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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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 0-256 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 ring counter that display eight (8)LEDs starting from left.

III. Results

TinkerCad

Exercise 1: Write a code that create Arduino circuit of Binary representation (decimal 0-256 using 8 LEDs)

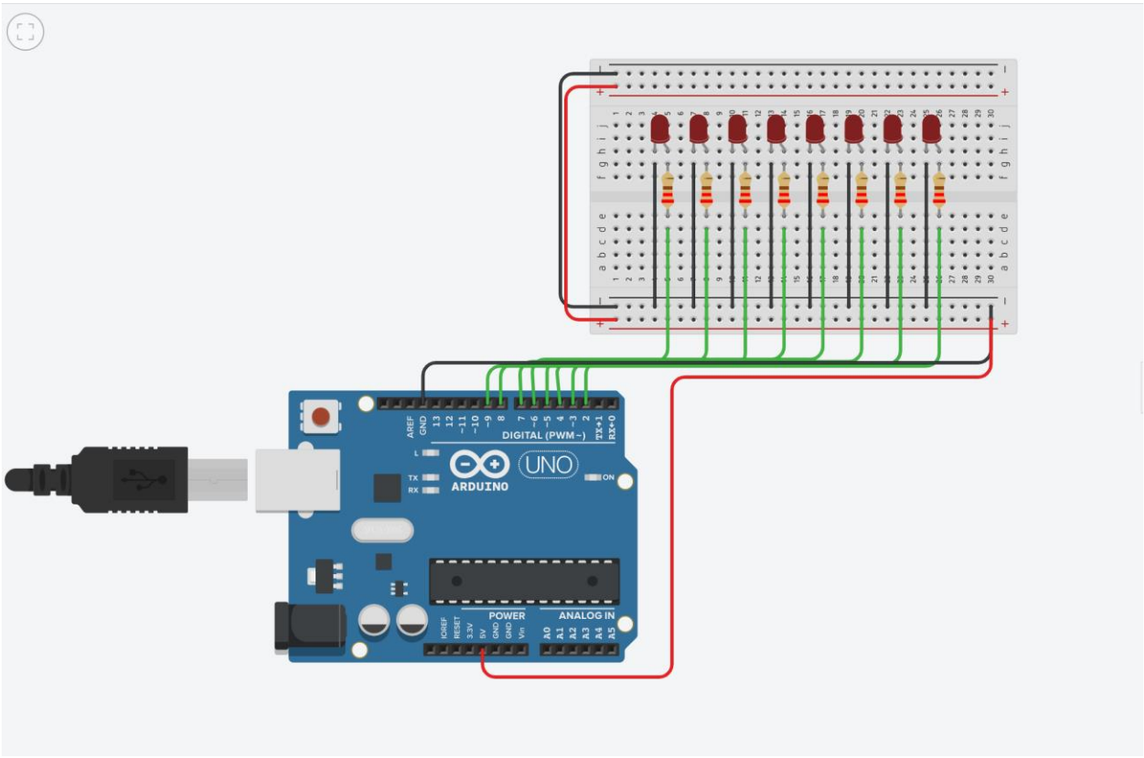

Figure No.1 Binary representation (decimal 0-256 using 8 LEDs)

Components Used

1. 8 LEDs
2. Resistor (220 ohms)
3. Breadboard
4. Jump wires

CODE:

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

void setup() {
  Serial.begin(9600);
  for (int i = 0; i < numLeds; i++) {
    pinMode(ledPins[i], OUTPUT);
  }
}

void loop() {
  for (int decimal = 0; decimal <= 256; decimal++) {
    displayBinary(decimal);
    delay(500); // Delay for half a second (adjust as needed)
  }
}

void displayBinary(int decimal) {
  for (int i = 0; i < numLeds; i++) {
    int bitValue = (decimal >> i) & 1; // Extract the i-th bit
    digitalWrite(ledPins[i], bitValue);
  }

  // Print the binary representation to the Serial Monitor
  Serial.print("Decimal: ");
  Serial.print(decimal);
  Serial.print(" Binary: ");
  for (int i = numLeds - 1; i >= 0; i--) {
    Serial.print((decimal >> i) & 1);
  }
  Serial.println();
}
```

IV. Conclusion

The provided Arduino code serves the purpose of displaying the binary representation of decimal numbers ranging from 0 to 256. This display is achieved through a set of LEDs connected to Arduino pins 2 to 9.

The first two lines of the program declare two constants: ledPins[] and numLeds. ledPins[] is an array of integers that stores the pin numbers of the LEDs. numLeds is the number of LEDs in the row. Next, The setup() function is called once when the Arduino is powered on or reset. In this function, we initialize the Serial port and set the LED pins to output mode. Then, the loop() function is called repeatedly after the setup() function has finished running. In this function, we iterate over all the decimal numbers from 0 to 256. For each decimal number, we call the displayBinary() function to display the binary representation of the number on the LEDs. Lastly, the displayBinary() function takes a decimal number as input and displays the binary representation of the number on the LEDs. To do this, the function first extracts each bit of the decimal number, starting from the most significant bit. Then, the function sets the corresponding LED to high or low depending on the value of the bit.

In summary, this Arduino code serves as a practical demonstration of how to create a binary display using LEDs. It skillfully harnesses bitwise operations to dissect decimal values into their constituent binary bits, subsequently visualizing them on individual LEDs. The displayBinary() function plays a pivotal role in this process, rendering the code easily comprehensible and adaptable for diverse applications. Additionally, the code showcases the utilization of loops, constants, and serial communication, offering a glimpse into how these elements can be employed for monitoring and debugging purposes.

References

Please refer to this link:

Circuit design Lab-Activity-No.3 | Tinkercad