

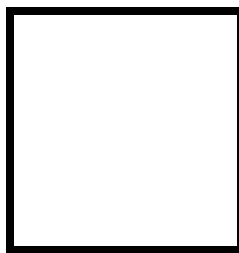


PAMANTASAN NG LUNGSOD NG MAYNILA
(University of the City of Manila)
Intramuros, Manila

Microprocessor Lab

Laboratory Activity No. 3

Binary Representation of 8 LEDs in TinkerCad and Arduino Programming



Score

Submitted by:

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Saturday 1PM-4PM / CPE 0412.1-2

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:

- To create Arduino circuit of Binary representation (decimal 0-255 using 8 LEDs).
- To understand binary representation.
- To create and simulate design in TinkerCad and Arduino IDE.

II. Methodology

1. Create the design in TinkerCad using Arduino Uno, breadboard, 8 LEDs, 8 resistors, jumper wires.
2. Write a code that will perform a binary representation using 8 LEDs.
3. Simulate in TinkerCad.
4. Build the actual Arduino circuit of Binary representation (decimal 0-255 using 8 LEDs) using the hardwares.
5. Paste the code in Arduino IDE.
6. Connect the Arduino Board to the laptop and run the program.

III. Results

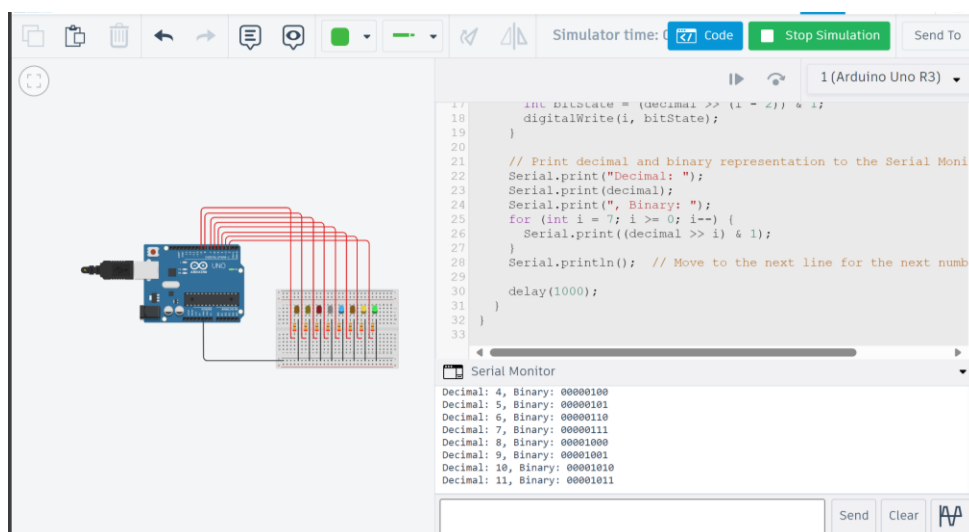


Figure No.1 Simulation in TinkerCad of Binary Representation Display Circuit Diagram

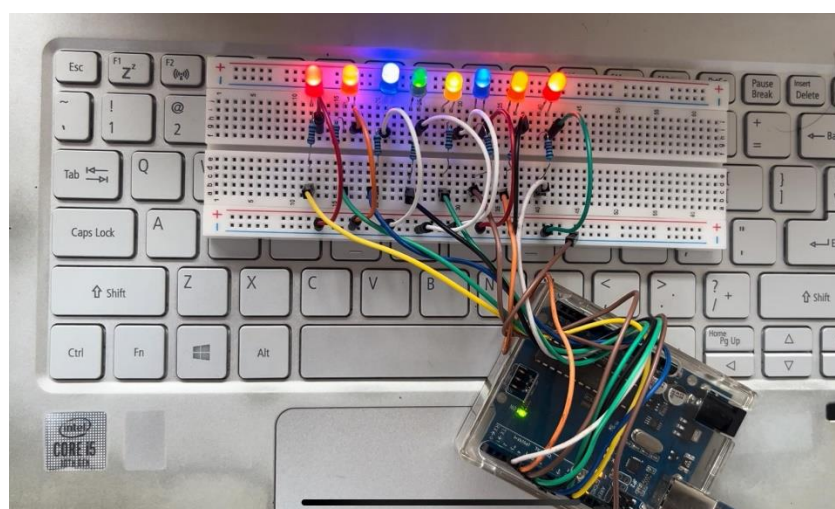


Figure No. 2 Actual Implementation with Results of Binary Representation Display Circuit Diagram

Links:

<https://www.tinkercad.com/things/5YOB7oIrbPI-smashing-gaaris-bombul/editel?sharecode=DRiGT7GLFjFTqy7PZM7Pd7Pk6MA3djkiA1dIbLaz3UA>

[LAB VID - Google Drive](#)

CODE:

```
// Aban, Baldonado, Muro, Rodriguez, Tecson, Tuazon
// CPE 0412-2

void setup() {
  Serial.begin(9600); // Initialize serial communication at 9600 bits per second
  // Set pins 2 to 9 as OUTPUT
  for (int i = 2; i <= 9; i++) {
    pinMode(i, OUTPUT);
  }
}

void loop() {
  // Loop from 0 to 255
  for (int decimal = 0; decimal <= 255; decimal++) {
    // Convert decimal to binary and light up corresponding LEDs
    for (int i = 2; i <= 9; i++) {
      int bitState = (decimal >> (i - 2)) & 1;
      digitalWrite(i, bitState);
    }
    // Print decimal and binary representation to the Serial Monitor
    Serial.print("Decimal: ");
    Serial.print(decimal);
    Serial.print(", Binary: ");
    for (int i = 7; i >= 0; i--) {
      Serial.print((decimal >> i) & 1);
    }
    Serial.println(); // Move to the next line for the next number

    delay(1000);
  }
}
```

IV. Conclusion

The conclusion expresses the summary of the whole laboratory report as perceived by the authors of the report.

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Binary is a numerical system rooted in base-2, employing 0 and 1 to denote values, often referred to as true and false states. Similar to constructing decimal numbers, binary numbers are formed using these fundamental states. In this laboratory activity no. 3, we were able to create, simulate, and implement a binary representation of 8 LEDs. Creating a binary representation of 8 LEDs in TinkerCad and Arduino IDE is a valuable educational exercise. It enhances knowledge of fundamental digital concepts and provides a practical application of theoretical knowledge. This project lays the foundation for more complex projects involving digital circuits and microcontroller programming, making it an excellent starting point for beginners in the field of electronics and programming.

V. References

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

[2] "Binary Representations in Digital Logic," *GeeksforGeeks*, Sep. 14, 2018.
<https://www.geeksforgeeks.org/binary-representations-in-digital-logic/>

[3] "Binary Number System (Table, Conversion, Operations & Examples)," *BYJUS*.
<https://byjus.com/maths/binary-number-system/>

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