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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7 AM – 10AM/ Saturday

Date Submitted
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Submitted to:

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I. Objectives

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

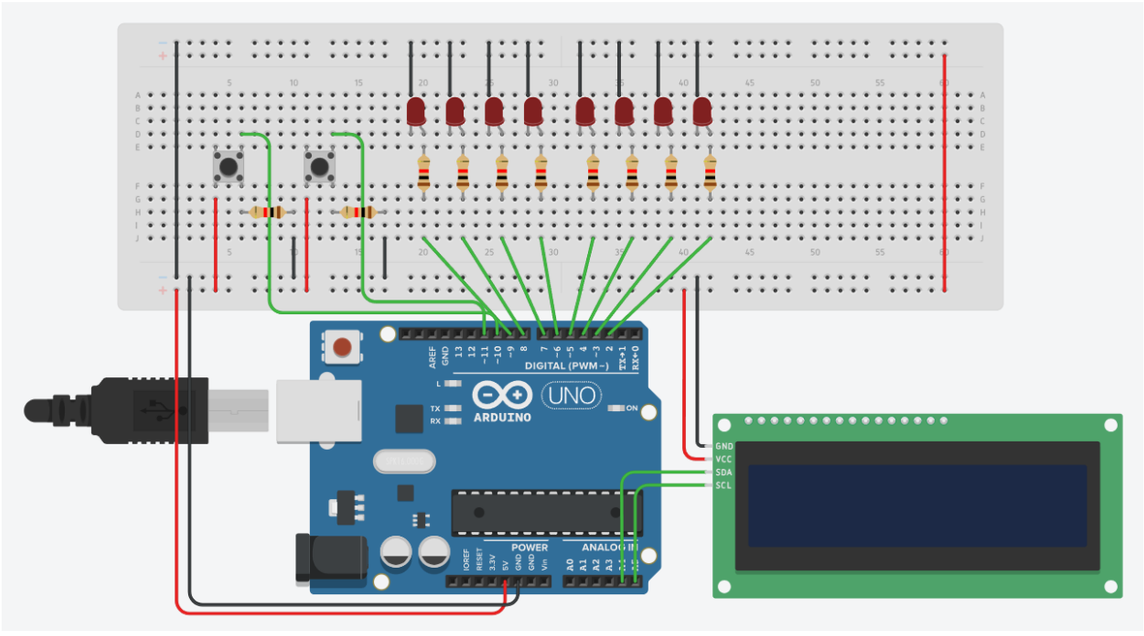
II. Components Used

1. 8 LEDs
2. 8 220 Ohms Resistor
3. Breadboard
4. Arduino Uno
5. Push Buttons
6. I2C LCD 16x2

III. Design and Code

LINK: https://www.tinkercad.com/things/cjYRq0CduLA-amazing-stantia-leelo/editel?sharecode=evlJxvVEC3cl0qfuqZdq9_2b51iFFn3aRVIvTUutcSI

Circuit Design:

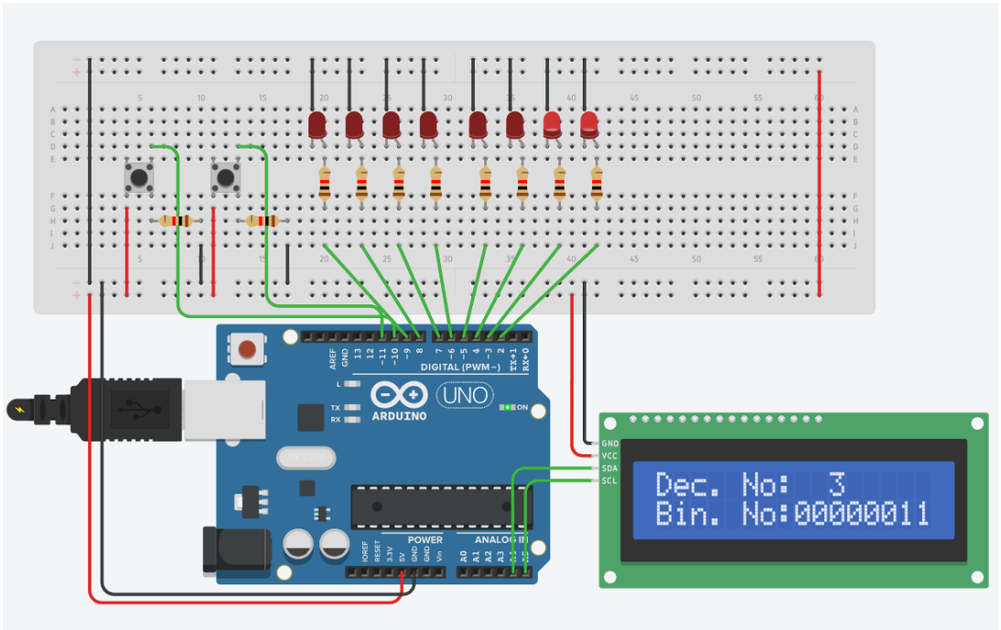


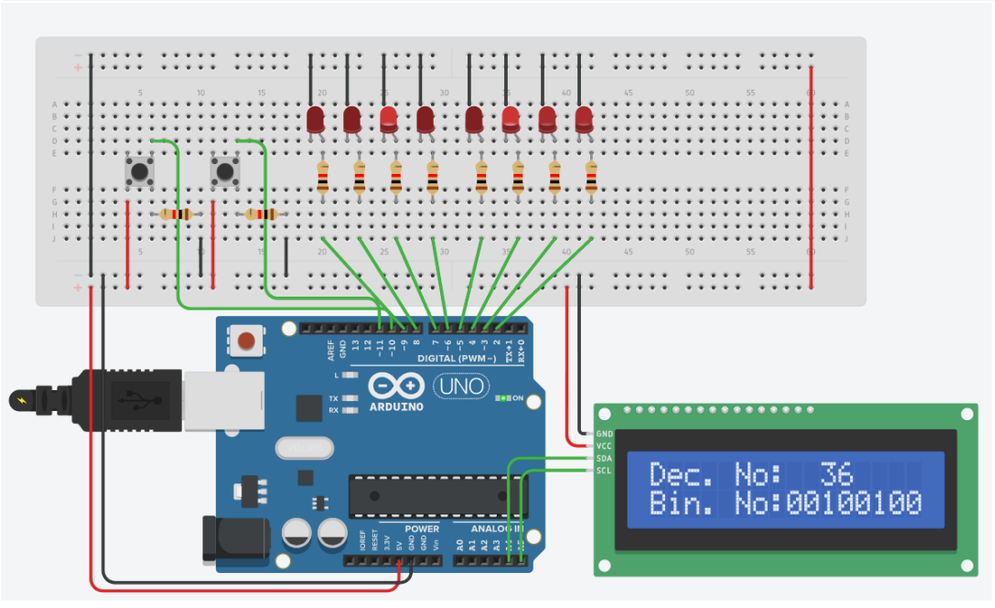
Code Used:

```
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd_1(32, 16, 2);

int ledPins[] = {2, 3, 4, 5, 6, 7, 8, 9};
int arr[] = {0,0,0,0,0,0,0,0};
int ind = 7;
int but = 10;
int but1 = 11;

void setup() {
  Serial.begin(9600);
  pinMode(but, INPUT);
  pinMode(but1, INPUT);
  for (int i = 0; i < 8; i++) {
    pinMode(ledPins[i], OUTPUT);
  }
  lcd_1.init();
  lcd_1.setCursor(0, 0);
  lcd_1.backlight();
  lcd_1.display();
}

void loop() {
  int butState = digitalRead(but);
  Serial.println(butState);
  if(butState == 1){
    lcd_1.setCursor(0, 0);
    lcd_1.print("Dec. No:  ");
    for (int decimalNumber = 0; decimalNumber <= 256; decimalNumber++) {
      displayBinary(decimalNumber);
      delay(500);
      int butState1 = digitalRead(but1);
      if (butState1 == 1){
        lcd_1.clear();
        break;
      }
    }
  }
  delay(500);
}
```

```
void displayBinary(int decimalNumber) {
  int ind = 7;
  lcd_1.setCursor(0, 0);
  lcd_1.print("Dec. No:  ");
  lcd_1.print(decimalNumber);
  lcd_1.setCursor(0, 1);
  lcd_1.print("Bin. No:");
  for (int i = 0; i < 8; i++) {
    int bitValue = (decimalNumber >> i) & 1;
    arr[ind] = bitValue;
    lcd_1.print(arr[i]);
    digitalWrite(ledPins[i], bitValue);
    ind--;
  }
}
```

IV. Results





V. Conclusion

Developing this system proposed a lot of challenges for me as I didn't think of the function of the button only works by identifying its current state, and I2C LCD as it requires a library which gives me access to a different set of codes. Developing the process of the binary was hard too as I had to come up with a way where I can get the value of the current decimal number and light the led that corresponds to the value of the binary value.

Overall, it gave me a different way of thinking which I can use in the future in developing circuits like this. I learned a lot especially about the functionality of the component that I just used which is the LCD Screen, which made me think of the other applications where I can use that component. What I have learned in developing this activity will surely be implemented in the future activities.

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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