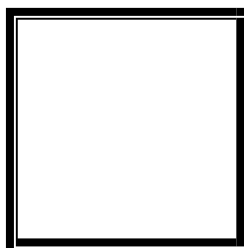# PAMANTASAN NG LUNGSOD NG MAYNILA
(University of the City of Manila)
Intramuros, Manila

Microprocessors (Laboratory)

Laboratory Activity No. 4
Arduino Operation

Score

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

Submitted to:

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Date Submitted:

11/11/2023

I.   Objectives

This laboratory activity aims to implement the principles and techniques of hardware programming using Arduino through:
-     Familiarizing with the Arduino IDE.
-     Demonstrate Analog and Digital Input techniques.
-     Write a code that does a ring counter if all switches are ON but all lights are ON if all switches are OFF.

II.   Methods

-     Visualize and label the Arduino IDE interface.
-     Perform the tasks and problems presented in the presentation.
-     Present a unique implementation representative of the objectives.

III.   Results

To create an Arduino circuit that does a ring counter if the switch is ON and all lights are on when the switch is OFF and Arduino Uno R3 is used. The parts list of the activity is below

Name	Quantity	Component
U1	1	Arduino Uno R3
D1 D2 D3 D4 D5 D6 D7 D8	8	Red LED
R1 R2 R3 R4 R5 R6 R7 R8	8	1 kΩ Resistor
BAT2	1	9V Battery
S1	1	Slideswitch

Table 1. List of Components

Eight LEDs with resistors are used as indicators for the ring counter. A 9V battery is connected to the LEDs as a power supply, however the 5V pin of the Arduino can also be used for the voltage supply of the circuit. Each LED is connected to a digital pin of the Arduino and for this activity pins 6-13 were used as output pins. For the input pin of the switch, pin number 2 is used and connected to the common pin of the slide switch, while the other pins of the switch is connected to VCC and Ground.
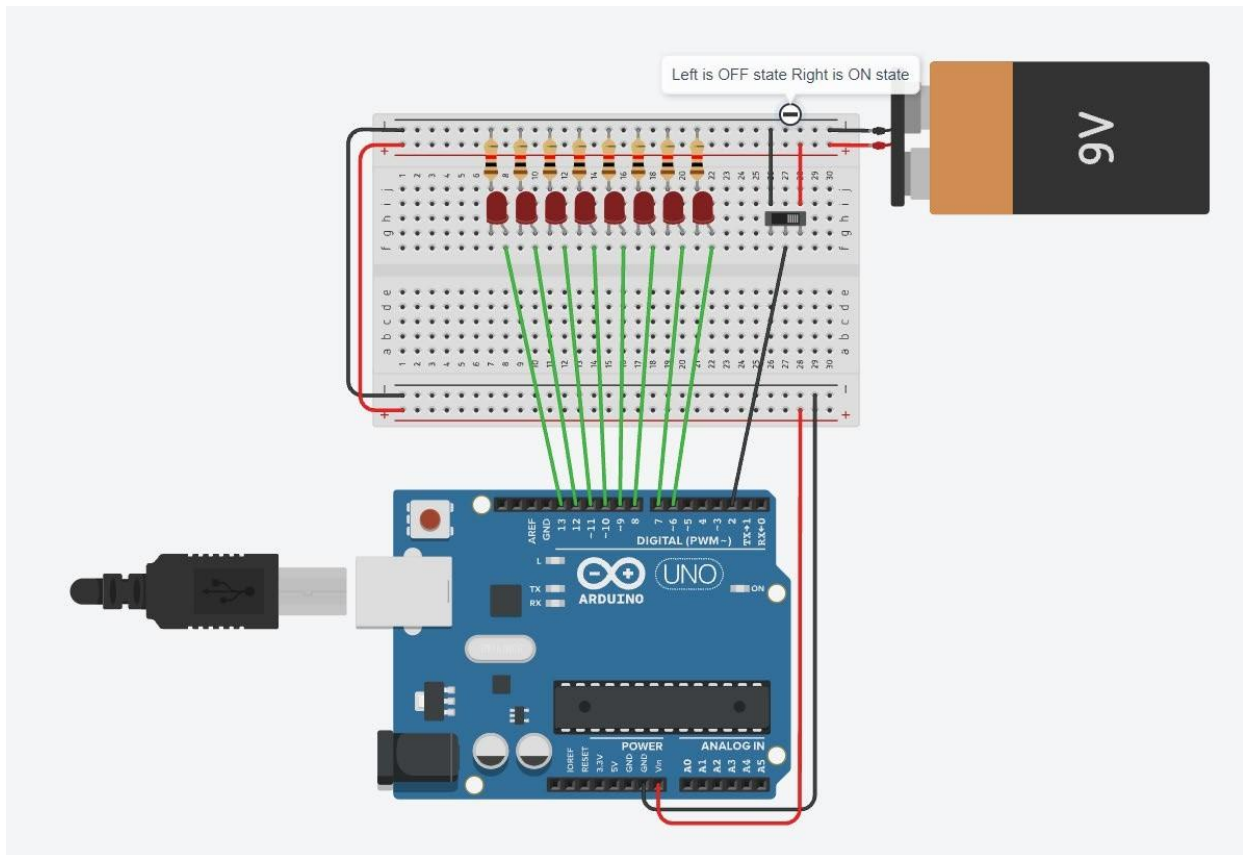
Figure 1. Circuit Diagram

For the code of the Arduino, the output pins and input pins are declared as they are. The loop for the code contains a nested if else statement that initially checks that state of the switch if it is HIGH or LOW. This will determine the functionality of the LEDs, when the switch is ON the circuit will do a ring counter and when the switch is OFF, the LEDs will stay on.

The code is illustrated below.

```cpp
1   // C++ code
2   //
3   int pin_Number = 13;
4   void setup()
5   {
6     pinMode(13, OUTPUT);
7     pinMode(12, OUTPUT);
8     pinMode(11, OUTPUT);
9     pinMode(10, OUTPUT);
10    pinMode(9, OUTPUT);
11    pinMode(8, OUTPUT);
12    pinMode(7, OUTPUT);
13    pinMode(6, OUTPUT);
14    pinMode(2, INPUT);
15  }
16
17  void loop()
18  {
19    int state = digitalRead(2);
20    if(state==LOW){
21      digitalWrite(13,HIGH);
22      digitalWrite(12,HIGH);
23      digitalWrite(11,HIGH);
24      digitalWrite(10,HIGH);
25      digitalWrite(9,HIGH);
26      digitalWrite(8,HIGH);
27      digitalWrite(7,HIGH);
28      digitalWrite(6,HIGH);
29    }
30    else if(state==HIGH){
31
32      if(pin_Number>=6){
33          digitalWrite(pin_Number,HIGH);
34          delay(500);
35          digitalWrite(pin_Number,LOW);
36          pin_Number--;
37      }
38
39      else{
40          pin_Number = 13;
41      }
42    }
43
44  }
```

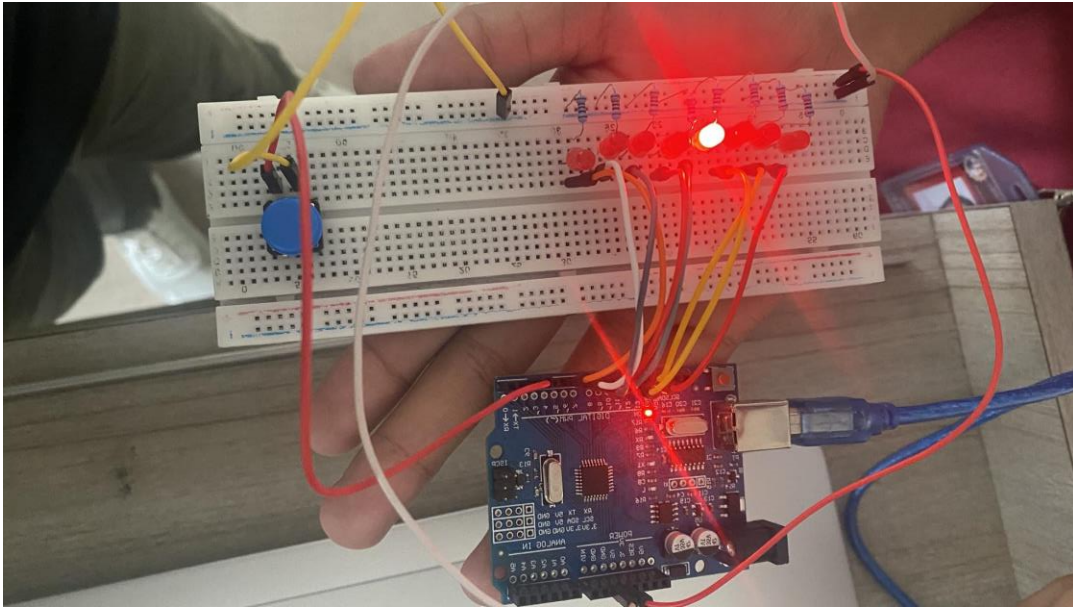*Figure 2. Code Listing*

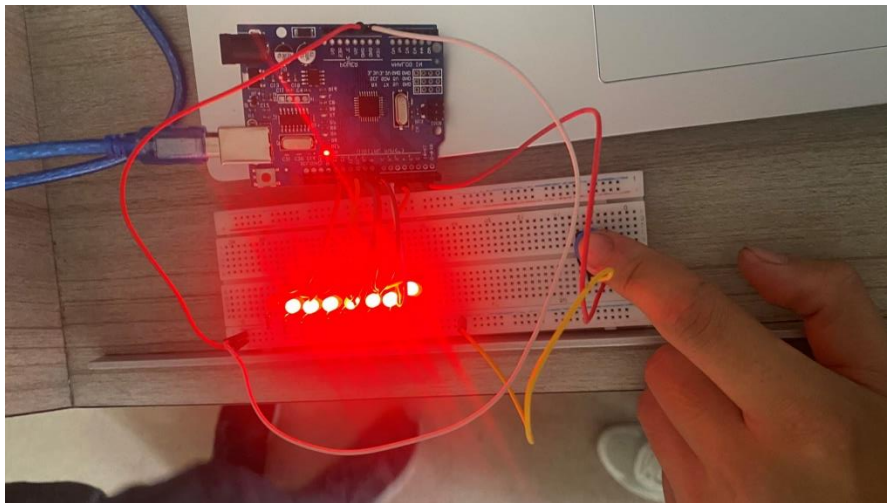Actual Implementation:

Figure 3. OFF State

Figure 4. ON State

IV. Conclusion

In conclusion, the Arduino circuit functions as a ring counter when the switch is ON, and all lights are illuminated when the switch is OFF. This behavior suggests a unique and potentially intentional design for demonstration or educational purposes. The report may investigate the circuit's components, programming logic, and the observed outcomes in both switch states. These considerations could also be explored for such a circuit's educational or practical applications. For instance, the circuit might be a hands-on example for learning about digital logic programming or a foundation for more complex projects. The report could conclude by summarizing the key insights gained and potential areas for further improvement or exploration.

References

[1] M. A. B. "Build a Simple Binary Counter Using Your Arduino, "Instructables. https://www.instructables.com/Build-a-Simple-Binary-Counter-using-your-Arduino/ (accessed Nov. 11, 2023).