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 10:00am-1:00pm> / <Section 1>

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.

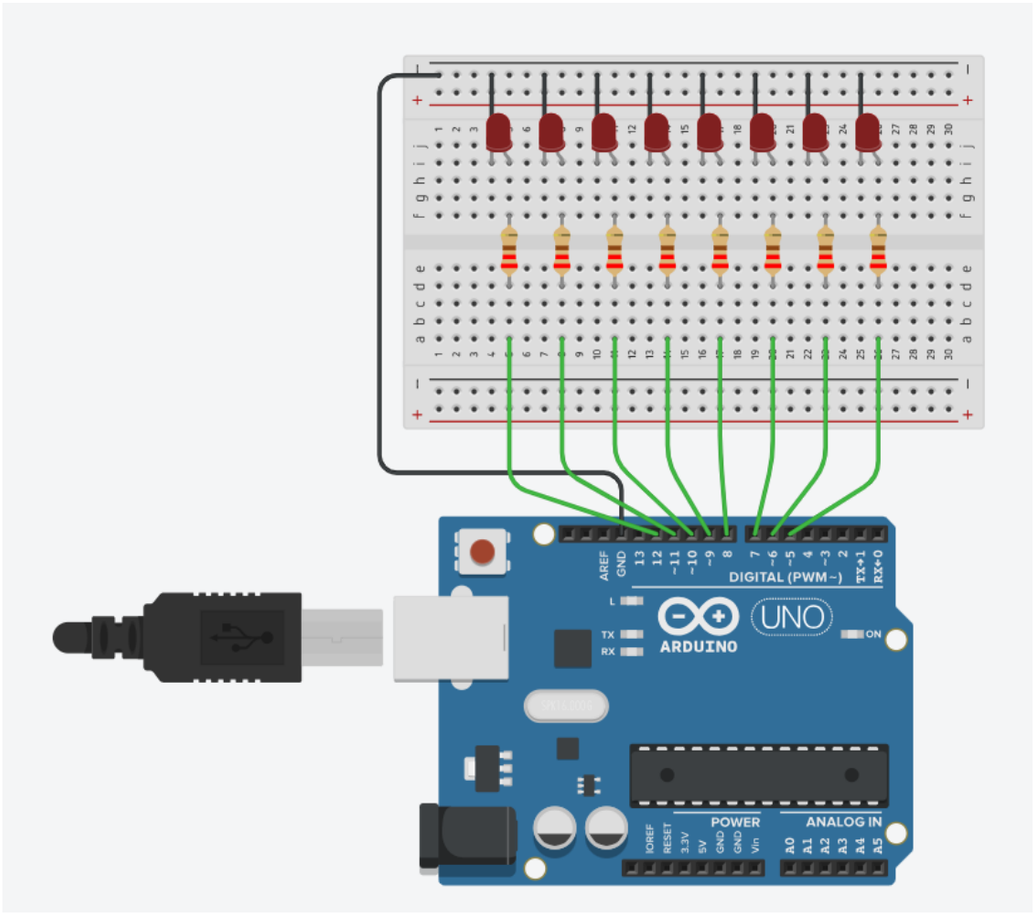


Figure No.1 Ring Counter Display Circuit Diagram

Components Used

1. 8 LEDs
2. Resistor
3. Breadboard

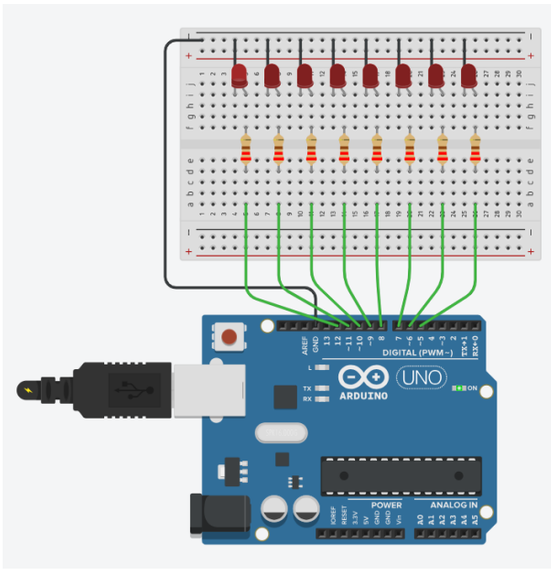
CODE:

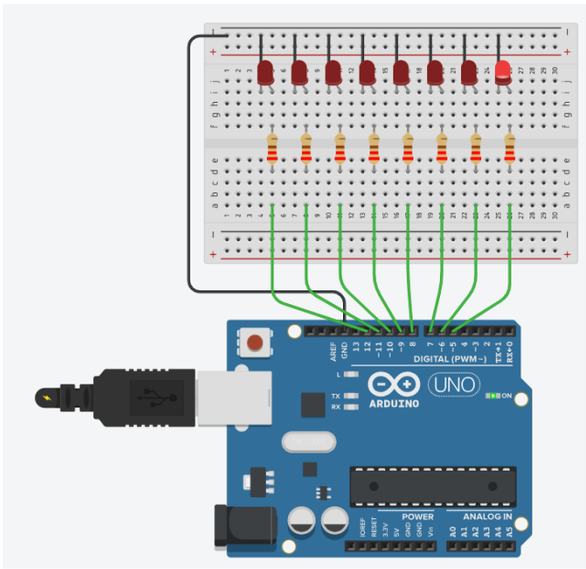
Given code:

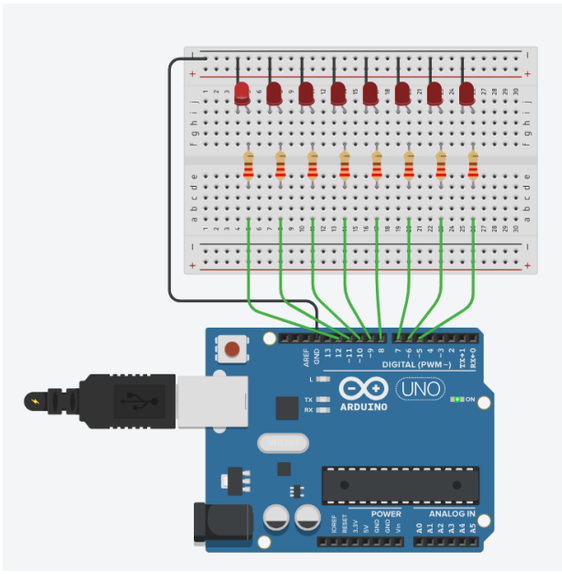
```
// C++ Code
// Ring counter display for eight (8) LEDs starting from left

void setup() {
  // Set pins 5 through 13 as OUTPUT
  pinMode(5, OUTPUT);
  pinMode(6, OUTPUT);
  pinMode(7, OUTPUT);
  pinMode(8, OUTPUT);
  pinMode(9, OUTPUT);
  pinMode(10, OUTPUT);
  pinMode(11, OUTPUT);
  pinMode(12, OUTPUT);
  Serial.begin(9600);
}

void loop() {
  digitalWrite(12, HIGH);
  delay(500); // Wait for 0.5 seconds
  Serial.println("The LED1 is HIGH");

  digitalWrite(12, LOW);
  delay(500); // Wait for 0.5 seconds
  Serial.println("The LED1 is LOW");

  digitalWrite(11, HIGH);
  delay(500); // Wait for 0.5 seconds
  Serial.println("The LED2 is HIGH");

  digitalWrite(11, LOW);
  delay(500); // Wait for 0.5 seconds
  Serial.println("The LED2 is LOW");

  digitalWrite(10, HIGH);
  delay(500); // Wait for 0.5 seconds
  Serial.println("The LED3 is HIGH");

  digitalWrite(10, LOW);
  delay(500); // Wait for 0.5 seconds
  Serial.println("The LED3 is LOW");

  digitalWrite(9, HIGH);
  delay(500); // Wait for 0.5 seconds
  Serial.println("The LED4 is HIGH");

  digitalWrite(9, LOW);
  delay(500); // Wait for 0.5 seconds
  Serial.println("The LED4 is LOW");

  digitalWrite(8, HIGH);
  delay(500); // Wait for 0.5 seconds
  Serial.println("The LED5 is HIGH");

  digitalWrite(8, LOW);
  delay(500); // Wait for 0.5 seconds
  Serial.println("The LED5 is LOW");

  digitalWrite(7, HIGH);
  delay(500); // Wait for 0.5 seconds
  Serial.println("The LED6 is HIGH");

  digitalWrite(7, LOW);
  delay(500); // Wait for 0.5 seconds
  Serial.println("The LED6 is LOW");

  digitalWrite(6, HIGH);
  delay(500); // Wait for 0.5 seconds
  Serial.println("The LED7 is HIGH");

  digitalWrite(6, LOW);
  delay(500); // Wait for 0.5 seconds
  Serial.println("The LED7 is LOW");

  digitalWrite(5, HIGH);
  delay(500); // Wait for 0.5 seconds
  Serial.println("The LED8 is HIGH");

  digitalWrite(5, LOW);
  delay(500); // Wait for 0.5 seconds
  Serial.println("The LED8 is LOW");
}
```

LINK: https://www.tinkercad.com/things/5p8pwmY7HZo-lab-activity-2/editel?sharecode=p9Z6zCe41280sopXDL7d_IdC9MuCeBLEpPsBV9HKtNs

Output using the Given code:







Serial Monitor

```
The LED1 is HIGH
The LED1 is LOW
The LED2 is HIGH
The LED2 is LOW
The LED3 is HIGH
The LED3 is LOW
The LED4 is HIGH
The LED4 is LOW
The LED5 is HIGH
The LED5 is LOW
The LED6 is HIGH
The LED6 is LOW
The LED7 is HIGH
The LED7 is LOW
The LED8 is HIGH
The LED8 is LOW
The LED1 is HIGH
```

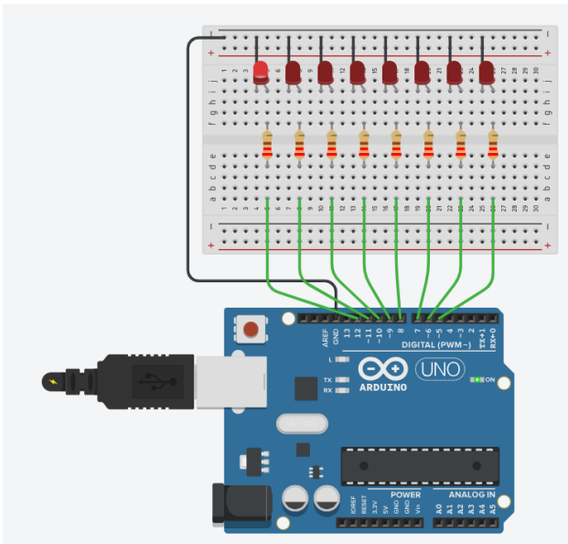
Serial Monitor

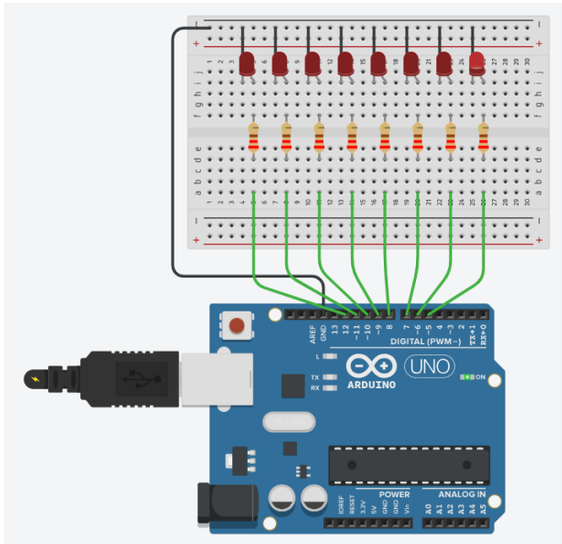
```
The LED1 is HIGH
The LED1 is LOW
The LED2 is HIGH
The LED2 is LOW
The LED3 is HIGH
The LED3 is LOW
The LED4 is HIGH
The LED4 is LOW
The LED5 is HIGH
The LED5 is LOW
The LED6 is HIGH
The LED6 is LOW
The LED7 is HIGH
The LED7 is LOW
The LED8 is HIGH
The LED8 is LOW
The LED1 is HIGH
The LED1 is LOW
The LED2 is HIGH
The LED2 is LOW
The LED3 is HIGH
The LED3 is LOW
The LED4 is HIGH
The LED4 is LOW
The LED5 is HIGH
The LED5 is LOW
The LED6 is HIGH
The LED6 is LOW
The LED7 is HIGH
The LED7 is LOW
The LED8 is HIGH
The LED8 is LOW
The LED1 is HIGH
```

Same objective but using for loop code:

```
// C++ Code
// Ring counter display for eight (8) LEDs starting from left

void setup() {
  // Set pins 5 through 12 as OUTPUT using a for loop
  for (int pin = 5; pin <= 12; pin++) {
    pinMode(pin, OUTPUT);
  }
  Serial.begin(9600);
}

void loop() {
  for (int pin = 12; pin >= 5; pin--) {  // Start from 12 and move to 5
    digitalWrite(pin, HIGH);
    delay(500);                 // Wait for 0.5 seconds
    Serial.print("The LED");
    Serial.print(13 - pin);     // Calculate LED number from pin number
    Serial.println(" is HIGH");

    digitalWrite(pin, LOW);
    delay(500);                 // Wait for 0.5 seconds
    Serial.print("The LED");
    Serial.print(13 - pin);     // Calculate LED number from pin number
    Serial.println(" is LOW");
  }
}
```

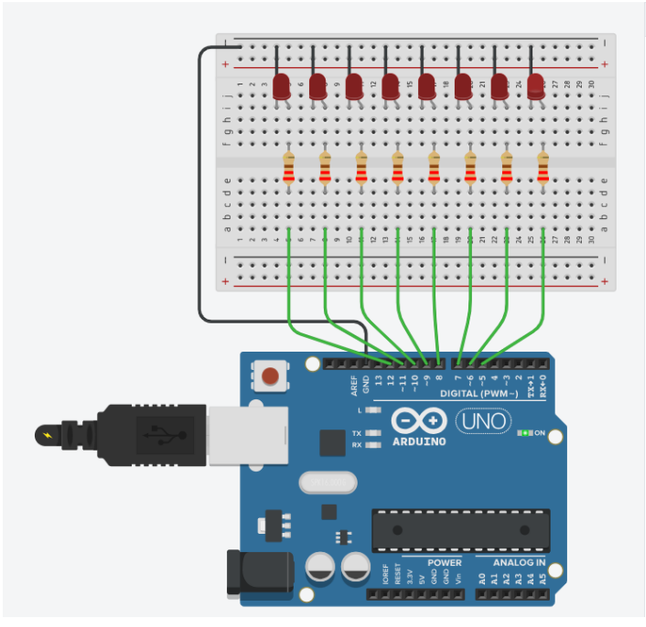
Output using for loop code:





Serial Monitor

```
The LED1 is HIGH
The LED1 is LOW
The LED2 is HIGH
The LED2 is LOW
The LED3 is HIGH
The LED3 is LOW
The LED4 is HIGH
The LED4 is LOW
The LED5 is HIGH
The LED5 is LOW
The LED6 is HIGH
The LED6 is LOW
The LED7 is HIGH
The LED7 is LOW
The LED8 is HIGH
The LED8 is LOW
The LED1 is HIGH
The LED1 is LOW
The LED2 is HIGH
The LED2 is LOW
The LED3 is HIGH
The LED3 is LOW
The LED4 is HIGH
The LED4 is LOW
The LED1 is HIGH
The LED1 is LOW
```



Serial Monitor

```
The LED1 is HIGH
The LED1 is LOW
The LED2 is HIGH
The LED2 is LOW
The LED3 is HIGH
The LED3 is LOW
The LED4 is HIGH
The LED4 is LOW
The LED5 is HIGH
The LED5 is LOW
The LED6 is HIGH
The LED6 is LOW
The LED7 is HIGH
The LED7 is LOW
The LED8 is HIGH
```

LINK: https://www.tinkercad.com/things/gibmq8plADp-lab-activity-2-using-for-loop/editel?sharecode=fjS1i4aoMd719nkdpAGGU3KWHewMdT-mj9tLSnOItvY

IV. Conclusion

This laboratory exercise offered an insightful exposure to the world of hardware programming using Arduino, highlighting the creation of an Arduino program using the Tinkercad simulation. The primary task at hand was the implementation of a ring counter display that toggles eight (8) LEDs sequentially, starting from the left.

The process involved using Tinkercad, an online simulation tool to bring the circuit and the code to life. With the components provided, including LEDs, resistors, a breadboard, the Arduino UNO, and jumper wires, the simulation produced an output as expected from the code and hardware connections. With the given detailed code, I have come up with an idea to apply the for loop function to simplify the code and create another version with the same objective and output.

After finishing this lab, I realized it's not just about lighting up LEDs. I learned a lot about Arduino programming, especially commands like `Serial.begin` and `pinMode`. Additionally, my understanding of the `for` loop function, important in many programming scenarios, has been significantly strengthened. Overall, this lab was a great hands-on way to connect what we learn in books or modules to real-world tasks.

References

[1] *Arduino for loop - how you can use it the right way.* Best Microcontroller Projects. (n.d.). https://www.best-microcontroller-projects.com/arduino-for-loop.html#:~:text=The%20Arduino%20for%20loop%20provides,each%20time%20around%20the%20loop.