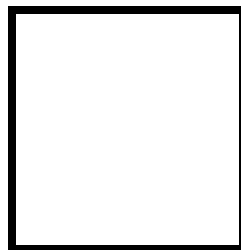**PAMANTASAN NG LUNGSOD NG MAYNILA**

(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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S 1:00-7:00PM / CPE 0412-2

Date Submitted
30-09-2023

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

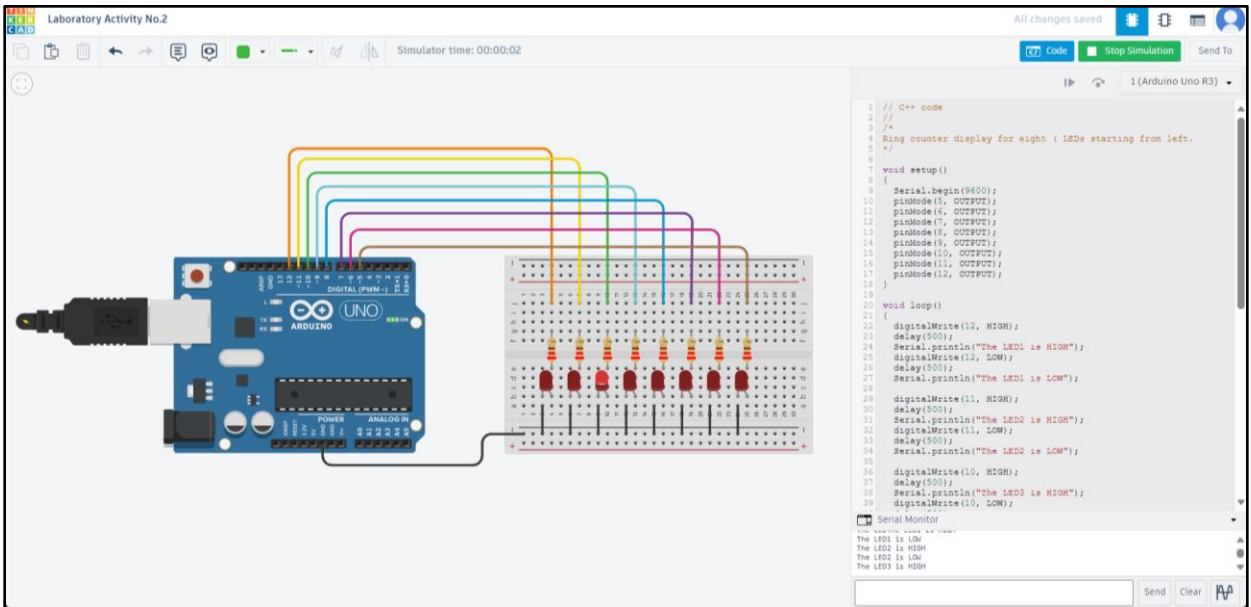**Exercise 1: Write a code that does a ring counter display for eight (8) LEDs starting from left.**
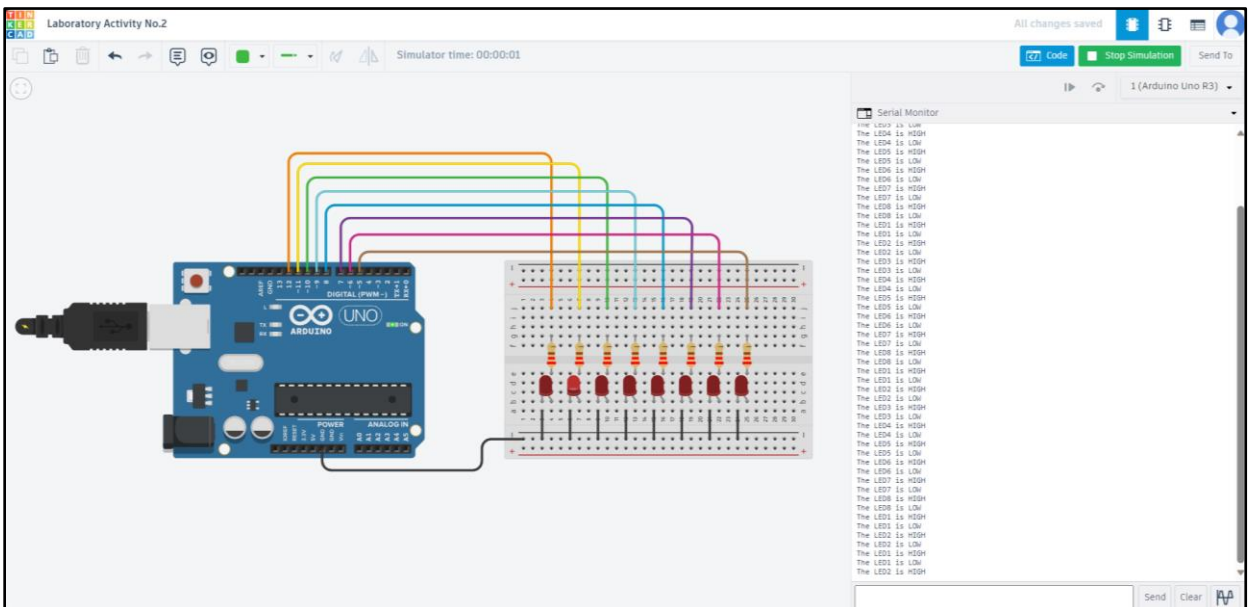

Figure 1. Ring Counter Display Circuit Diagram

Figure 2. Serial Monitor Results

Components Used

1. 8 LEDs
2. Resistor
3. Breadboard

CODE:

```cpp
// C++ code
//
/*
Ring counter display for eight (LEDs starting from left to right.
*/

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);
  Serial.println("The LED1 is HIGH");
  digitalWrite(12, LOW);
  delay(500);
  Serial.println("The LED1 is LOW");

  digitalWrite(11, HIGH);
  delay(500);
  Serial.println("The LED2 is HIGH");
  digitalWrite(11, LOW);
  delay(500);
  Serial.println("The LED2 is LOW");

  digitalWrite(10, HIGH);
  delay(500);
  Serial.println("The LED3 is HIGH");
  digitalWrite(10, LOW);
  delay(500);
  Serial.println("The LED3 is LOW");

  digitalWrite(9, HIGH);
  delay (500);
  Serial.println("The LED4 is HIGH");
  digitalWrite(9, LOW);
  delay(500);
  Serial.println("The LED4 is LOW");

  digitalWrite(8, HIGH);
  delay(500);
  Serial.println("The LED5 is HIGH");
  digitalWrite(8, LOW);
  delay(500);
  Serial.println("The LED5 is LOW");

  digitalWrite(7, HIGH);
  delay (500);
  Serial.println("The LED6 is HIGH");
  digitalWrite(7, LOW);
  delay(500);
```

```
    Serial.println("The LED6 is LOW");

  digitalWrite(6, HIGH);
  delay (500);
  Serial.println("The LED7 is HIGH");
  digitalWrite(6, LOW);
  delay(500);
  Serial.println("The LED7 is LOW");

  digitalWrite(5, HIGH);
  delay (500);
  Serial.println("The LED8 is HIGH");
  digitalWrite(5, LOW);
  delay(500);
  Serial.println("The LED8 is LOW");
}
```

Simulation Link: https://www.tinkercad.com/things/2QW0wBOGgw1-ingenious-lahdi/editel?sharecode=P42s12mIqV9z3NjNKSsY8BAOZozw2y2SwIYGYeUEuII

IV. Conclusion

   This laboratory activity introduces the interface of Arduino and Tinkercad through the design of a ring counter display using Arduino Uno R3, LEDs, 220Ω resistors, and a breadboard. LED is a type of diode that emits lights when a sufficient current flows through its filament. To build the circuit in Tinkercad, the cathode side of the LEDs (the negative or shorter leg) is placed to the ground while its anode side (the positive or longer leg) is connected to the digital pins of the Arduino Uno 3 [2]. As observed, a 220Ω resistor should be coupled for every LED to restrict the flow of excessive voltage, which can burn out the filament inside the LEDs. Afterward, the behavior of each LED is configured in the code editor of Tinkercad.

   In the setup function, the digital pin mode for each LED was initialized as output using the pinMode command, and Serial.begin(9600) statement was included to print the text values in the serial monitor. Meanwhile, all commands that require repetition are placed in the loop function. To turn the LED on, the digitalWrite command was used with a high value, and a delay of 500ms was added. Then, the LED was turned off using the digitalWrite with a low value, and a delay of 500ms was included. This process was repeated for each LED from left to right, creating an array of blinking LEDs that mimic the behavior of the ring counter display. Meanwhile, texts are also displayed in the serial monitor that describes the current LED that is turned on or off.

References

[1] D.J.D. Sayo. "University of the City of Manila Computer Engineering Department Honor Code," PLM-CpE Departmental Policies, 2020.
[2] "Blink," Arduino. Available: https://www.arduino.cc/en/Tutorial/BuiltInExamples/Blink