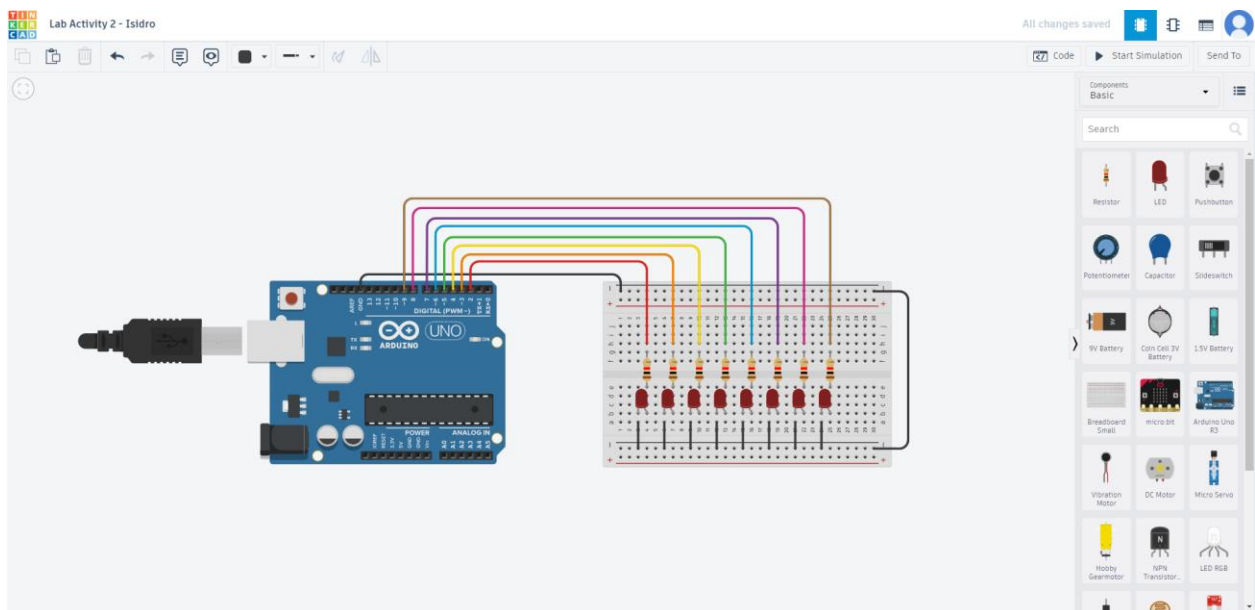


Figure No.2 Ring Counter Circuit Setup

CODE:

```

1  // C++ code
2  //
3  void setup()
4  {
5      Serial.begin(9600);
6      pinMode(2, OUTPUT);
7      pinMode(3, OUTPUT);
8      pinMode(4, OUTPUT);
9      pinMode(5, OUTPUT);
10     pinMode(6, OUTPUT);
11     pinMode(7, OUTPUT);
12     pinMode(8, OUTPUT);
13     pinMode(9, OUTPUT);
14 }
15
16 void loop()
17 {
18     for (int x = 2; x < 10; x++)
19     {
20         digitalWrite(x, HIGH);
21         Serial.println("The LED" + String(x) + " is HIGH");
22         delay(700);
23         digitalWrite(x, LOW);
24         Serial.println("The LED" + String(x) + " is LOW");
25         delay(700);
26     }
27 }

```

TinkerCAD Link: <https://www.tinkercad.com/things/gTDims9ErP8-grand-luulia/editel?sharecode=rnHrtt9Rqf9SZOJHWmbMSWu-7S982q7jHjhRCndy13I>

IV. Conclusion

Setting up a simulated Arduino environment in Tinkercad allows you to replicate and simulate the code. A virtual breadboard would need to be connected to an Arduino board first before you could drag and drop it into the workspace. After that, you can connect LEDs and resistors to the breadboard by connecting them to pins 2 through 9 as instructed in the code. Once the parts have been set up, you can launch a code editor, paste the supplied C++ code, and upload the result to the fictitious Arduino board. By emulating the sequential on-and-off behavior of the LEDs in real life, Tinkercad has a built-in serial monitor where you can view the messages written by the code.

In essence, the code generates a looping pattern that consecutively turns on and off LEDs attached to Arduino pins 2 through 9. In order to enable the pins to control external devices like LEDs, it initializes them as OUTPUT at the beginning. The 'loop()' method then executes a for loop iterating through pins 2 through 9. It sends a message to the serial monitor for each pin and changes the appropriate digital output to HIGH, turning on the LED. It prints another message and then delays for 0.7 seconds before setting the output to LOW and turning off the LED. A sequence of LEDs lighting up and then sequentially turning off results from this cycle, which keeps repeating endlessly. You can test the behavior of the circuit and make adjustments as necessary by modeling this code in Tinkercad before putting it into practice in a real-world Arduino setup.

References

[1] D.J.D. Sayo. “University of the City of Manila Computer Engineering Department Honor Code,” PLM-CpE Departmental Policies, 2020.

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