ASIA PACIFIC UNIVERSITY OF TECHNOLOGY & INNOVATION

TECHNOLOGY PARK MALAYSIA

INDIVIDUAL ASSIGNMENT

EE008-3-2-DE

DIGITAL ELECTRONICS

LABORATORY REPORT

TITLE	TP NUMBER SIMULATION
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1.0 Introduction

Digital circuits play a crucial role in electronics, particularly in handling digital signals represented in binary language (0s and 1s). This report investigates a digital circuit designed to perform data transmission and code conversion tasks. The specific objective is to create a digital system capable of demonstrating a student's TP number, specifically using the TP number 071302.

2.0 Objectives

The chosen digital circuit is designed to showcase the TP number 071302. The simulation of this circuit is conducted using the Proteus simulation software. The goal is to provide a detailed understanding of how the circuit processes digital signals to achieve the desired output.

3.0 Circuit Design

3.1 Individual Design

3.1.1 Truth Table

A tabular representation of every conceivable set of truth values for a logical expression is called a truth table. It displays the expression's result for every set of input values. Truth tables are frequently used in computer science, logic, and mathematics to examine and comprehend the behaviour of logical circuits and expressions. My TP number for this assignment is 071302. I choose to use a truth table with three switches (A, B, C).

Digits	A	B	C	a	b	c	d	e	f	g
0	0	0	0	1	1	1	1	1	1	0
1	0	0	1	0	1	1	0	0	0	0
2	0	1	0	1	1	0	1	1	0	1
3	0	1	1	1	1	1	1	0	0	1
4	1	0	0	X	X	X	X	X	X	X
5	1	0	1	X	X	X	X	X	X	X

6	1	1	0	X	X	X	X	X	X	X
7	1	1	1	1	1	1	0	0	0	0

Table 1-Truth Table

3.1.2 K-Maps

A graphical depiction of truth tables used in digital circuit design and Boolean algebra is called a Karnaugh Map, or K-map. It offers a methodical approach to logic circuit optimisation and Boolean expression simplification. When working with complex logical expressions and several variables, the K-map is quite helpful.

A	BC				
		00	01	11	10
	00	1	0	1	1
	01	X	X	1	X

Table 2 -K-map of a

Output: C’ + B

A	BC				
		00	01	11	10
	00	1	1	1	1
	01	X	X	1	X

Table 3 -K-map of b

Output: 1

A	BC				
		00	01	11	10
	00	1	1	1	0
	01	X	X	1	X

Table 4 -K-map of c

Output: B’ + C

A	BC				
		00	01	11	10
	00	1	0	1	1
	01	X	X	0	X

Table 5-K-map of d

Output: C’ + A’B

A	BC				
		00	01	11	10
	00	1	0	0	1
	01	X	X	0	X

Table 6 -K-map of e

Output: C'

A	BC				
		00	01	11	10
	00	1	0	0	0
	01	X	X	0	X

Table 7 - K-map of f

Output: B'C'

A	BC				
		00	01	11	10
	00	0	0	1	1
	01	X	X	0	X

Table 8 - K-map of g

Output: A'B

3.2 Individual Design Simulation Result

3.2.1 Simulation picture

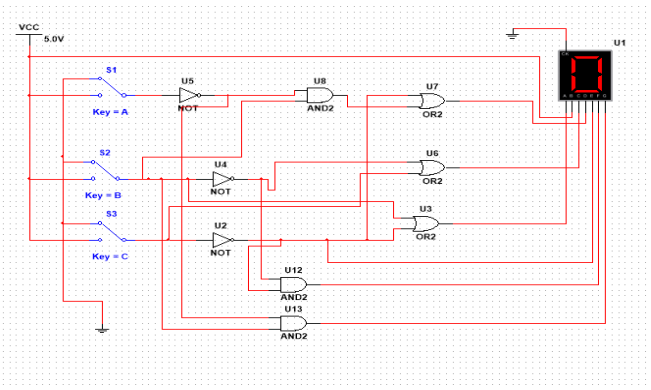

Figure 1- Display of zero

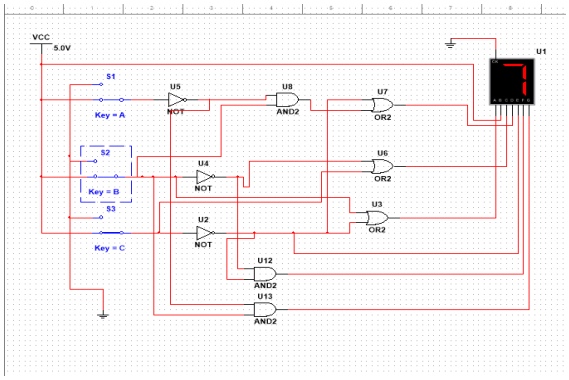

Figure 2 - Display of Seven.

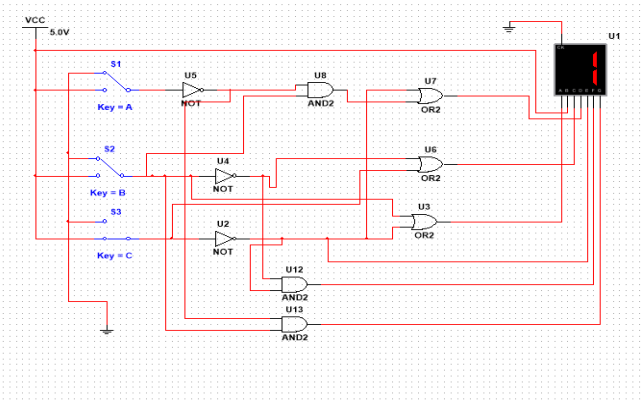

Figure 3 - Display of One.

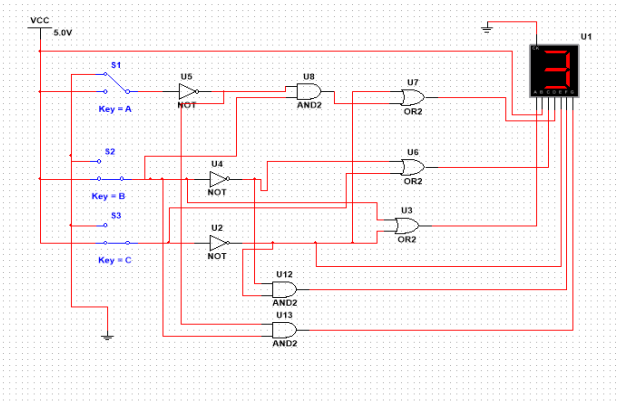

Figure 4 - Display of Three.

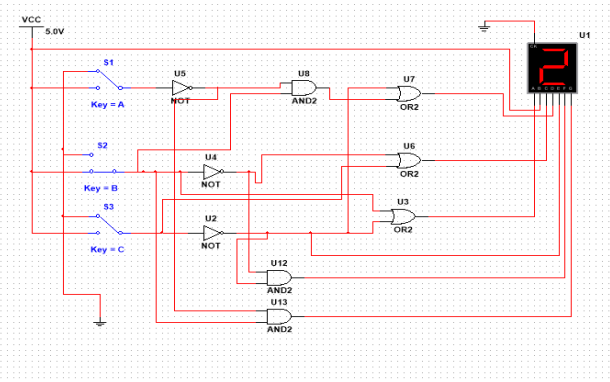

Figure 5 - Display of Two.

3.2.2 Hand Sketch

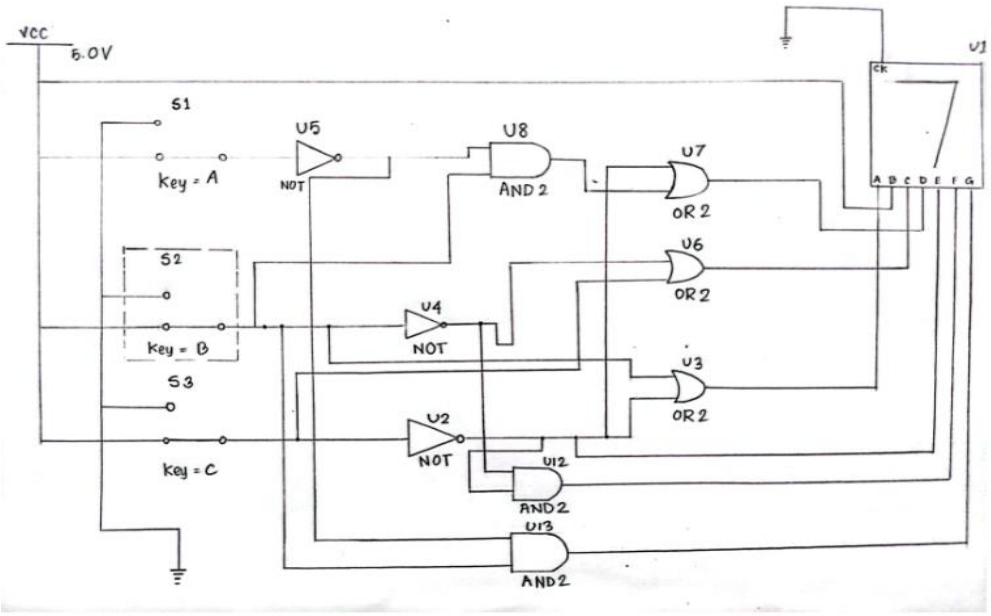

Figure 6 - Hand sketch of the circuit

3.2.3 Discussion

My TP number is 071302. I have made a truth table and also K-map for it above. For my TP number I have 0,1,2,3 and 7. For the simulation I used Multisim for the assignment. In the simulation I used one VCC, three switch, one seven segment display, three NOT-Gate, three OR-Gate, three AND-Gate, and two ground to complete the circuit.

VCC: This voltage represents the positive power supply. It gives the components in digital circuits the power they need to function.

Switches: Three switches, A, B, and C, were used by me. These switches most likely serve as the circuit's inputs. By manipulating the position of these switches, one can regulate the circuit's current flow.

Seven Segment Display: This output display is frequently used to show decimal numbers in digital systems. Since each segment is independently controlled, it is possible to display some letters (A-F) and numbers (0-9) on it.

NOT-Gates: The input signal is reversed by these gates. The output is low if the input is high, and vice versa. I utilised three NOT-gates in the circuit.

OR-Gates: I made three OR-gates use. They most likely combine signals in a way that aids in deciding which seven-segment display segments ought to be illuminated.

AND-Gates: In the circuit, I employed three AND-gates. They probably have an impact on when specific seven-segment display segments are activated depending on the configuration of switch inputs.

Ground: This serves as the circuit's electrical potential reference point. It gives every component a common starting point.

4.0 Conclusion

Finally, the documentation describes how to design a digital circuit with a truth table and K-maps, specifically for the student's TP number 071302 for this assignment. While K-maps make logical expressions simpler, the truth table provides a list of potential input values and the corresponding output states. For every set of TP numbers, the documentation offers K-maps, term groupings, and streamlined Boolean expressions. With the aid of the simulation programme Multisim, the circuit is constructed using parts such as switches, a seven-segment display, and VCC. The documentation offers a thorough grasp of the rational layout and useful application of a digital circuit.

5.0 Reference

TechTarget. (2020, December). What is logic gate (AND, OR, XOR, NOT, NAND, NOR and XNOR)? A definition from WhatIs.com. WhatIs.com. https://www.techtarget.com/whatis/definition/logic-gate-AND-OR-XOR-NOT-NAND-NOR and-XNOR