**Microprocessor Lab**

Laboratory Activity No. 3

**8-Bit – LED Binary Counter Circuit**

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Score

*Submitted by:*

**Lapid, Henderson Eiann C.**

**<Saturday – 1:00 pm – 4:00 pm> / <Section | Block 2>**

*Date Submitted*

**10-14-2023**

*Submitted to:*

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I. Objectives

This laboratory activity aims to implement the principles and techniques of hardware programming using Arduino through:

- Creating an Arduino programming and circuit diagram.

II. Method/s

- Research about binary counters and their logic.

- In Tinkercad: Design an 8-bit – LED Binary Counter Circuit, and write a code showing a binary counter’s logic.

III. Results

**TinkerCad**

A computer screen shot of a circuit board

Description automatically generated

*Figure No.1 8-Bit – LED Binary Counter Circuit*

A computer screen shot of a computer

Description automatically generated

*Figure No.2 – In Simulation, output for 14 - 00001110*

A white board with a white screen

Description automatically generated

*Figure No.3 – Enlarged Serial Monitor Output*

A computer screen shot of a circuit board

Description automatically generated

*Figure No.4 – Output for 256 - 10000000*

A computer screen shot of a circuit board

Description automatically generated

*Figure No.5 – Counter Reset after 256*

**Components Used**

1. 8 LEDs
2. 8 Resistors
3. Breadboard

**CODE:**

A screenshot of a computer program

Description automatically generated

A white background with yellow text

Description automatically generated

Circuit Tinkercad Link: <https://www.tinkercad.com/things/1ftfwz6demL>

IV. Conclusion

First and foremost, circuits known as binary counters produce binary sequences that are related to the quantity of clock signal pulses delivered to the input. Regarding this, it is a common practice to divide a decimal value by 2 and set the remainder aside when converting it to binary. Binary values can be created by continually dividing decimal numbers by two and noting the outcome. As a result, understanding binary to decimal conversion is crucial for computer programming. Humans can readily grasp the decimal number system, which has all ten digits, whereas machines can only understand the binary number system, which only has the values 0 and 1.

On the other hand, by doing this laboratory activity, the team acquired some knowledge on understanding binary that helps to unravel the mystery of computers as I begin to understand the representation of binary digits on and off. Overall, creating our own design and codes on Tinkercad can be quite difficult but with the help of different viable resources, the group managed to finish the given tasks.

**References**

[1] D.J.D. Sayo. “University of the City of Manila Computer Engineering Department Honor

Code,” PLM-CpE Departmental Policies, 2020.

[2] “Arduino Binary (8-bit) LED’s counter.,” www.youtube.com.

https://www.youtube.com/watch?v=HYOsJhSR9S8 (accessed Oct. 14, 2023).

[3] “Connecting an Arduino to a Breadboard to light up LEDs using Tinkercad,” CodeProject,

Jun. 05, 2018. https://www.codeproject.com/Articles/1247033/Connecting-an-Arduino-to-aBreadboard-to-light-up (accessed Oct. 14, 2023).

[4] “Let’s create 8-bit LED binary counter,” GuyWithTech, Mar. 28, 2017.

https://guywithtech.wordpress.com/2017/03/28/lets-create-8-bit-led-binary-counter/ (accessed

Oct. 14, 2023).