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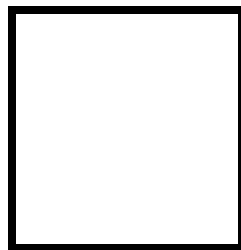
(University of the City of Manila)
Intramuros, Manila

Microprocessor Lab

Laboratory Activity No. 3
Binary Representation of 8 LEDs in TinkerCad and Arduino Programming

Score

Submitted by:
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Sat 1:00-4:00PM / CpE-412-2

Date Submitted
11/10/2023

Submitted to:

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I.   Objectives

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

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

II.   Method/s

- Design and construct a functional Arduino circuit capable of visually representing decimal numbers from 0 to 255 (8-bit binary) using a set of 8 LEDs.

- Ensure that each LED corresponds to one bit in the binary representation

- Ensure that visual representation in binary and decimal value in serial monitor are the same.

III.   Results

TinkerCad:

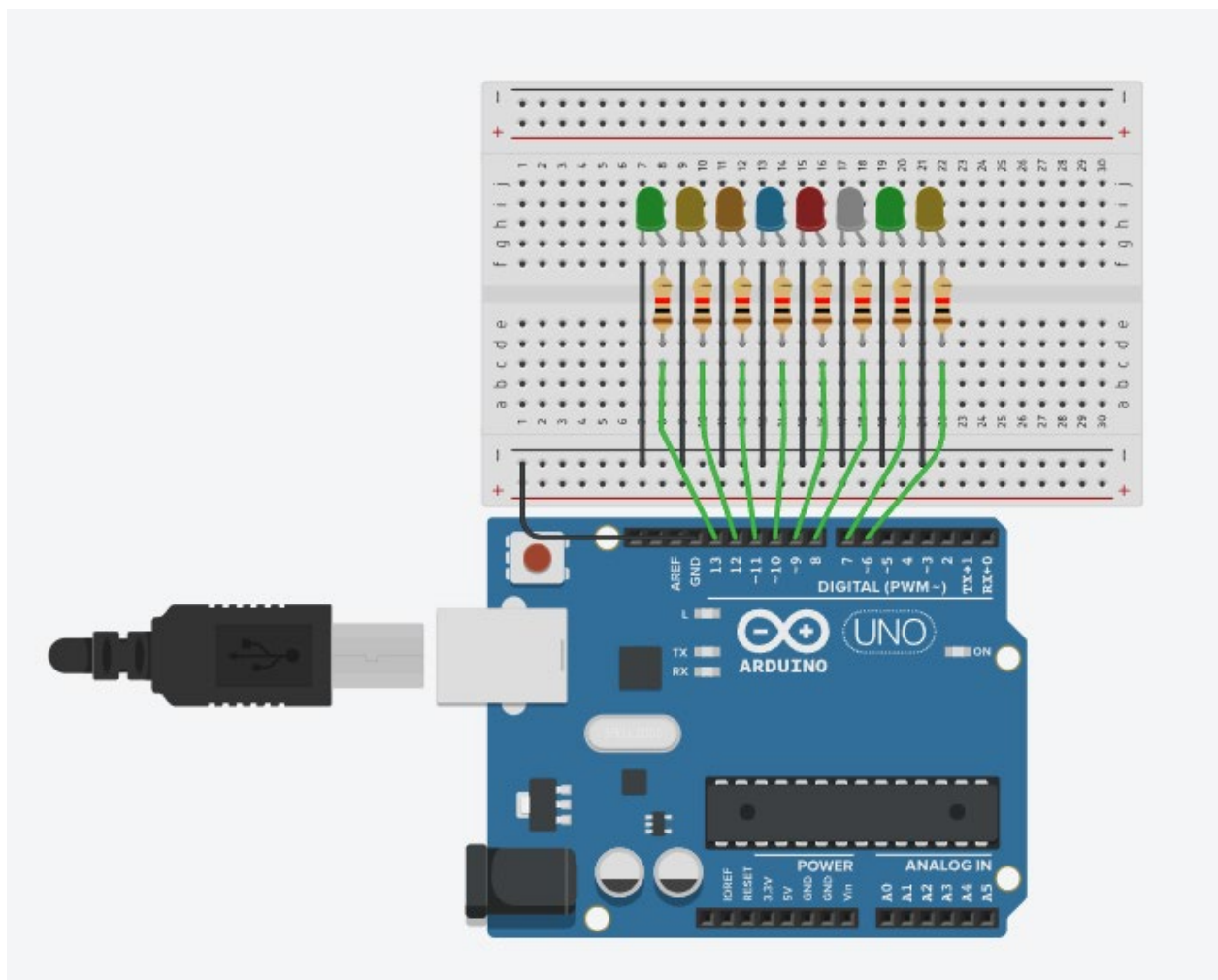**Exercise 1: Write a code that visually represents binary numbers from 0 to 255 using 8 LEDs.**

Figure No.1 8-Bit Counter using Arduino in TinkerCad

Components Used

1. 8 LEDs
2. Resistor
3. Breadboard
4. Wires

TinkerCad Link

https://www.tinkercad.com/things/7LXkNZf5m41

CODE:

```
1  //initializing the pins and count
2  int ledPins[] = {13, 12, 11, 10, 9, 8, 7, 6};
3  byte count = 0;
4
5  //sets the output signal
6  void setup() {
7    for (int i = 0; i < 8; i++) {
8      pinMode(ledPins[i], OUTPUT);
9    }
10   Serial.begin(9600);
11 }
12
13 //main loop function and increment the count by iteration
14 void loop() {
15   count++;
16   for (int i = 0; i < 8; i++) {
17     digitalWrite(ledPins[i], count & (1 << i));
18   }
19   Serial.println(count); //decimal value in serial monitor
20   delay(1000);
21 }
22
```

SIMULATION:
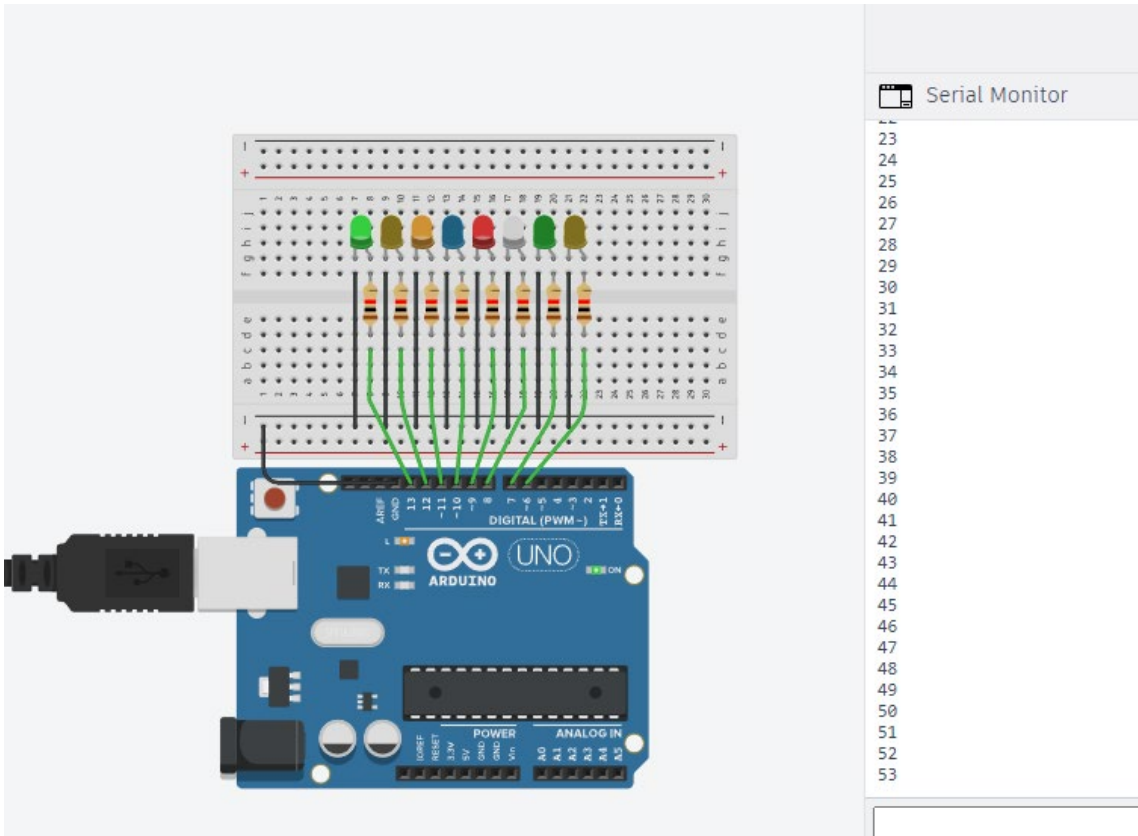
IV. Conclusion

In this laboratory exercise, I created a circuit with 8 LEDs connected to pins 13-6 on the Arduino board. Through the use of binary representation, the circuit was able to visually display decimal numbers ranging from 0 to 255.

In the main program loop, I continuously incremented a count variable and updated the LEDs to reflect the binary representation of count. I used bitwise operations to perform the necessary calculations, such as shifting the binary representation of count to the right to turn on the corresponding LED.

Additionally, I printed the decimal value of count to the serial monitor, both to track the progression and accuracy of the count and to cross-check if the binary values represented by the LED outputs were the same as the decimal values.

This lab exercise allowed me to demonstrate my understanding of key concepts in Arduino programming, such as variables, loops, conditional statements, and bitwise operations. I also learned how to use the Arduino simulation in TinkerCad to prototype and test my circuit before building it on a physical breadboard.

References

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

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