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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Sat 1:00 PM – 4:00 PM / CPE-412.1-2

Date Submitted

14-10-2023

Submitted to:

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I. Objectives

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

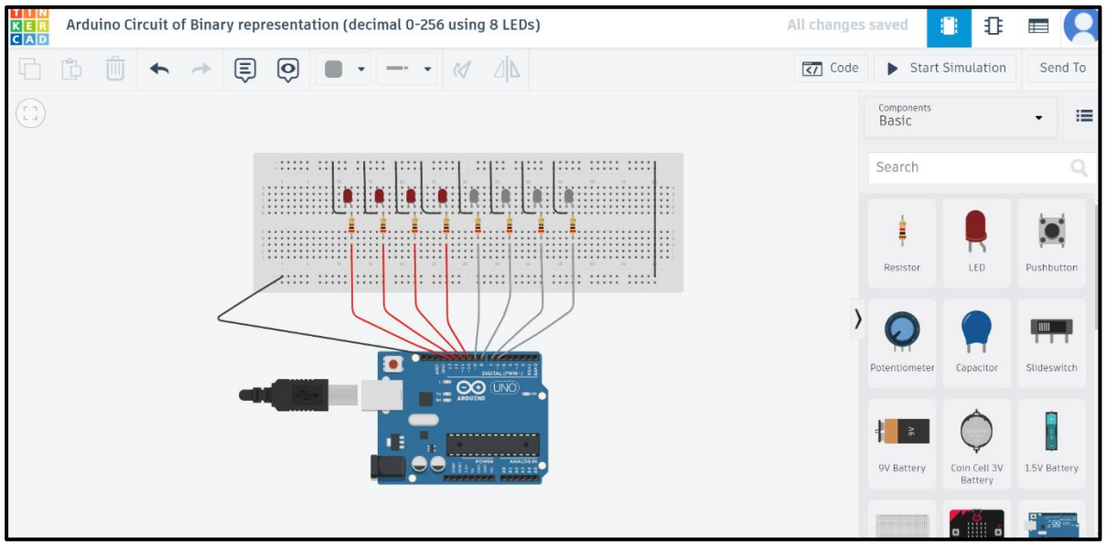
- create Arduino circuit of Binary representation (decimal 0-256 using 8 LEDs)

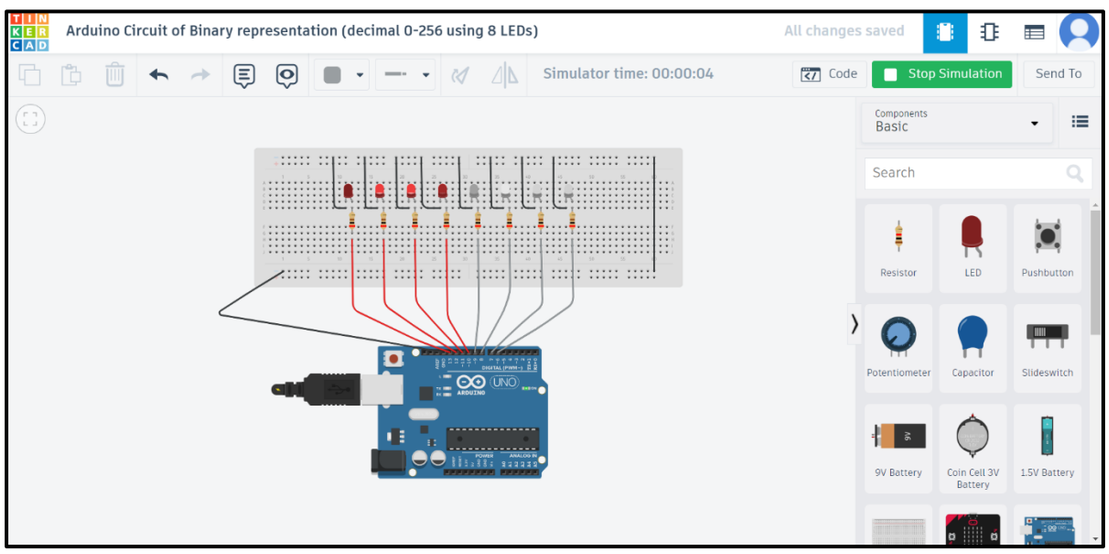
II. Method/s

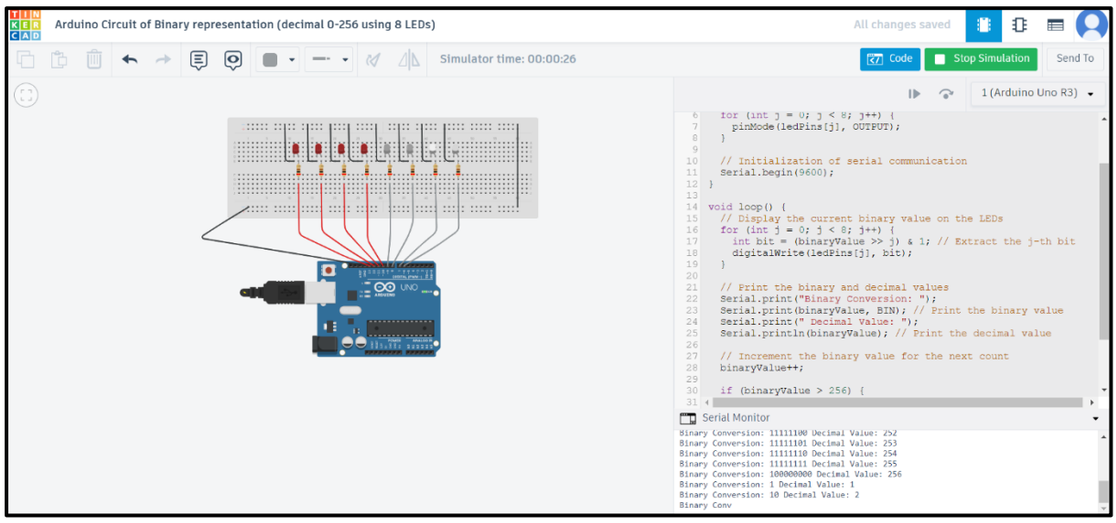
- Perform a task problem given in the presentation.
- Write a code and perform an Arduino circuit diagram of a Binary counter that represents decimal 0-256 using 8 LEDs.
- To produce binary sequences that are related to the quantity of clock signal pulses applied to the input.

III. Results

TINKERCAD SIMULATION:







CODE:

```
const int ledPins[] = {6, 7, 8, 9, 10, 11, 12, 13};
int binaryValue = 1;

void setup() {
  // Initialization of LED pins as outputs
  for (int j = 0; j < 8; j++) {
    pinMode(ledPins[j], OUTPUT);
  }

  // Initialization of serial communication
  Serial.begin(9600);
}

void loop() {
  // Display the current binary value on the LEDs
  for (int j = 0; j < 8; j++) {
    int bit = (binaryValue >> j) & 1; // Extract the j-th bit
    digitalWrite(ledPins[j], bit);
  }

  // Print the binary and decimal values
  Serial.print("Binary Conversion: ");
  Serial.print(binaryValue, BIN); // Print the binary value
  Serial.print(" Decimal Value: ");
  Serial.println(binaryValue); // Print the decimal value

  // Increment the binary value for the next count
  binaryValue++;

  if (binaryValue > 256) {
    binaryValue = 1; // Reset the counter to 1 after reaching 256
  }

  delay(100); // Wait for one second before incrementing
}

```

IV. Conclusion

Fundamentally, circuits known as binary counters produce binary sequences that are related to the quantity of clock signal pulses applied to the input. Considering this, it is a common practice to divide a decimal value by 2 and set the remainder aside when converting it to binary. Binary values can be created by continually dividing decimal numbers by two and recording the outcome. Consequently, the concept of understanding binary to decimal conversion is crucial for computer programming. Humans can easily comprehend the decimal number system, which contains all 10 digits, whereas machines can only comprehend the binary number system, which contains just the values 0 and 1. Hence, binary counter is beneficial in understanding the connection of computer hardware parts and its software.

References

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