Computer and control system department

faculty of engineering Mansoura university.

logic project 2024.

project name: converting 4 bit binary to excess 3.

❖ ***Supervisors:***

Dr : Ahmed Saleh

Eng : Aya Adel

Author: Mariam Hosny Mahmoud Ezzat

❖ *Team names:*

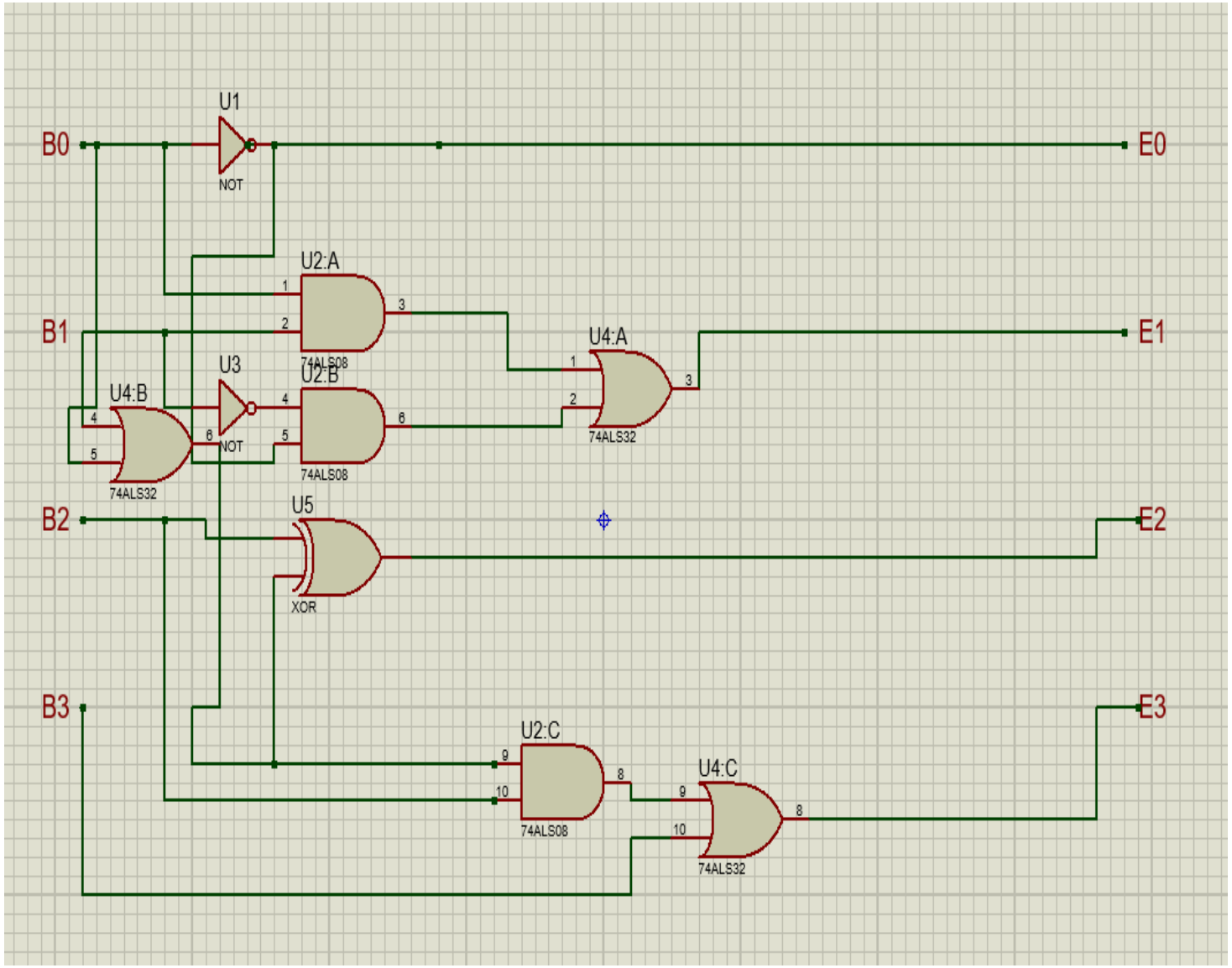
1. *Mariam Hosny Mahmoud Ezzat Ebrahim.*
2. *Mariam El-Said El-Sayed Abd El- Raziq.*
3. *Mariam Yousef Mohammed Yousef.*
4. *Zeinab Ahmed Mohammed El-Adawy*

❖ *Background:*

our project is designed to combine 4-bit binary number(0-9) with three for that we have four inputs with maximum 4 outputs.

Truth table:

B3	B2	B1	B.	E3	E2	E1	E.
0	0	0	0	0	0	1	1
0	0	0	1	0	1	0	0
0	0	1	0	0	1	0	1
0	0	1	1	0	1	1	0
0	1	0	0	0	1	1	1
0	1	0	1	1	0	0	0
0	1	1	0	1	0	0	1
0	1	1	1	1	0	1	0
1	**0**	**0**	**0**	1	0	1	1
1	0	0	1	1	1	0	0



- *To calculate E. :*

E. map :

B3	B2	B1	0	0	1	1
		B.	0	1	1	0
0	0	**1**		**0**	**0**	**1**
0	1	1		0	0	1
1	1	x		x	x	x
1	0	1		0	x	x

x represents "not care" value

by using the previous map, E. can be given as :
E.= B.'

- *to calculate E1 :*

E1 map :

B3	B2	B1	0	0	1	1
		B.	0	1	1	0
0	0	**1**		**0**	**1**	**0**
0	1	1		0	1	0
1	1	x		x	x	x
1	0	1		0	x	x

by using the previous map, E1 can be given as :
E1=B1B.+B1'B.'

To calculate E2:

E2 map:

B3	B2	B1 0	0	1	1
		B. 0	1	1	0
0	0	**0**	**1**	**1**	**1**
0	1	1	0	0	0
1	1	x	x	x	x
1	0	0	1	x	x

from the previous map, E2 can be given as :

E2=B2'(B1+B.)+B2(B1+B.)'

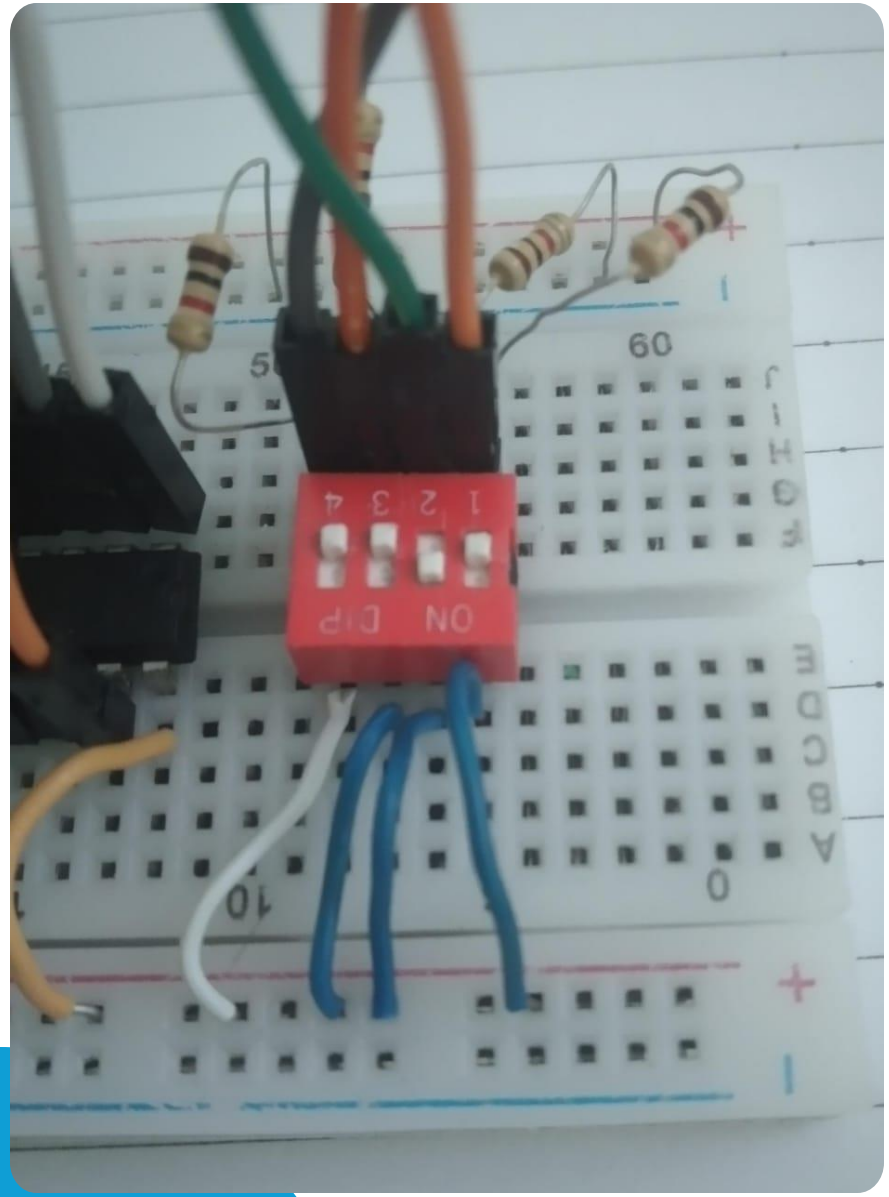
to calculate E3:

E3 map :

B3	B2	B1 0	0	1	1
		B. 0	1	1	0
0	0	**0**	**0**	**0**	**0**
0	1	0	1	1	1
1	1	x	X	x	x
1	0	1	1	x	x

from the previous map,E3 can be given as :

E3=B3+B2(B1+B.)



❖ Tools:

- 2 “AND” gates
- 1 “OR” gate
- 1 “NOT” gate
- 4 LEDs
- 4 resistors 100 ohm
- 4 resistors 1K ohm
- dip switch
- jumpers
- breadboard

❖ connections:

To begin, we connected the positive terminal of the breadboard to a 5V input, and we connected the negative terminal to the ground .

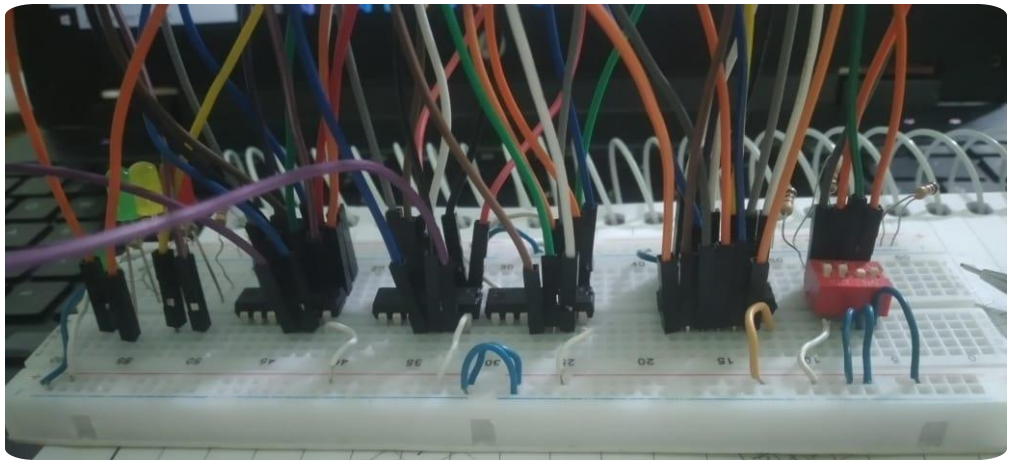
We used a dip switch as an input for a 4-bit binary number by

connecting one side to the positive terminal and the other side to a 1k resistor, which

is then connected to the ground.

- For “E.” connection we simply used “NOT” gate and the input “B.” and then connected the positive terminal

Of the led to the output of the “NOT“ gate and the other terminal with the 100 ohm



- ***For the “E1”output :***

we used “AND” gate to generate “B1.B.”,for the other term we used “NOT gate to generate

the reverse of the pervious inputs. lastly, we used

“OR” gate to generate the final output.

we connected the output of the “OR “gate to the “LED” using the same connection we mentioned before.

- ***For the “E2”output:***

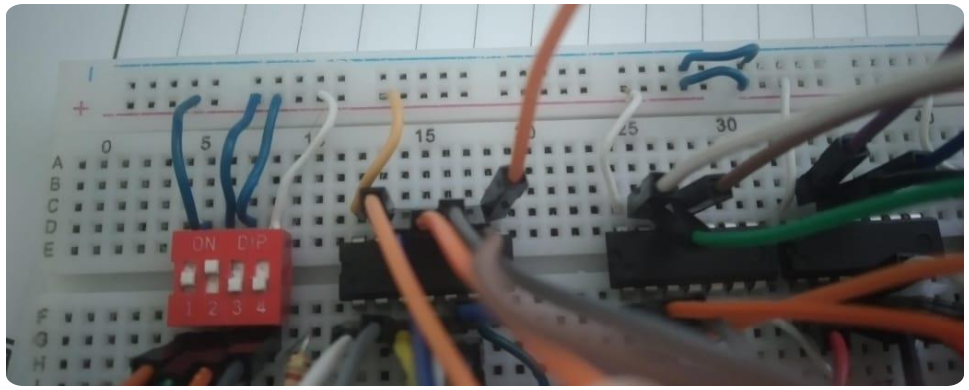
We begin with connecting “B2”to the “AND” gate ,followed by the output of “not gate”

which takes the output of the “OR”gate for the two inputs “B1”,”B.”

- ***For the “E3”output:***

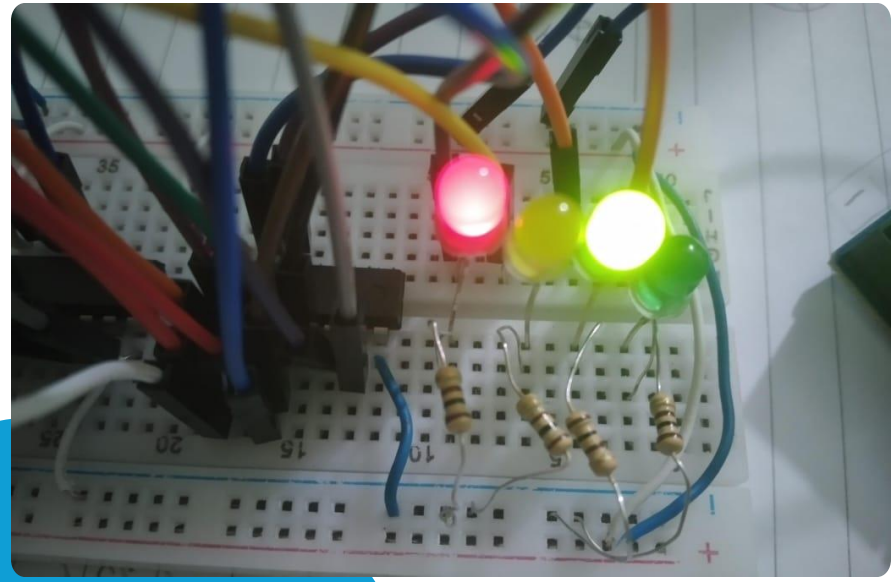
We connected “B3” to the “OR” gate combined with “B2”with the term”B1+B.” that we got using “AND ”gate

all the output we connected to their specific “LED”s the same way we mentioned above.



❖ *Testing:*

When we use “2” whose binary representation is “0010”



We will get the output”5”(binary=0101)which is the summation of “2+3”