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

Microprocessor Lab

Laboratory Activity No. 1

Binary Representation of 8 LEDs in TinkerCad and Arduino Programming

Score

Submitted by:
Chiong Maya, Henrich Bryan R.
<Saturday 1:00-7:00pm> / <CpE 412-2>

Date Submitted
10-13-2023

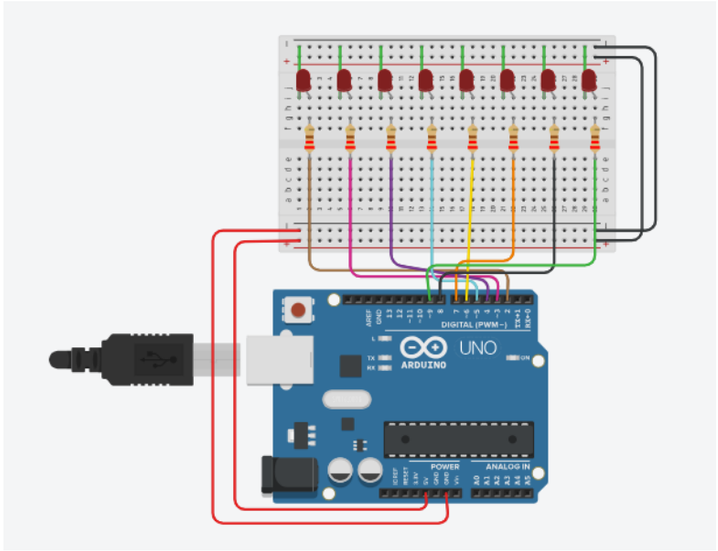
Submitted to:

Engr. Maria Rizette H. Sayo

I. Objectives

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

II. Circuit Diagram



III. CODE

```
const int LED_PINS[] = {2, 3, 4, 5, 6, 7, 8, 9};
bool ledsOn = false;  // Variable to track if LEDs are currently on
int decimal = 1;

void setup() {
  Serial.begin(9600); // Initialize the serial monitor
  for (int i = 0; i < 8; i++) {
    pinMode(LED_PINS[i], OUTPUT);
  }
}

void loop() {
  if (decimal <= 256) {
    displayBinary(decimal);
    Serial.println(decimal); // Output the decimal value to the serial monitor

    if (decimal == 255) {
      if (!ledsOn) {
        turnOnAllLEDs();
        ledsOn = true;
        delay(400); // Keep LEDs on for 100 ms
      } else {
        turnOffAllLEDs();
        Serial.println("All LEDs are OFF.");
        delay(100); // Wait for 100 ms before stopping
        while (true) {
          // Infinite loop to stop the program
        }
      }
    }

    delay(300);  // Adjust the delay to control the speed of counting.
    decimal++;
  }
```

```
}

void displayBinary(int decimal) {
  for (int i = 0; i < 8; i++) {
    int bitValue = (decimal >> i) & 0x01;
    digitalWrite(LED_PINS[i], bitValue);
  }
}

void turnOnAllLEDs() {
  for (int i = 0; i < 8; i++) {
    digitalWrite(LED_PINS[i], HIGH); // Turn on all LEDs
  }
}

void turnOffAllLEDs() {
  for (int i = 0; i < 8; i++) {
    digitalWrite(LED_PINS[i], LOW); // Turn off all LEDs
  }
}
```

IV. LINK TO TINKERCAD

https://www.tinkercad.com/things/8kYj4qek4bR-lab3/editel?sharecode=lm2nEfmV-BZ9MXUFWo4cV1J-pHXNgEdd9snkQC9z4Mo

V. Conclusion

In the provided Arduino sketch, a group of eight LEDs is under precise control to showcase the binary representation of decimal numbers spanning from 1 to 255. The code establishes the necessary pin configurations and initializes variables for tracking the LEDs' status and the current decimal value. The primary loop continually increments the decimal value and translates it into binary format, subsequently projecting it onto the LEDs, while also transmitting the decimal value to the serial monitor. When the decimal value reaches 255, it scrutinizes the LEDs' state. If they are currently inactive, it briefly activates all LEDs before turning them off again, indicating that all LEDs are now extinguished. The code then enters an eternal loop to cease program execution. This code offers a straightforward yet visually engaging approach to visualize the binary representations of decimal numbers through an array of LEDs.