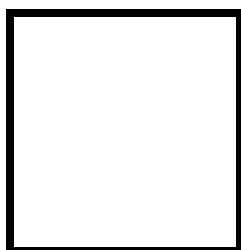




PAMANTASAN NG LUNGSOD NG MAYNILA
(University of the City of Manila)
Intramuros, Manila

Microprocessor Lab

Laboratory Activity No. 3
Binary Representation of 8 LEDs



Score

Submitted by:
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S 10:00am-1:00pm / CPE 0412.1-1

Date Submitted
11-11-2023

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 an Arduino circuit in Tinkercad to represent decimal numbers from 0 to 255 using 8 LEDs.

II. Method/s

- Write an Arduino program to control the LEDs and display binary representations.
- Implement a function to convert decimal numbers to binary and light up the LEDs accordingly.
- Observe the LEDs to ensure they correctly represent binary numbers from 0 to 255.

III. Results

TinkerCad

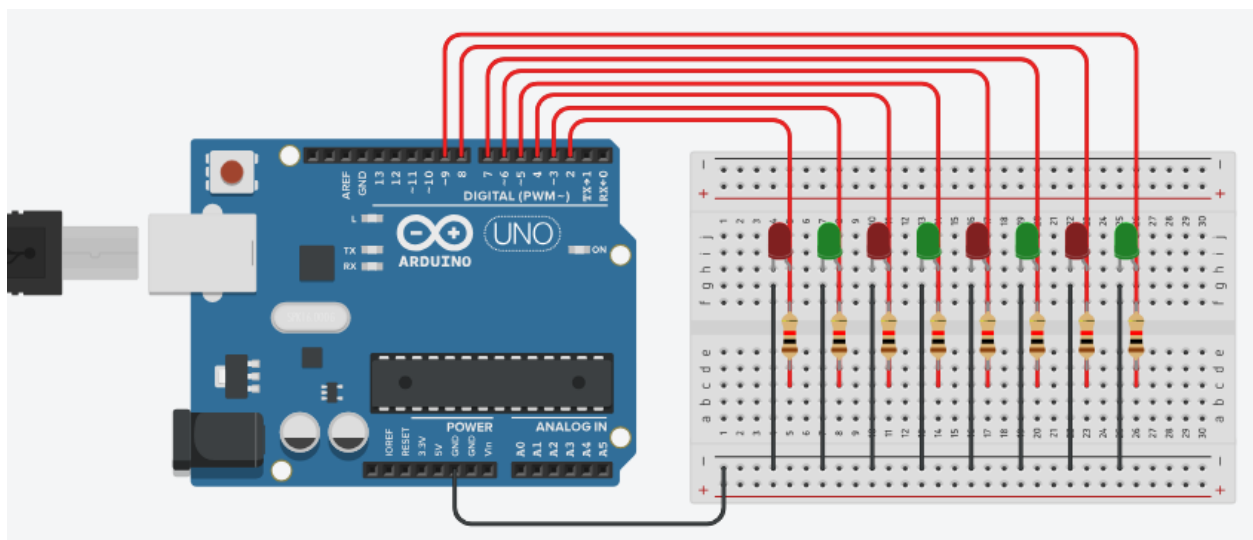


Figure No.1 Binary Representation of 8 LEDs Circuit Diagram

Components Used

1. Arduino microcontroller
2. Breadboard
3. 8 Resistors
4. 8 LEDs
5. Jump wires

Source Code:

```
// Binary representation of decimal 0-256 using 8 LEDs
```

```
int ledPins[] = {2,3,4,5,6,7,8,9};
```

```
void setup(){
```

```
    Serial.begin(9600);
```

```
    for (int i = 0; i < 8; i++) {
```

```
    pinMode(ledPins[i],OUTPUT);  
  }  
}
```

```
void loop(){  
  for (int i = 0; i < 256; i++){  
    displayBinary(i);  
    delay(500);  
    Serial.print("Decimal: ");  
    Serial.print(i);  
    Serial.print("Binary: ");  
    printBinary(i);  
    Serial.println();  
  }  
}
```

```
void displayBinary(int value){  
  for (int i = 0; i < 8; i++){  
    int bit = (value >> i) & 1;  
    digitalWrite(ledPins[i],bit);  
  }  
}
```

```
void printBinary(int value){  
  for (int i = 7; i >= 0; i--){  
    int bit = (value >> i) & 1;  
    Serial.print(bit);  
  }  
}
```

Actual Implementation:

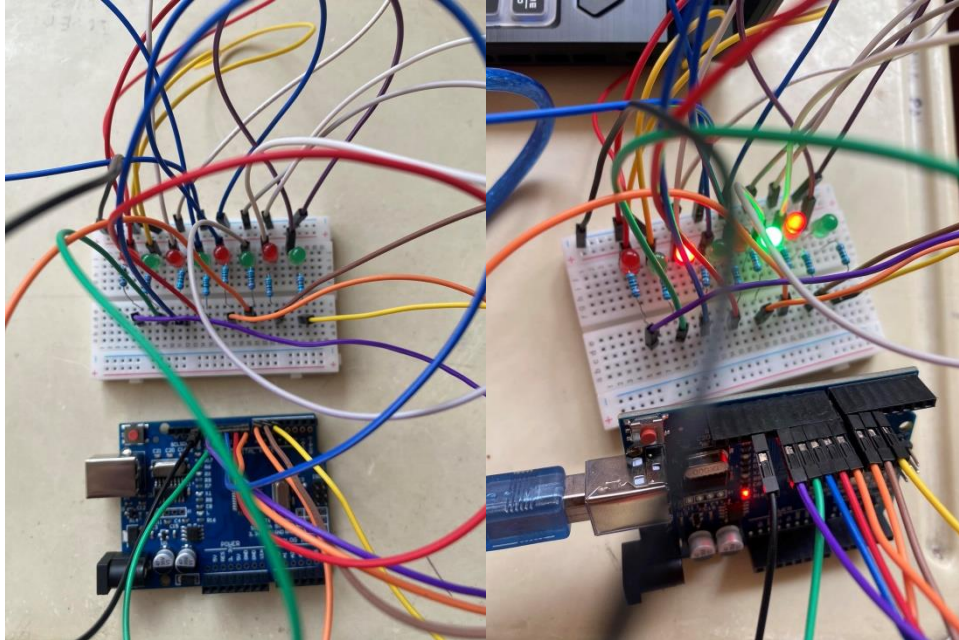


Figure No.2 Actual Binary Representation of 8 LEDs

IV. Conclusion

In conclusion, the laboratory activity of creating a binary representation of decimal numbers from 0 to 255 using 8 LEDs in Tinkercad and Arduino was an exciting and engaging experience. Through this laboratory activity, I gained a profound knowledge of digital electronics and programming by implementing the principles of binary representation and bitwise operations. We successfully designed a circuit that effectively visualized the entire range of decimal values using LEDs, offering a tangible and interactive representation of binary numbers. The main result I observed was that the output LEDs accurately displayed binary representations of decimal numbers as we cycled through the full range from 0 to 255. Also, it enabled us to seamlessly control the LEDs and observe the conversion of decimal numbers into binary form. The laboratory activity not only sharpened our technical skills but also encouraged creativity and problem-solving as we worked to display these binary patterns. Overall, it was a practical learning experience that combined theoretical knowledge with practical application and provided a solid foundation for further exploration of electronics and microcontroller-based projects.

References

- [1] Guywithtech, V. a. P. B. (2017, April 8). Let's create 8 bit LED binary counter. GuyWithTech. <https://guywithtech.wordpress.com/2017/03/28/lets-create-8-bit-led-binary-counter/>
- [2] MechaMan (2014). Arduino 8 bit Binary LED Counter. Fritzing. <https://fritzing.org/projects/arduino-8-bit-binary-led-counter>