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 1:00pm-4:00pm/ BSCpE 0412.1-2

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.

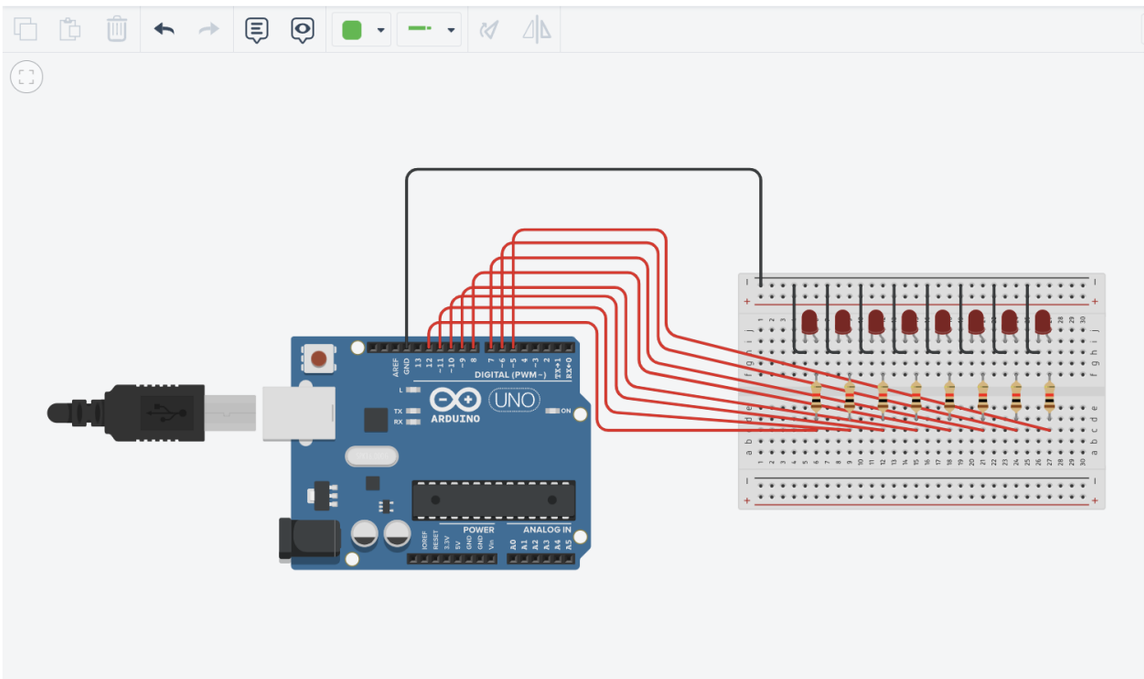


Figure No.1 Ring Counter Display Circuit Diagram

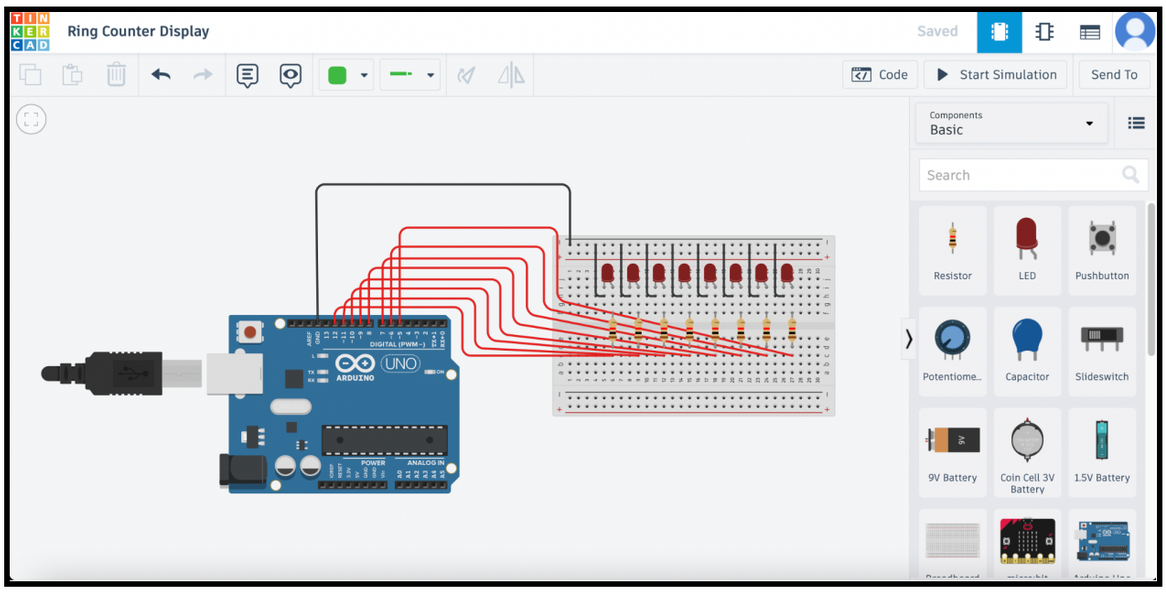
Components Used

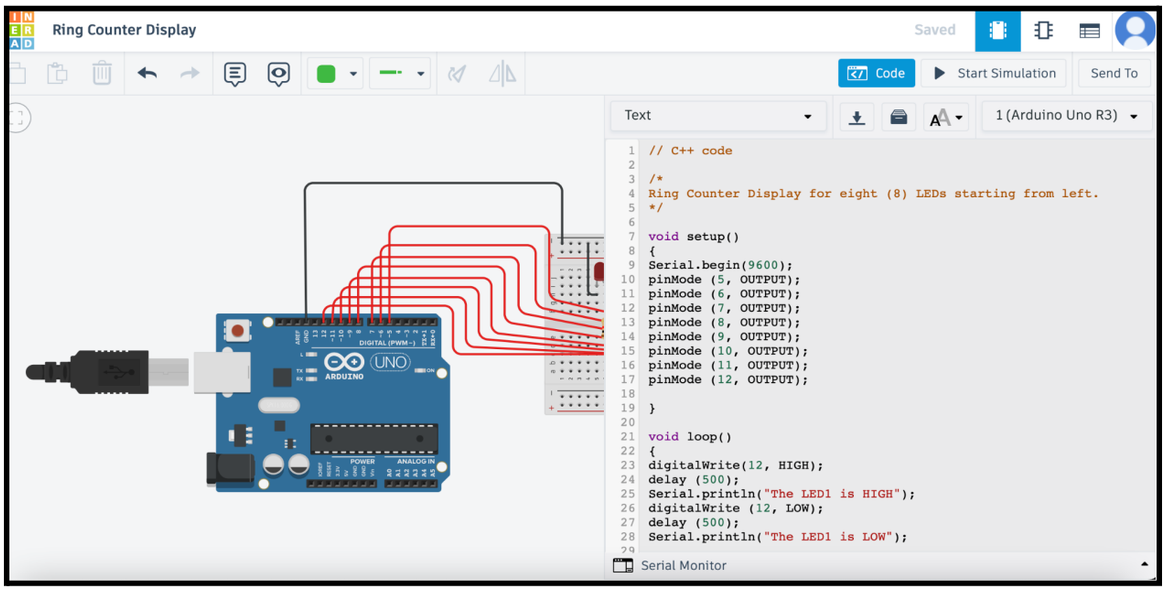
1. 8 LEDs
2. Resistor
3. Breadboard

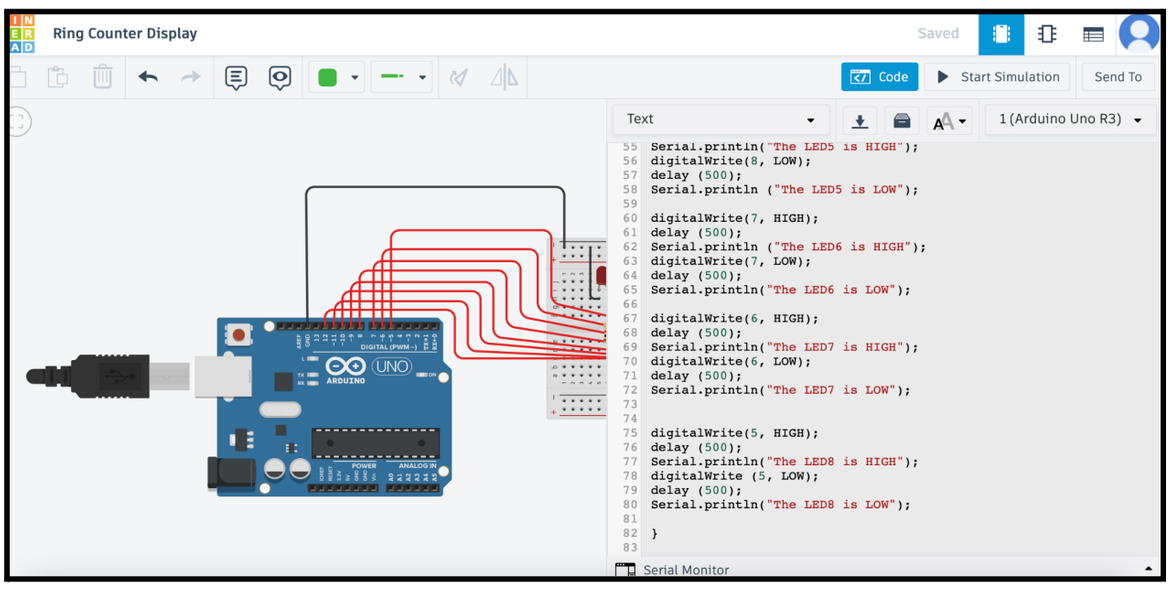
CODE:

```
// C++ code
//
/*
  Ring counter display for eight (8) 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");

}
```

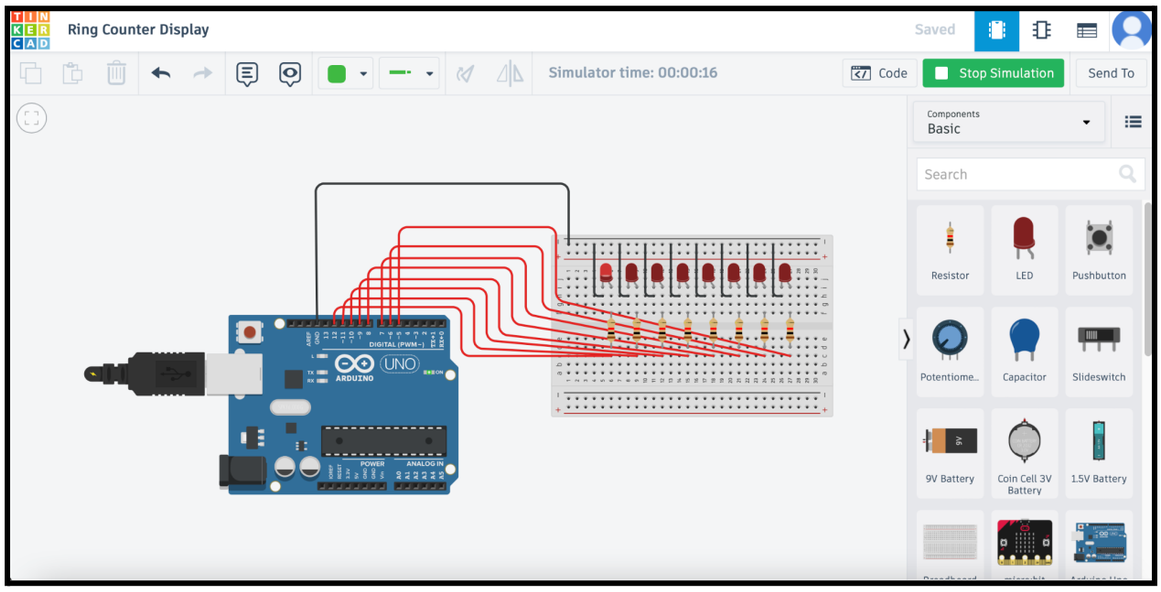
TinkerCAD Implementation

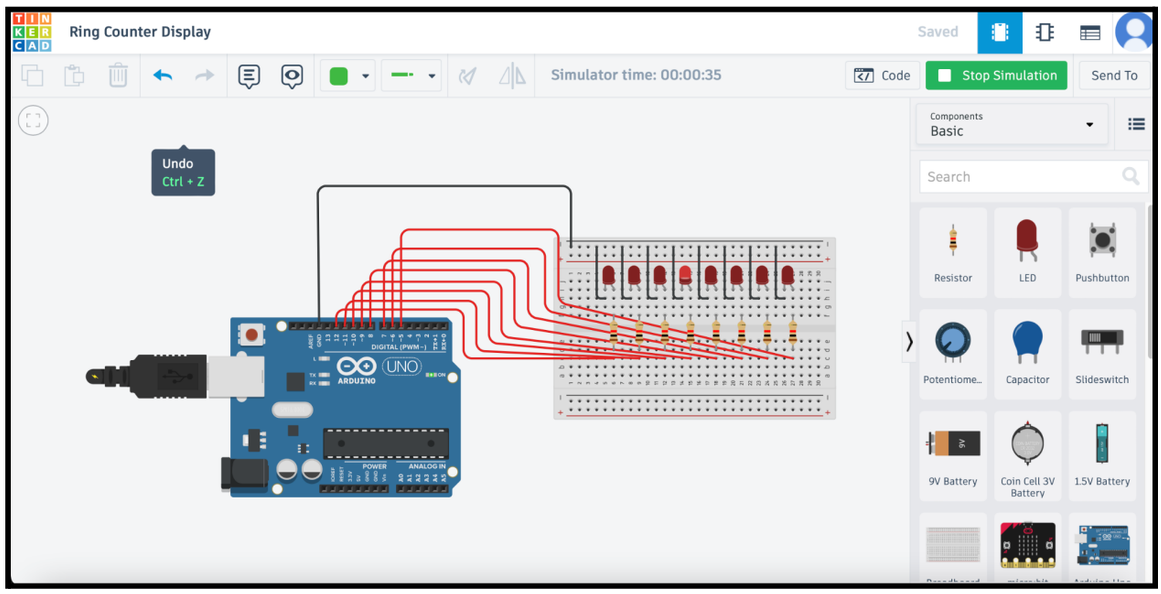


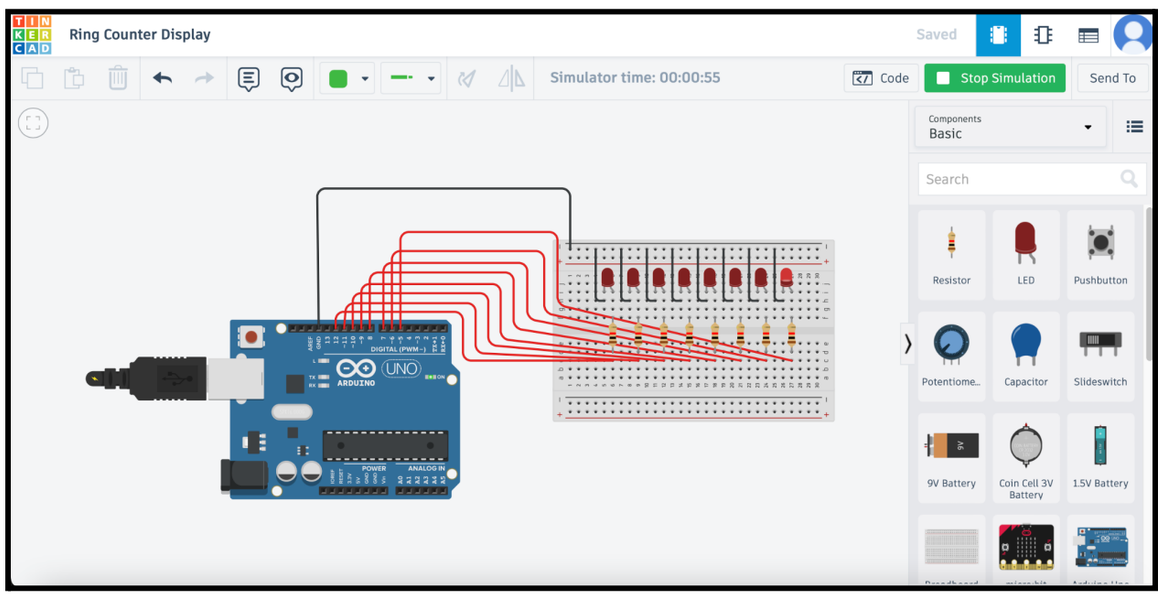




Simulation


Ring Counter Display
Saved
Simulator time: 00:00:16
Code
Stop Simulation
Send To
Components
Basic
Search
Resistor
LED
Pushbutton
Potentiome...
Capacitor
Slideswitch
9V Battery
Coin Cell 3V Battery
1.5V Battery


Ring Counter Display
Saved
Simulator time: 00:00:35
Code
Stop Simulation
Send To
Undo
Ctrl + Z
Components
Basic
Search
Resistor
LED
Pushbutton
Potentiome...
Capacitor
Slideswitch
9V Battery
Coin Cell 3V Battery
1.5V Battery


Ring Counter Display
Saved
Simulator time: 00:00:55
Code
Stop Simulation
Send To
Components
Basic
Search
Resistor
LED
Pushbutton
Potentiome...
Capacitor
Slideswitch
9V Battery
Coin Cell 3V Battery
1.5V Battery

IV. Conclusion

The ring counter for eight (8) LEDs starting from the left has been implemented through the use of TinkerCAD. In the initialization, the output of the last shift register to the first shift register input, and circulated a single one bit around the ring of the LEDs, has been executed. Hence, the number of states in a straight ring counter is equal to the number of flip-flops used. As the output of the last flip-flop is connected back to the input of the first flip-flop, this bit pattern rotates within the counter by shifting its position once for each clock pulse, coded as 'high' or 'low' to determine the corresponding waveforms. Subsequently, the structure of the circuit diagram has been formed by connecting the output of the last flip-flop to the input of the first flip-flop, through the eight LEDs.

References

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