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

Microprocessor Lab

Laboratory Activity No. 3

Binary Representation of 8 LEDs in TinkerCad and Arduino Programming

Score

Submitted by:
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< Saturday 10:30am – 1:00pm > / < CPE 0412-1.1>

Date Submitted
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Submitted to:

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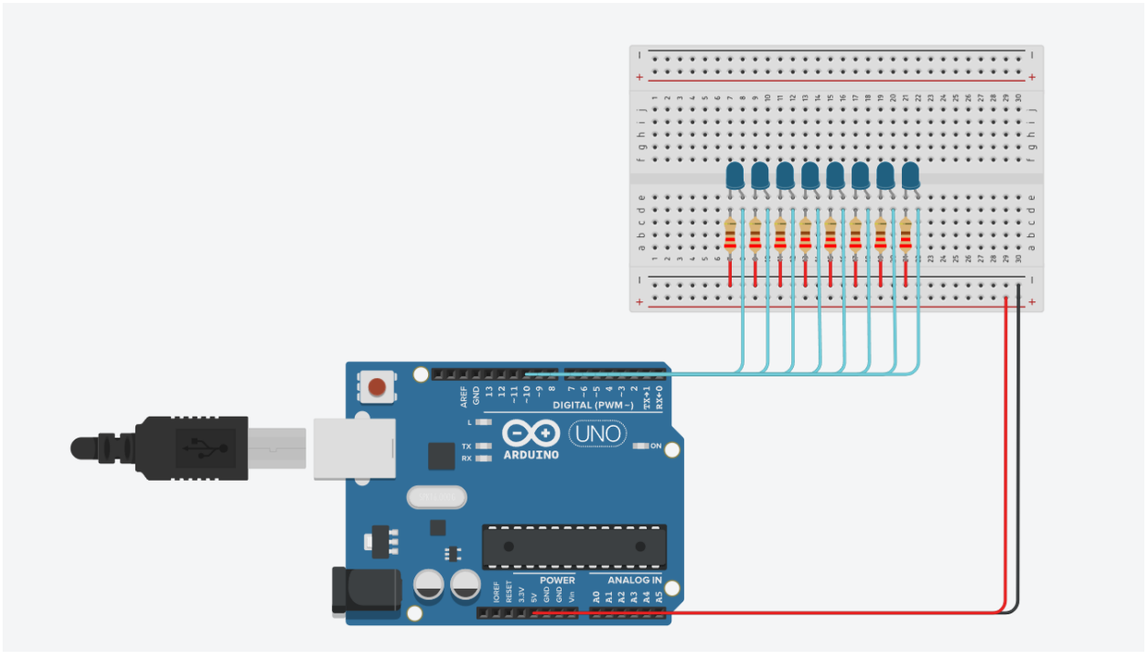
I. Objectives

This laboratory activity aims to implement the principles and techniques of hardware programming using Arduino through:

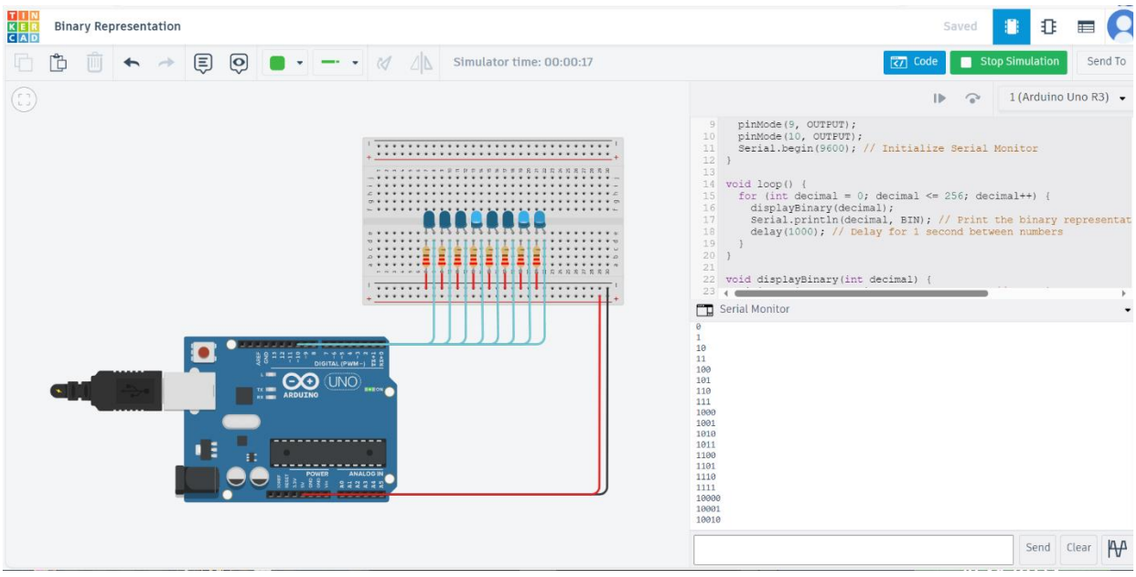
- To create Arduino circuit of Binary representation (decimal 0-256 using 8 LEDs)

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



CODE:

```
void setup() {
  // Set all LED pins as outputs
  pinMode(3, OUTPUT);
  pinMode(4, OUTPUT);
  pinMode(5, OUTPUT);
  pinMode(6, OUTPUT);
  pinMode(7, OUTPUT);
  pinMode(8, OUTPUT);
  pinMode(9, OUTPUT);
  pinMode(10, OUTPUT);
  Serial.begin(9600); // Initialize Serial Monitor
}

void loop() {
  for (int decimal = 0; decimal <= 256; decimal++) {
    displayBinary(decimal);
    Serial.println(decimal, BIN); // Print the binary representation to Serial Monitor
    delay(1000); // Delay for 1 second between numbers
  }
}

void displayBinary(int decimal) {
  digitalWrite(3, (decimal & 0x01) != 0);  // Set pin 3 based on the least significant bit
  digitalWrite(4, (decimal & 0x02) != 0);  // Set pin 4 based on the second least significant bit
  digitalWrite(5, (decimal & 0x04) != 0);  // Set pin 5 based on the third least significant bit
  digitalWrite(6, (decimal & 0x08) != 0);  // Set pin 6 based on the fourth least significant bit
  digitalWrite(7, (decimal & 0x10) != 0);  // Set pin 7 based on the fifth least significant bit
  digitalWrite(8, (decimal & 0x20) != 0);  // Set pin 8 based on the sixth least significant bit
  digitalWrite(9, (decimal & 0x40) != 0);  // Set pin 9 based on the seventh least significant bit
  digitalWrite(10, (decimal & 0x80) != 0); // Set pin 10 based on the most significant bit
}
```

IV. Conclusion

The laboratory experiment successfully demonstrates the concept of binary counting using an Arduino Uno. By utilizing LEDs to represent individual bits of a binary number, the experiment provides a visual representation of how binary counting operates. Each LED's state (on or off) corresponds to a specific bit (1 or 0), and as the counter increments, the pattern of lit LEDs changes to reflect the binary representation of the current number. Additionally, the experiment also showcases the use of bitwise operations in programming to manipulate and extract specific bits from a number.

References

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