Technological Institute of the Philippines

Quezon City Campus

Computer Engineering Department

FINAL PROJECT IN LOGIC CIRCUITS AND DESIGN

“DIGITAL CLOCK WITH ALARM”

In Partial Fulfillment of the

requirements for the course Logic Circuits and Design

2nd semester, S.Y. 2022-2023

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Technological Institute of the Philippines

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Computer Engineering Department

LOGIC CIRCUITS AND DESIGN

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DEGREE : Bachelor of Science in Computer Engineering

TITLE: "Digital Clock with Buzzer for Alarm"

OUTLINE

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I. DESCRIPTION OF YOUR PROJECT

The final project in Logic Circuits and Design is an innovative creation called the "Digital Clock with Alarm." It is a sophisticated electronic device that combines the functionality of a digital clock with the convenience of an alarm system.The Digital Clock with Alarm project is designed to showcase the principles of logic circuits and demonstrate the application of various digital components in a real-world scenario. It aims to provide an accurate time display, alarm setting, and reliable alarm triggering mechanism.

The core of this project lies in its ability to generate and maintain an accurate timekeeping system. It utilizes a combination of logic gates, counters, and display drivers to process and display the current time. The clock features a sleek digital display, showing hours, minutes, and seconds.

In addition to timekeeping, the Digital Clock with Alarm also incorporates an alarm system. Users can set a specific time for the alarm to go off. This functionality involves the implementation of a comparator circuit to compare the current time with the set alarm time. When the two values match, an alarm signal is generated, triggering a loud audible alert.

The project's design is focused on usability and user-friendly features. It includes buttons or switches for setting the time, adjusting the alarm, and enabling or disabling the alarm function. The clock's display is designed to be easily readable, with bright LEDs or LCD panels that provide clear visibility.

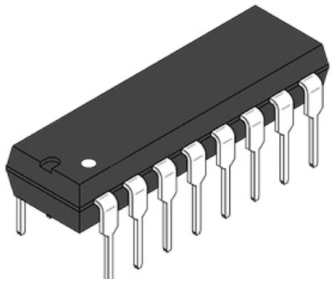
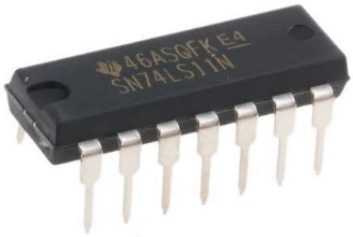
II. SUMMARY OF YOUR EXPERIMENTS

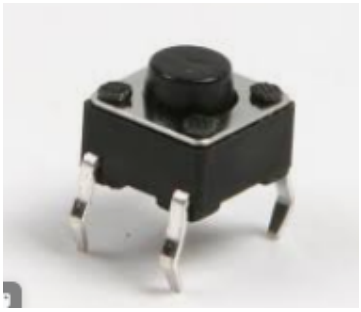
Exp. No	Title	Grade	Comment from the professor	Remarks
1	Experiment No.1: Digital Logic Gates	16.8 / 24		Late
2	Experiment No.2: Universal Logic Gates	16.8 / 24		Late
3	Experiment No.3: Simplification of Boolean Expression	16.8 / 24		Late
4	Experiment No.4: Code Conversion	24 / 24	Did not present the output/ No video recording	
5	Experiment No.5: KMAP Application	16 / 24	Please take note that when the boolean expression is wrong, everything will also be incorrect. Problem 1: Boolean expression is wrong (-5) Problem 2: TinkerCAD is not working (-3) Document: Complete	Late
6	Experiment No.6 : Adder and Subtractor	24 / 24		
7	Experiment No.7: Multiplexer and Demultiplexer	16.8 / 24		Late
8	Experiment No.8: Encoders	16.8 / 24		Late

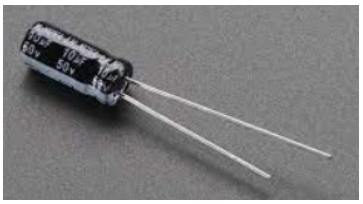
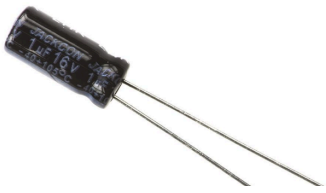
9	Experiment No.9: Letter Pattern in 7-Segment Display	24 / 24		Late
10				
11	Experiment No.11: Application of SR and JK flipflop	24 / 24		
12				
13	Experiment No.13: Counters	24 / 24	**Procedure 1 done**	

III. HARDWARE & SYSTEM REQUIREMENTS

In this section, you need to list down ALL the components that will be use in the creation of your project. Include a picture and definition of each component.

Name	Picture	Description
4026 IC		The 4026 IC is a widely used integrated circuit that functions as a 5-stage Johnson decade counter and decoder. It is commonly employed in various digital applications, including digital clocks, counters, and frequency dividers. The IC has ten output pins that can drive a seven-segment display or LEDs to represent numerical values from 0 to 9.
555 Timer		The 555 Timer is a widely used integrated circuit that operates as a versatile timing device. It consists of comparators, resistors, capacitors, and transistors, all integrated onto a single chip. The 555 Timer can be configured in various modes, including astable, monostable, and bistable modes.
7411 "3-Input And"		The 7411 IC is a 3-input AND gate integrated circuit. It performs logical AND operations on three input signals. The IC consists of three separate AND gates, each with three inputs and a single output. It is commonly used in digital logic circuits to combine multiple input signals and generate an output signal based on their logical conjunction.

Tactile Switch		A tactile switch, also known as a momentary switch or push-button switch, is a type of switch commonly used in electronic circuits. It is designed to provide a momentary contact when pressed or released. The switch consists of a small button or plunger that, when pressed, completes the circuit and allows current to flow. When released, the circuit is opened, interrupting the flow of current.
10k Ohm Resistors		The purpose of a 10k Ohm resistor is to control the amount of current flowing through a circuit, protecting components from damage due to excessive current. It is also frequently used as a pull-up or pull-down resistor in digital circuits to establish a stable voltage level when no other input is present.
100k Ohm Potentiometer		A 100k ohm potentiometer is an adjustable resistor commonly used in electronic circuits. It consists of a resistive track with a movable contact, allowing for variable resistance. The "100k ohm" value indicates the maximum resistance that can be achieved.
1k Ohm Resistor		A 1k Ohm resistor is an electronic component that provides resistance to the flow of electric current in a circuit. It is commonly represented by the color code brown-black-red-gold (1,000 Ohms with a ±5% tolerance).

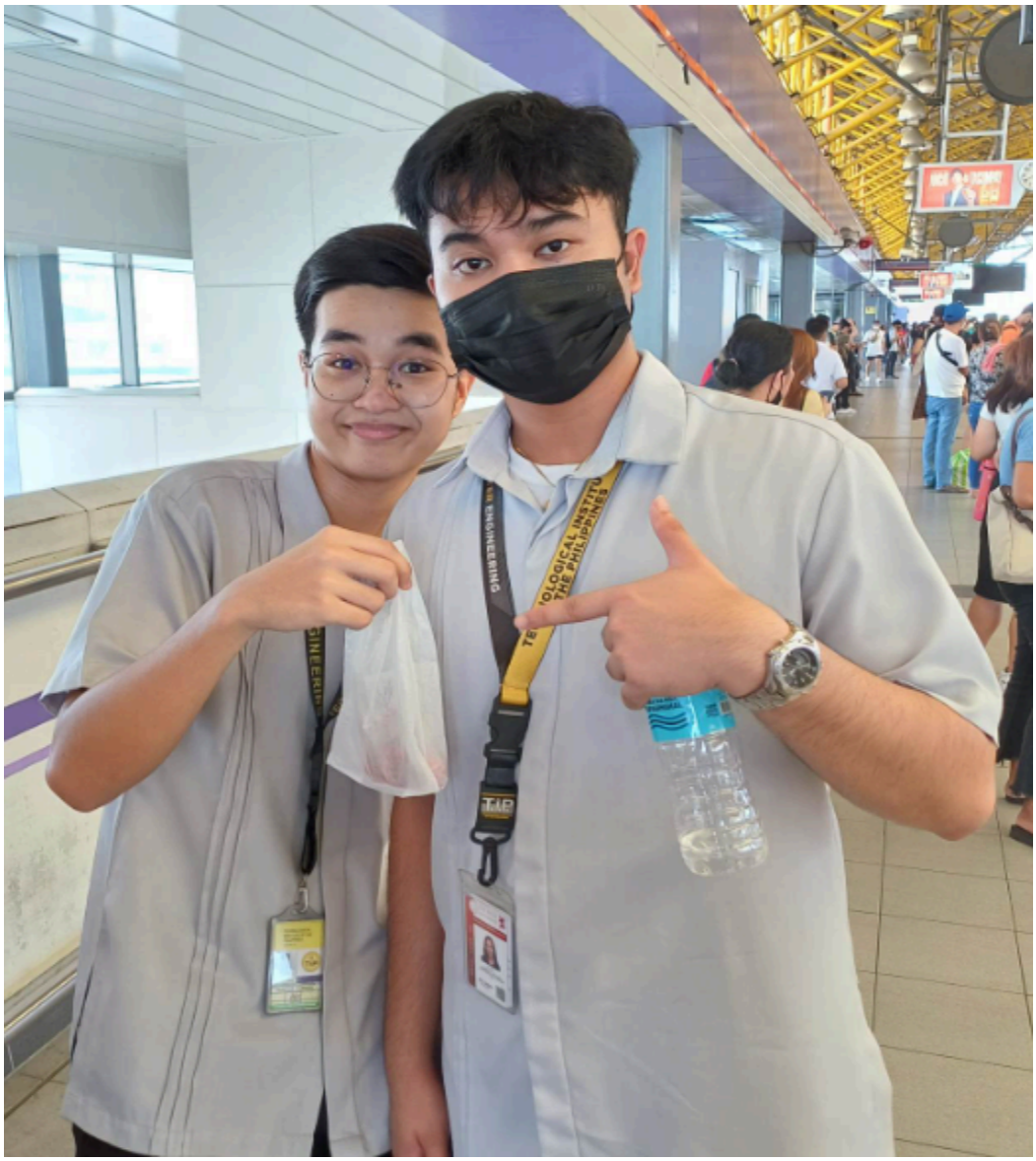
100 nF Capacitor		A 100 nF capacitor, also known as a 0.1 µF (microfarad) capacitor, is an electronic component used to store and release electrical energy in circuits. It belongs to the category of ceramic capacitors, which are widely used due to their small size and stability. The capacitance value of 100 nF indicates its ability to store 100 nanofarads of charge.
10 uF Capacitor		A 10 uF (microfarad) capacitor is an electronic component that stores and releases electrical energy. It is commonly used in various electronic circuits for filtering, decoupling, and timing applications. The capacitance value of 10 uF indicates its ability to store 10 microfarads of electrical charge.
1N4001 Diode		The 1N4001 diode is a commonly used general-purpose rectifier diode. It is a member of the 1N400x series of diodes, which are widely available and widely used in various electronic circuits. The 1N4001 diode is typically used for rectifying alternating current (AC) to direct current (DC) in power supply circuits and other applications where low to moderate voltage and current levels are involved.
1 UF (16 V) Capacitors		A 1 µF (microfarad) capacitor with a voltage rating of 16 V is an electronic component used for storing and releasing electrical energy in circuits. It has a capacitance value of 1 microfarad, which indicates its ability to store a specific amount of charge.

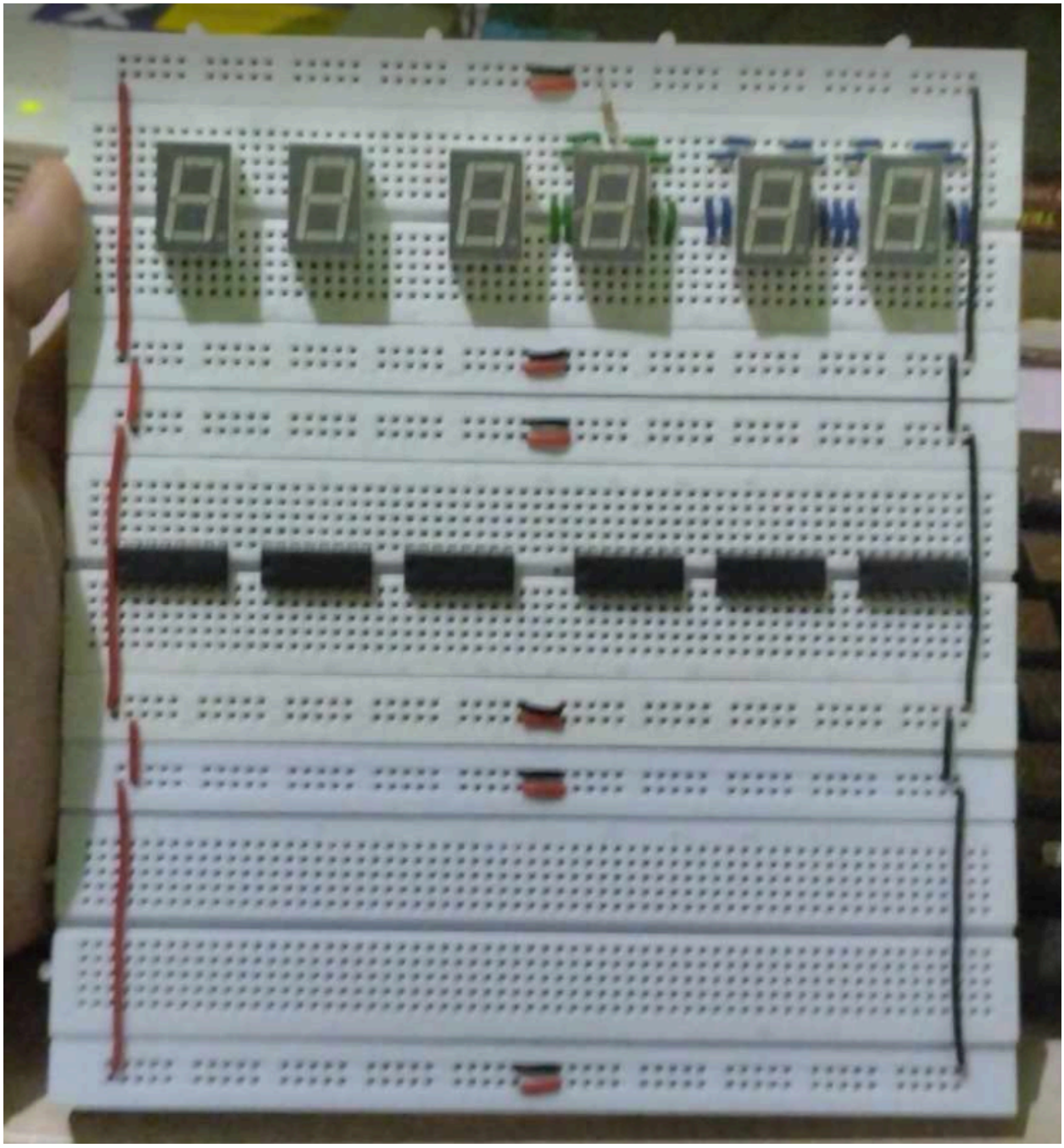
IV.**PROJECT COST**

Component	Quantity	Price
4026 IC	6	174
555 Timer	1	26
7411 "3-Input And"	3	165
Tactile Switch	2	5
470 Ohm Resistors	6	6
10k Ohm Resistors	4	4
100k Ohm Potentiometer	1	16
1k Ohm Resistor	1	1
100 nF Capacitor	1	4
10 uF Capacitor	1	13
1N4001 Diode	5	20
1 UF (16 V) Capacitors	2	4
Solid wires	5	25
Mini Piezo Buzzer	1	10
	Total cost of components	473
	Others	200
	Total	**673**

V.**WORK DOCUMENTATION**

Before





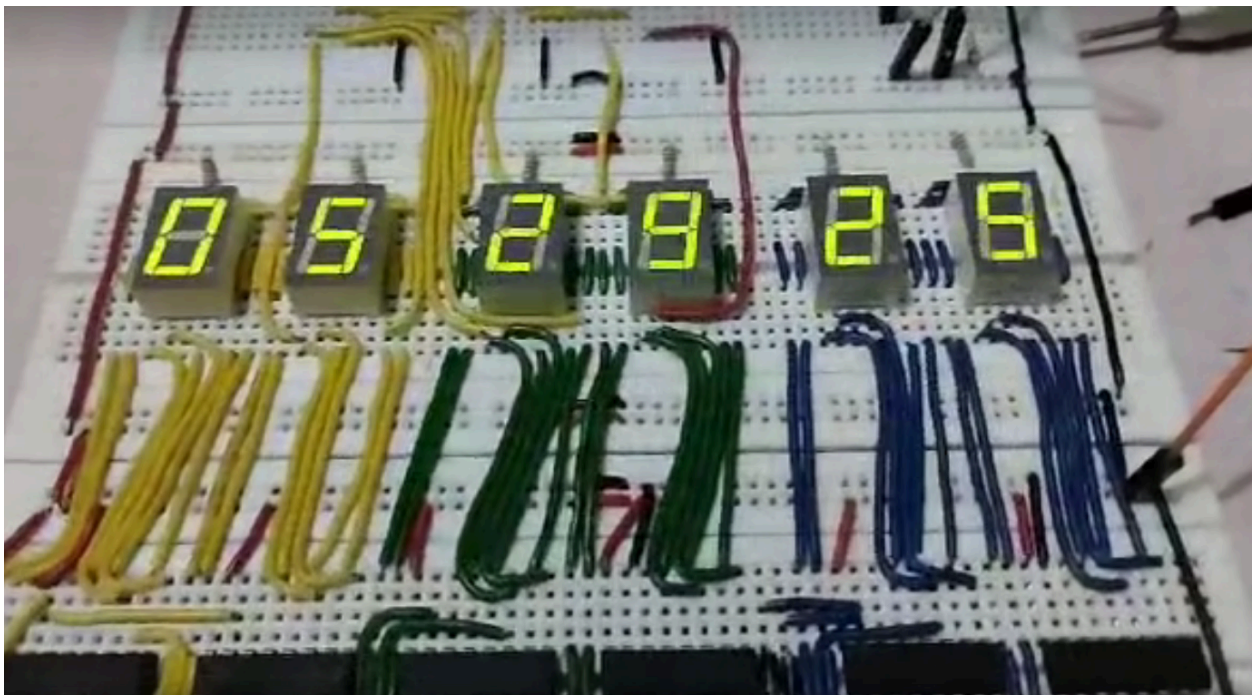
The group bought all the necessary components in order to start building the digital clock with an alarm. The components were put into place in accordance with the schematic diagram. The group mounted 3 breadboards as it was a big project and it included many components. They also planned on how the wirings will be implemented so that it will not overlap with each other and avoid confusion while doing so.

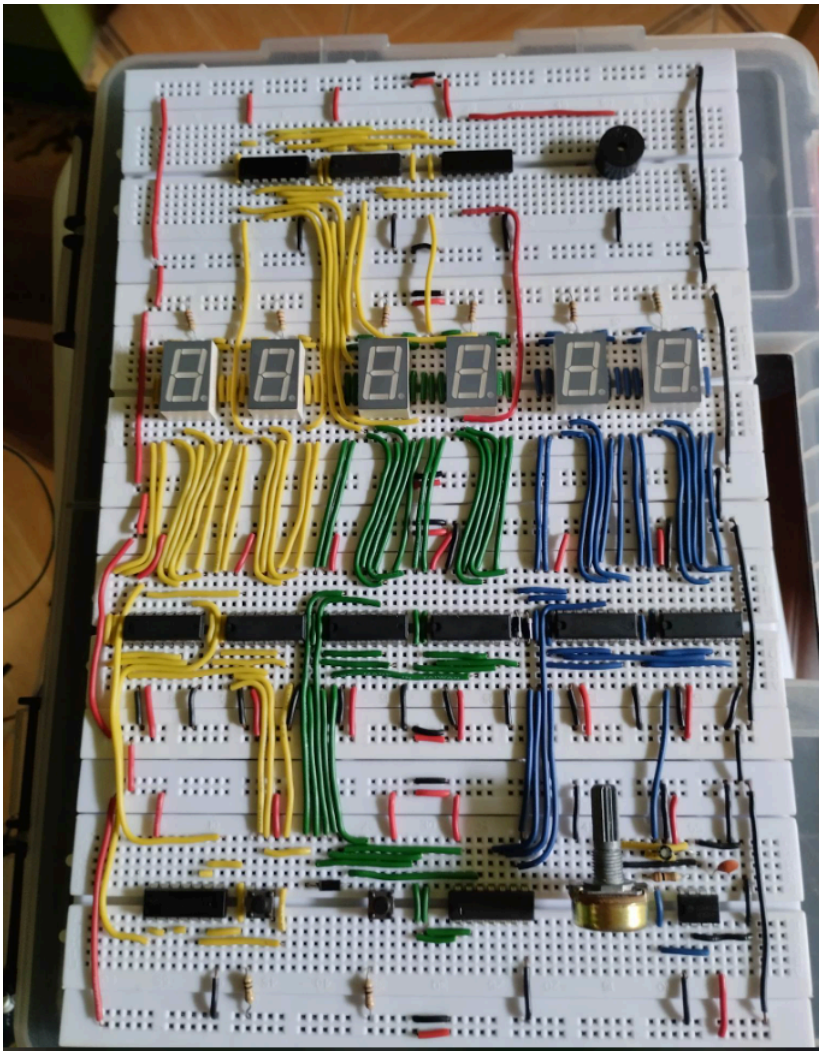
During

The group encountered a lot of difficulties in making the digital clock since the connection between ICs, resistors, 7 segment displays, Potentiometer, capacitors, and diodes must be in accordance with the schematic diagram and they made sure every connection was right. There were several trials and errors that occurred during the building stage of

the digital clock, after learning from mistakes, the group persevered and managed to progress through the project.

After





All of the components present in the breadboard are now working and the digital clock is fully functioning with a buzzer. The group made sure that the implementation of each component was optimized and the space in the breadboard was fully used. The wirings and connections were organized and correct, the project was a success.

VI. **LEARNING EXPERIENCE**

Carino, Rustom C.

The learning experience was filled with moments of frustration and disappointment, but they only served to enhance my knowledge and problem-solving skills.

At the beginning, I faced difficulties understanding the intricate circuitry involved. The complexity of integrating multiple components was overwhelming, and I found myself spending countless hours researching and studying the datasheets. It was frustrating to encounter errors and inconsistencies, often leading to failed attempts and wasted components.

However, with each setback, I persevered and gradually grasped the fundamental concepts. The excitement of seeing the clock come to life on the breadboard fueled my determination. Troubleshooting became an integral part of the learning process, as I had to identify faulty connections, incorrect wiring, and component compatibility issues.

Flores, Joshua Mico A.

I encountered frustrations as I tried to grasp the logic behind the clock's functionality. Understanding the binary nature of digital signals and converting them to decimal values for the 7-segment displays proved to be a daunting task. It took numerous attempts and careful study of the circuit diagram to ensure correct connections and proper signal flow.

The disappointment came when I encountered glitches and malfunctions during testing. Some segments on the displays failed to light up, and the alarm function didn't work as intended. Troubleshooting became a crucial part of the process, requiring me to carefully analyze each connection and component for potential errors. Through perseverance and a systematic approach, I was able to overcome these challenges. I learned the importance of double-checking connections, identifying faulty components. It was a valuable lesson in patience and attention to detail.

Rubin, Kent Raphael I.

It began with excitement as I delved into the world of digital electronics, eager to apply my theoretical knowledge into a practical project. Assembling the circuit on the breadboard was both challenging and rewarding, as I carefully connected each component, striving for precision.

However, along the way, frustrations did arise. There were moments when the clock didn't display the expected digits, leaving me perplexed and disappointed. Debugging the circuit became a time-consuming task, as I meticulously checked every connection and component. It required patience and perseverance to identify and rectify the errors, sometimes even requiring multiple attempts.

VII. SIGNIFICANCE OF THE EXPERIENCE

Carino, Rustom C.

By working on this project, I gain hands-on experience in circuit design and component selection, enhancing my understanding of ICs, resistors, capacitors, and diodes. Additionally, I learn how to interface and program 7-segment displays, enabling me to manipulate and display numerical information effectively. The inclusion of a potentiometer allows me to implement adjustable functionalities such as setting the time and alarm.

Moreover, this project helps me develop skills in debugging, troubleshooting, and logical thinking. As I encounter challenges and obstacles during the implementation process, I learn to analyze the circuit, identify potential issues, and devise effective solutions. This problem-solving mindset is crucial in the field of computer engineering, where identifying and resolving issues efficiently is essential.

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Flores, Joshua Mico A.

Implementing and working with ICs, I gain a deeper understanding of their functionality and how they contribute to digital systems. Resistors help control current flow and protect components, while capacitors store and release electrical energy. Diodes enable the flow of current in one direction, ensuring proper signal transmission.

Utilizing 7-segment displays allows me to master the art of visual representation and data display. Meanwhile, potentiometers help regulate analog signals and fine-tune various aspects of the clock and alarm functions.

Through this project, I develop crucial skills such as circuit design, wiring, troubleshooting, and testing. It also enhances my understanding of timing circuits, signal processing, and digital logic.

Rubin, Kent Raphael I.

This project not only enhances my understanding of fundamental electronic components but also allows me to develop practical skills in circuit design and implementation.

In completing this project, I gained hands-on experience in integrating different components to create a functional system. This includes understanding the principles behind ICs, such as counters and multiplexers, which are crucial in generating the clock signals and controlling the display. Additionally, resistors, capacitors, and diodes play a vital role in signal conditioning, voltage regulation, and protection.

Moreover, designing a digital clock with an alarm helps me strengthen my knowledge of digital logic and sequential circuits. I learn how to synchronize different clock signals, create accurate timekeeping mechanisms, and implement alarm functionalities.

VIII. **REFERENCES**

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