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

Microprocessor Lab

Laboratory Activity No. 2
Ring Counter

Score

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Saturday (1-4pm) / CPE 0412.1-2

Submitted to:
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I. Objectives

This laboratory experiments focuses on the concept of the Ring Counter, the following are the laboratory's main objectives:

- To create and simulate ring counter on TinkerCad
- To construct a working ring counter using Arduino
- To gain understanding of the underlying concept of Ring counter

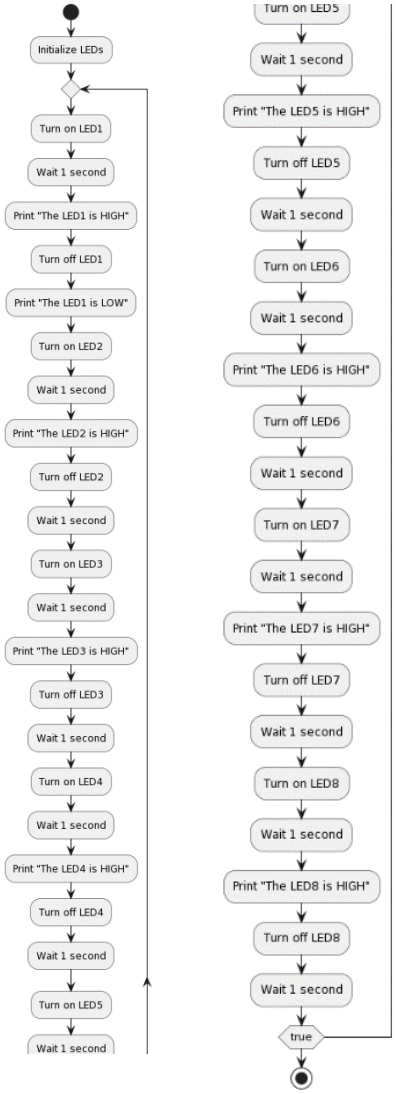
II. Methodology

1. Creating the circuit design in TinkerCad
   - Construct and use necessary circuit components in Tinkercad

   Materials used:
   8 LEDs
   Resistor
   Breadboard

2. Create a code and run it.

   Pseudocode



3. Simulate in TinkerCad.
4. Build actual Arduino circuit of Ring Counter using the electronic hardwares.
5. Install Arduino IDE.
6. Create a code in Arduino IDE.
7. Connect Arduino to Computer.

CODE:

```
// C++ code
//Ring counter display for eight LEDs starting from left.
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");
}
```

III. Results

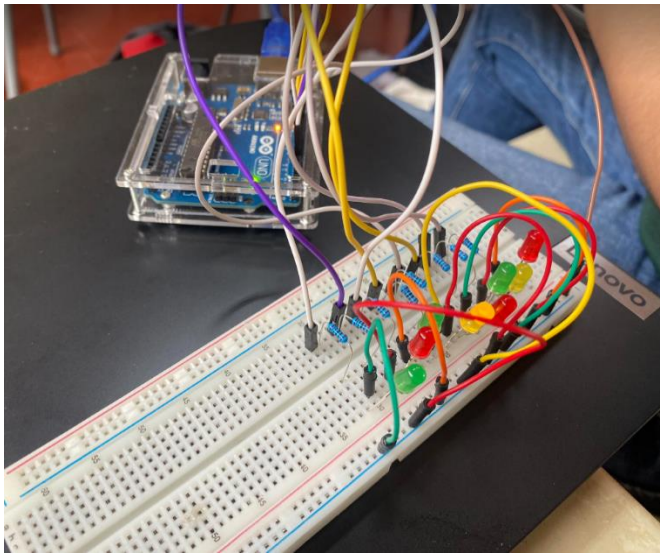


Figure 1 Arduino (RING COUNTER)

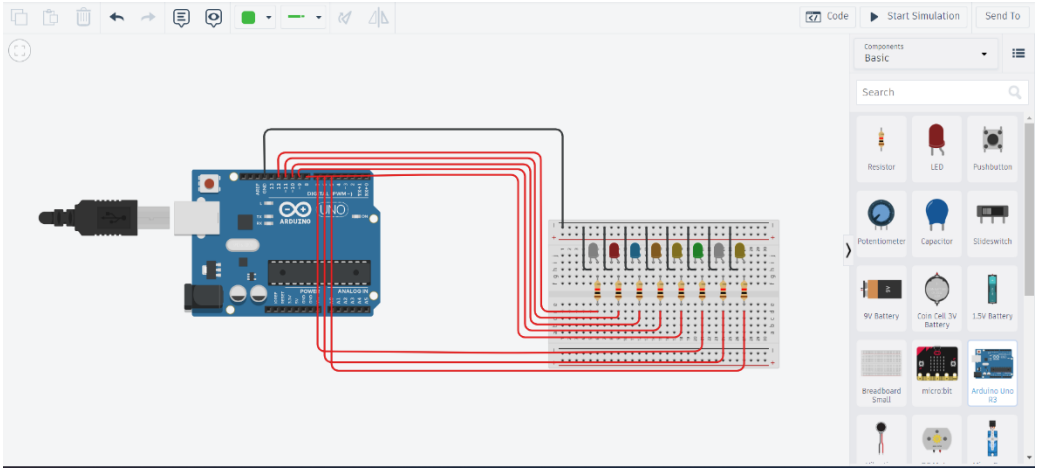


Figure 2 TinkerCad (RING COUNTER)

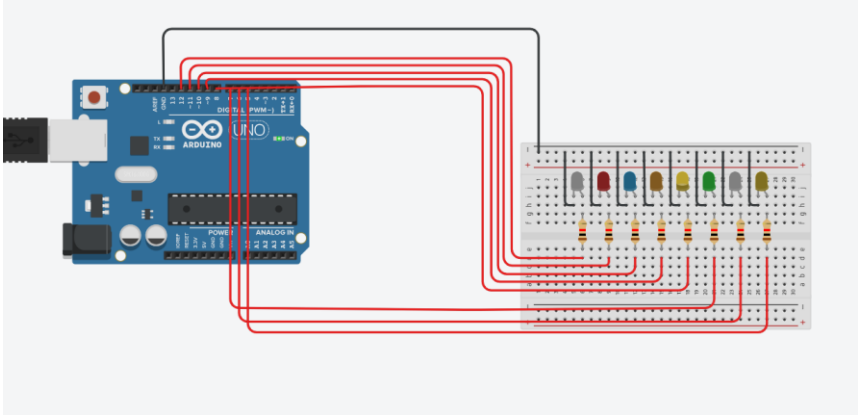


Figure 3 Running the simulation

GOOGLE LINK:
https://drive.google.com/file/d/1OkuTZ2Ge3hJCv93zA37GjSL_kjy0Q5dU/view?usp=sharing

TINKERCAD LINK:
https://www.tinkercad.com/things/bhkQPuZAStC-brilliant-blorr/editel?sharecode=WxrE2fnUthoxuXnSedT7NnlOxkjevUpTASlVczsGHnk

IV. Conclusion

This project is designed to create a ring counter display using eight LEDs. It's a setup where these LEDs light up one after the other in a sequence. The Arduino controls each LED by setting all the LED pins as outputs. In the loop() function, the first LED is turned on for 500 milliseconds, then turned off, and the next LED in the sequence is turned on. This cycle continues until all eight LEDs have had their turn.

The project also includes a feature that sends messages to the serial monitor whenever an LED is turned on or off. This can be useful for debugging and monitoring the circuit's operation. This circuit can serve as the foundation for various displays, from a basic running light pattern to more complex displays with changing patterns over time. For instance, you could modify the circuit to create a display where a single LED appears to move around the ring or one where the LEDs gradually fade in and out.

In the testing phase, eight standard LEDs were used, and they lit up in a sequence, starting with the leftmost LED and ending with the rightmost LED. Each LED remained lit for 500 milliseconds, and messages were printed to the serial monitor to indicate when LEDs were being turned on or off.

Overall, this project is a simple but effective way to create a variety of different LED displays. The circuit is easy to modify and can be used with different types of LEDs.

V. References

[1] "Ring Counter in Digital Electronics - Javatpoint," *www.javatpoint.com*. https://www.javatpoint.com/ring-counter-in-digital-electronics

[2] "Ring Counter in Digital Logic," *GeeksforGeeks*, Jun. 26, 2018. https://www.geeksforgeeks.org/ring-counter-in-digital-logic/