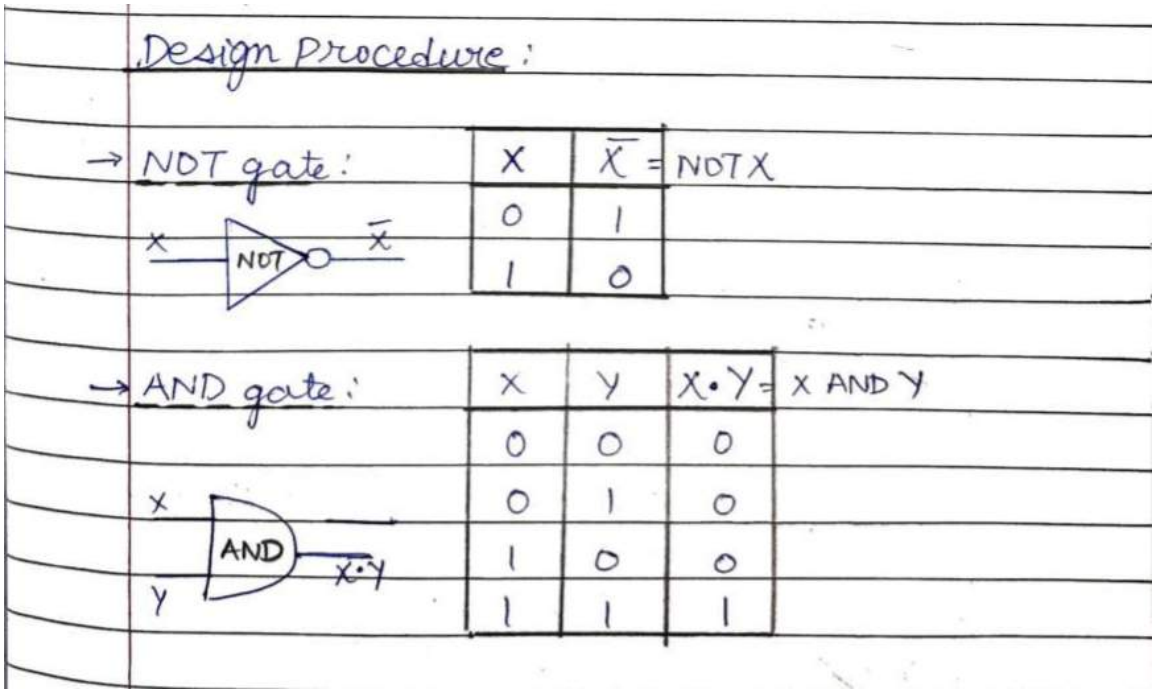
EXPERIMENT 1

Aim: Study of Digital ICs and basic components like power supply, DSO, etc.

Summary of the experiment: Study of basic digital ICs and verifying their functionality, learning the usage of function generator (FG) and digital storage oscilloscope (DSO), and rigging up of circuits.

Components used: IC 7404, 7408, 7432, 7486, 1kilo-ohm resistor array, DIP switches, LED displays, breadboard, power supply.

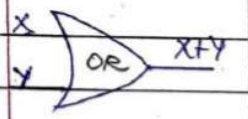
Design Procedure:



x	$\bar{x}$ = NOT x
0	1
1	0

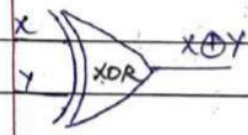
x	y	x·y = x AND y
0	0	0
0	1	0
1	0	0
1	1	1

→ OR gate:



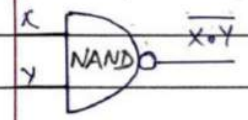
X	Y	X+Y = X OR Y
0	0	0
0	1	1
1	0	1
1	1	1

→ XOR gate:



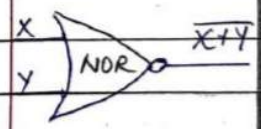
X	Y	X⊕Y = X XOR Y
0	0	0
0	1	1
1	0	1
1	1	0

→ NAND gate:



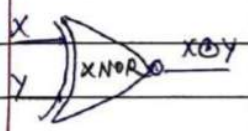
X	Y	$\overline{X \cdot Y}$ = X NAND Y
0	0	1
0	1	1
1	0	1
1	1	0

→ NOR gate:



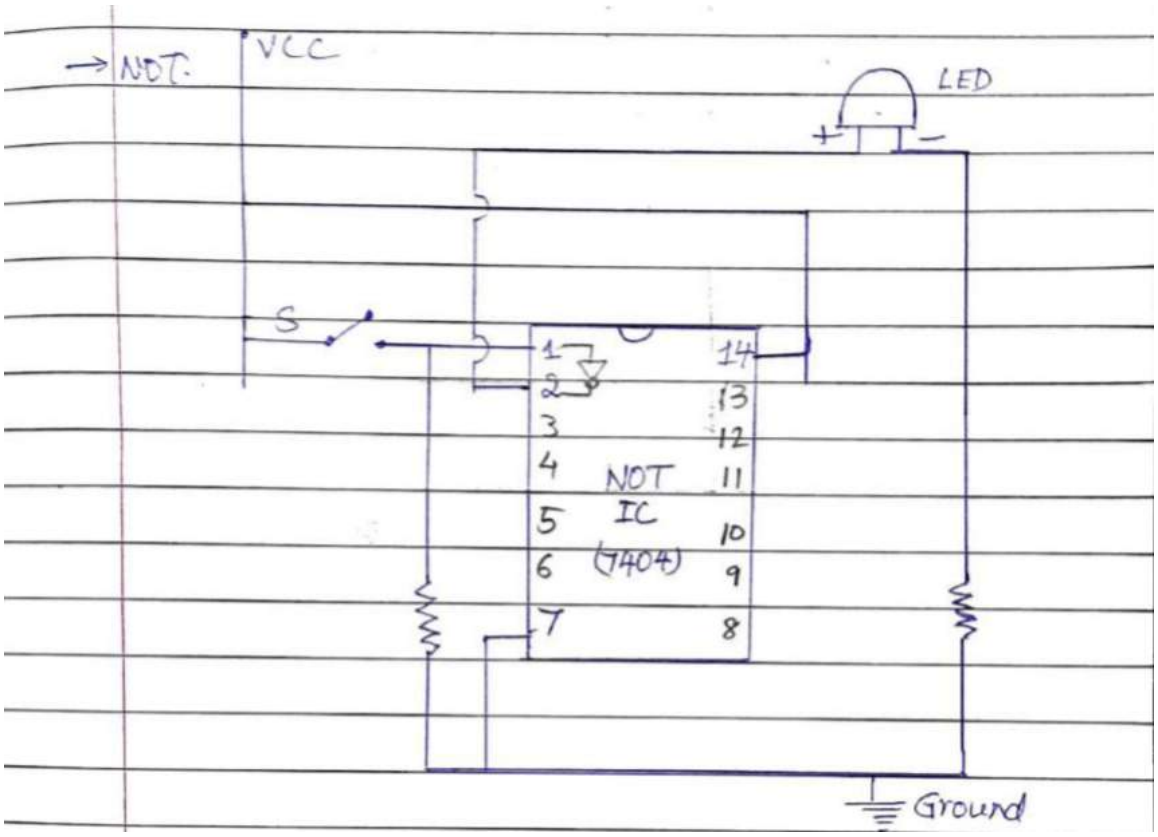
X	Y	$\overline{X+Y}$ = X NOR Y
0	0	1
0	1	0
1	0	0
1	1	0

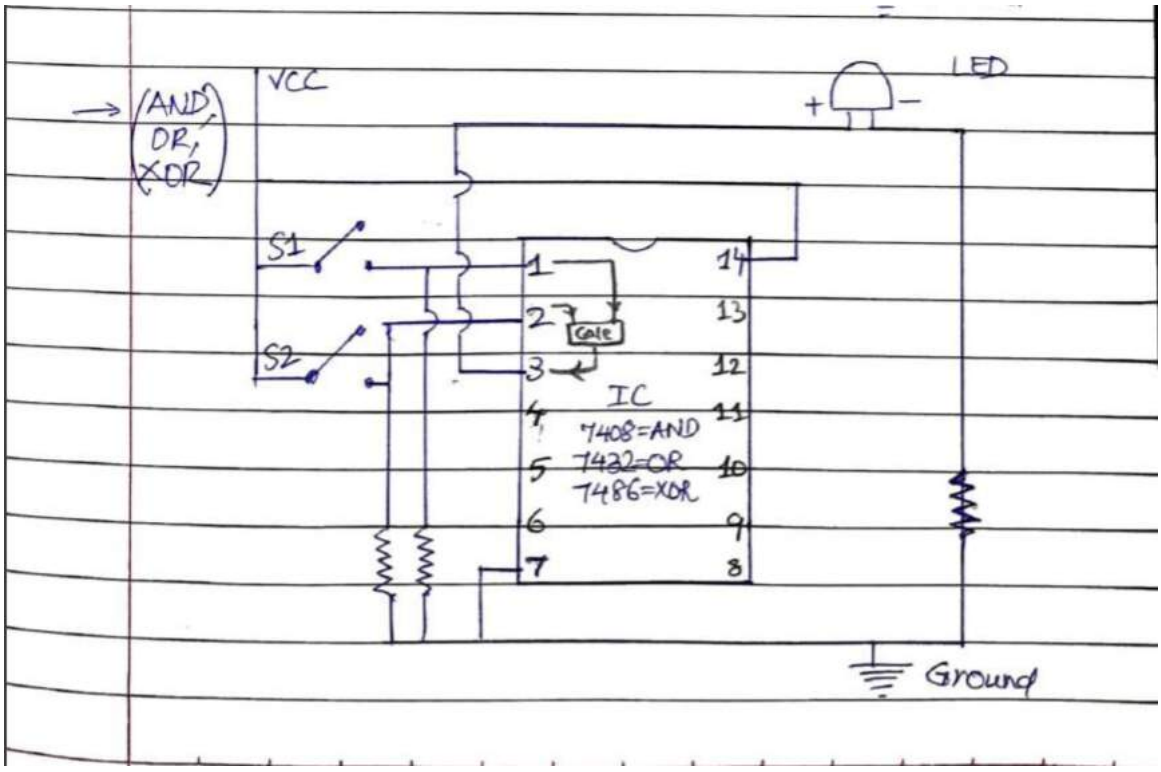
→ XNOR gate:

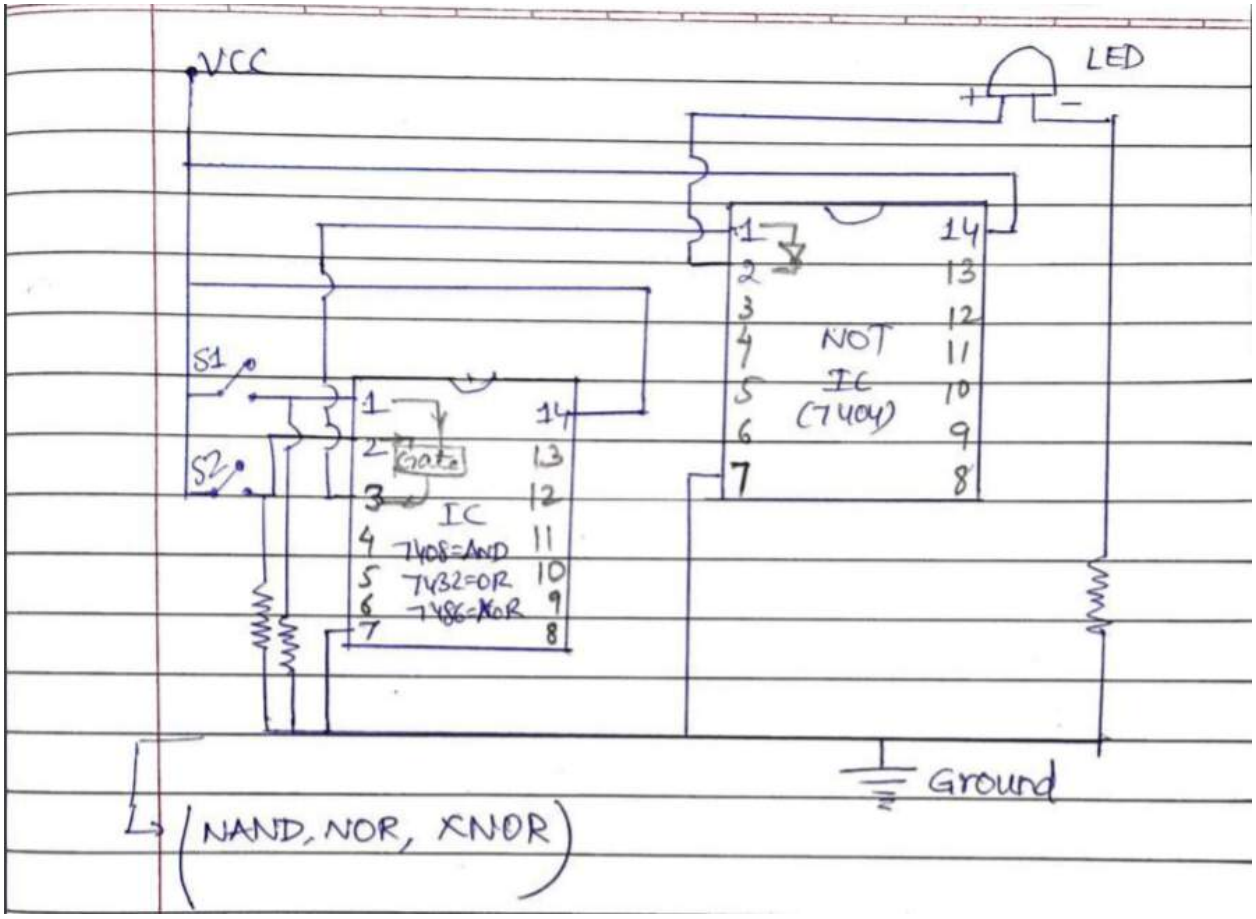


X	Y	X⊙Y = X XNOR Y
0	0	1
0	1	0
1	0	0
1	1	1

Circuit Diagrams:







Results and Discussions:

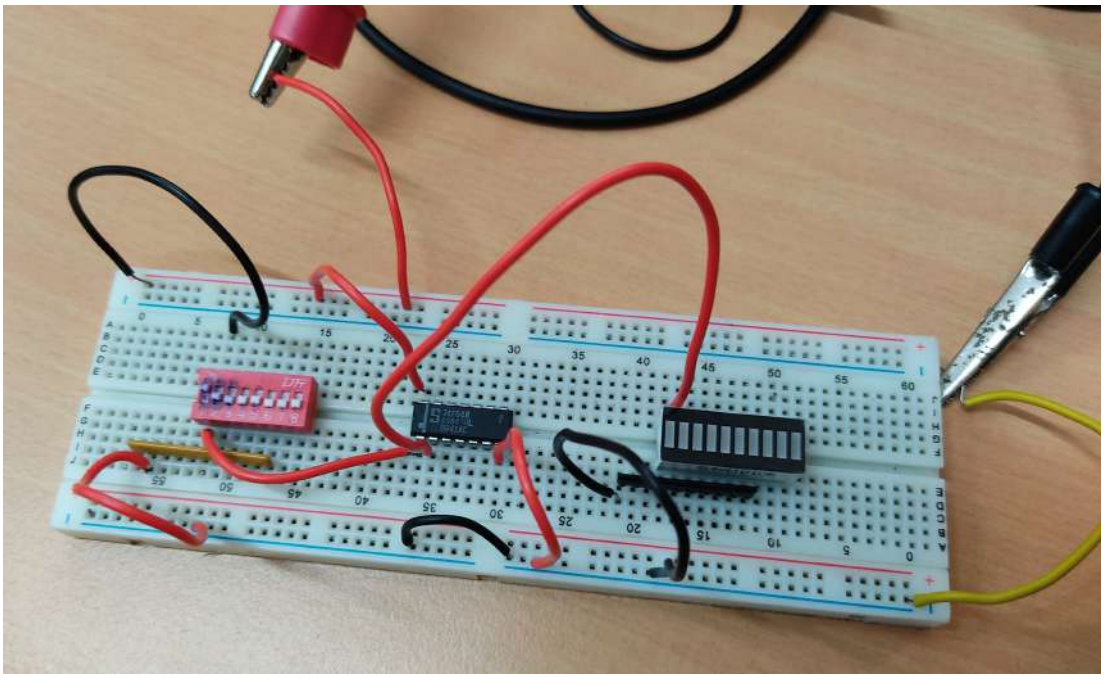
1. We can verify the outputs obtained using the truth tables.
2. We constructed the complex logic gates like NAND, NOR and XNOR using the combinations of NOT with AND, OR and XOR respectively.

Conclusion:

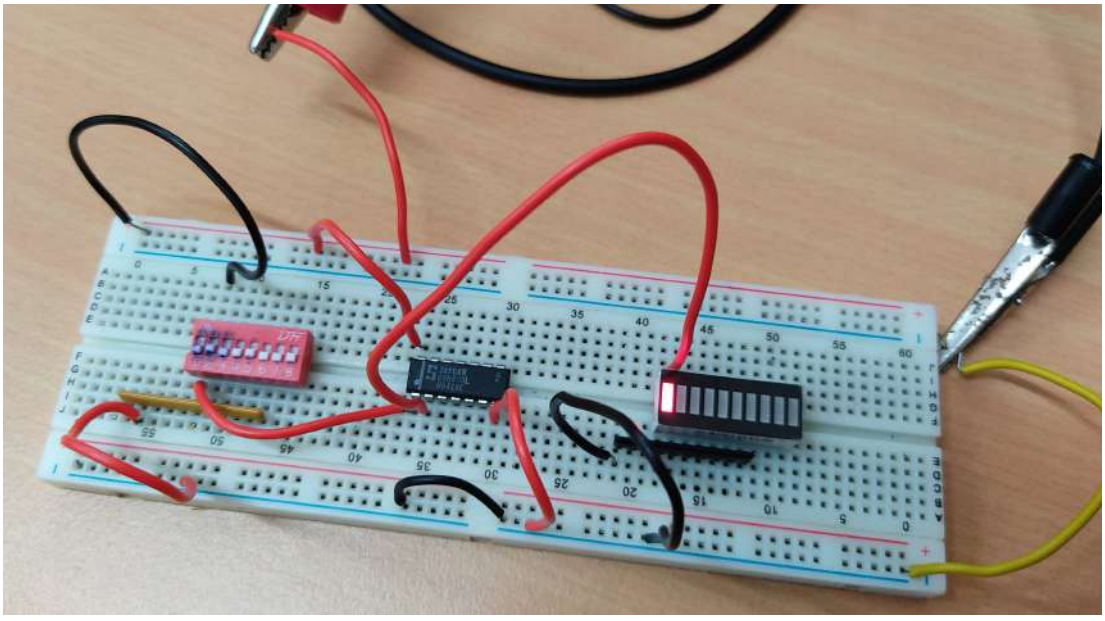
- We have verified the functionality of basic digital Integrated Circuits (ICs).

(Circuit Snapshots attached)

NOT:

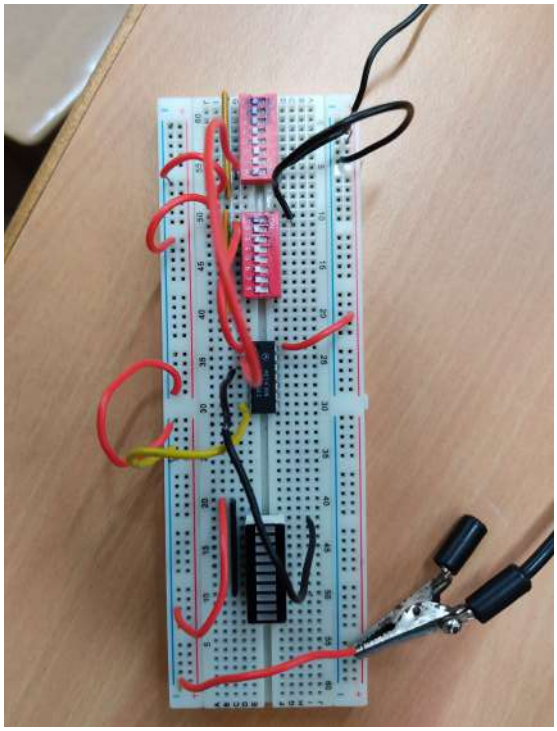


1 —> 0

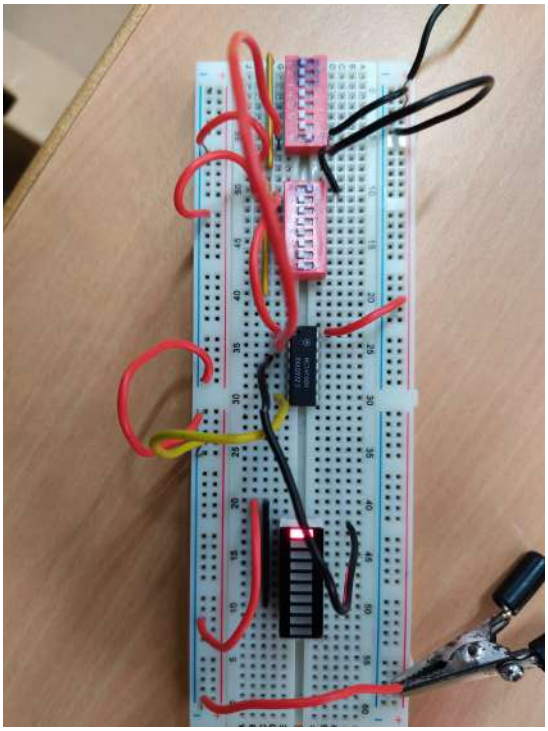


0 —> 1

AND:



0_0 —> 0



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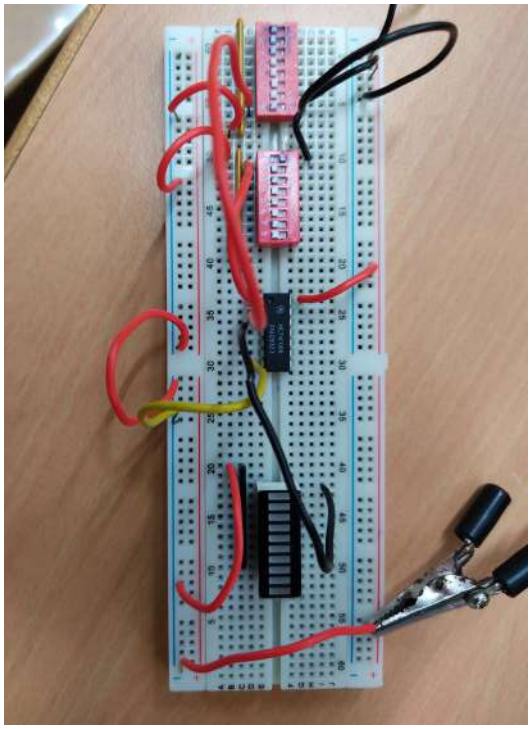

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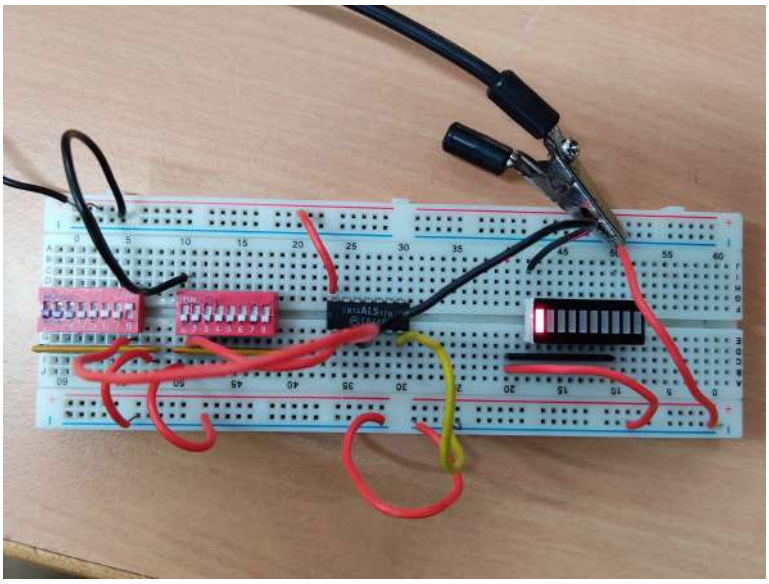
OR:



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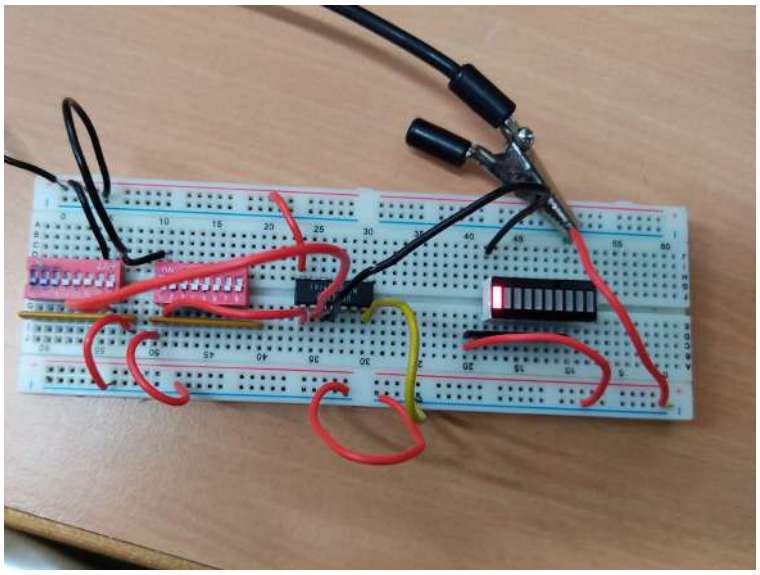

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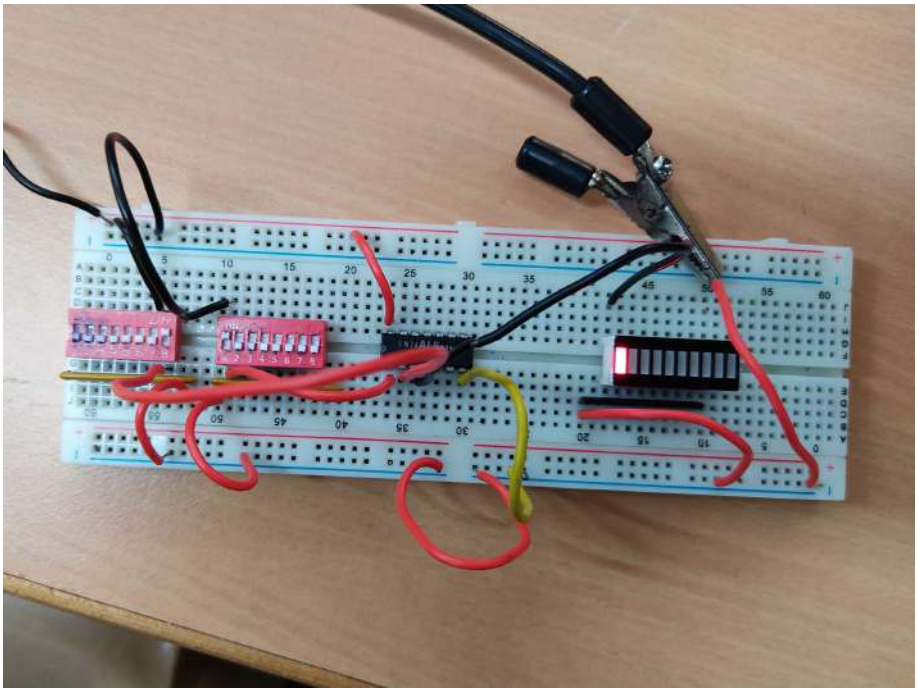
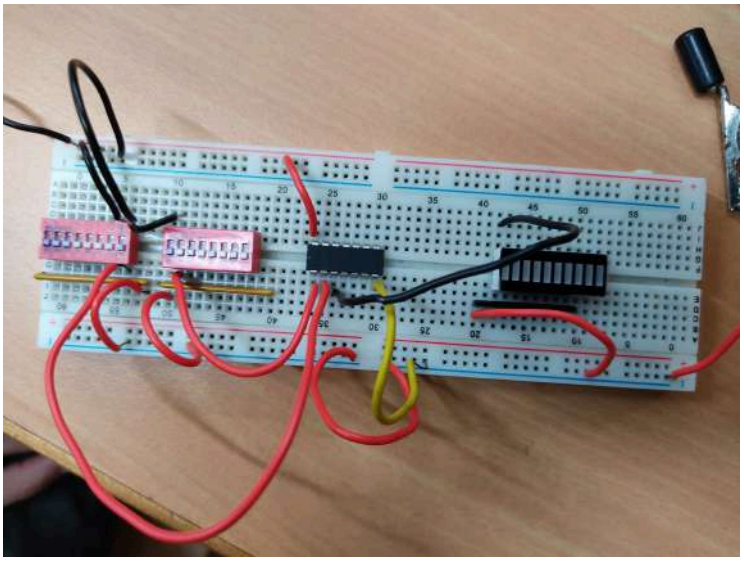


1_1 —> 1

XOR:



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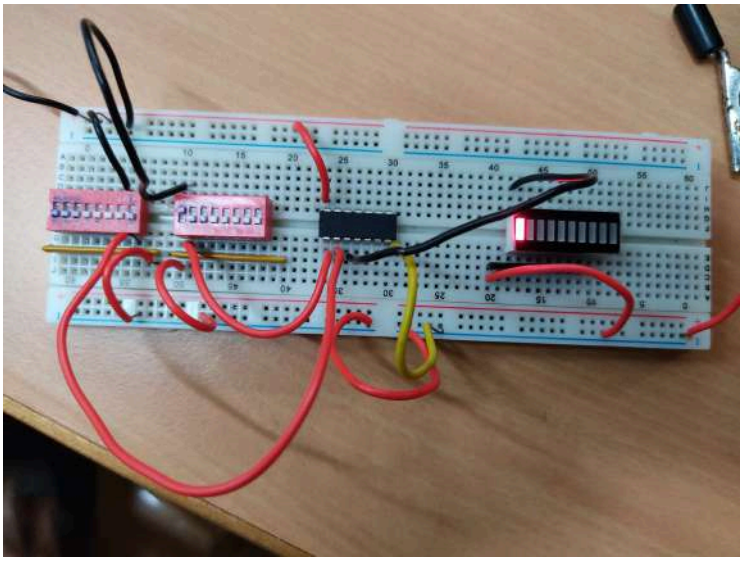

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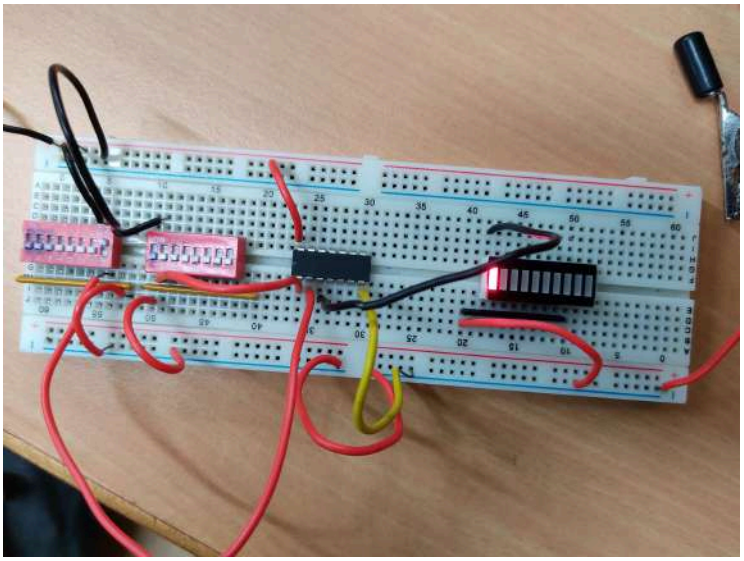

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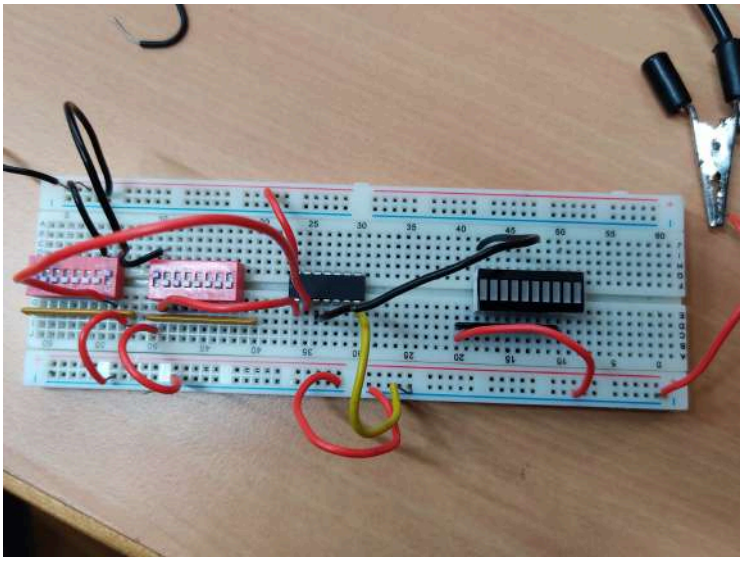

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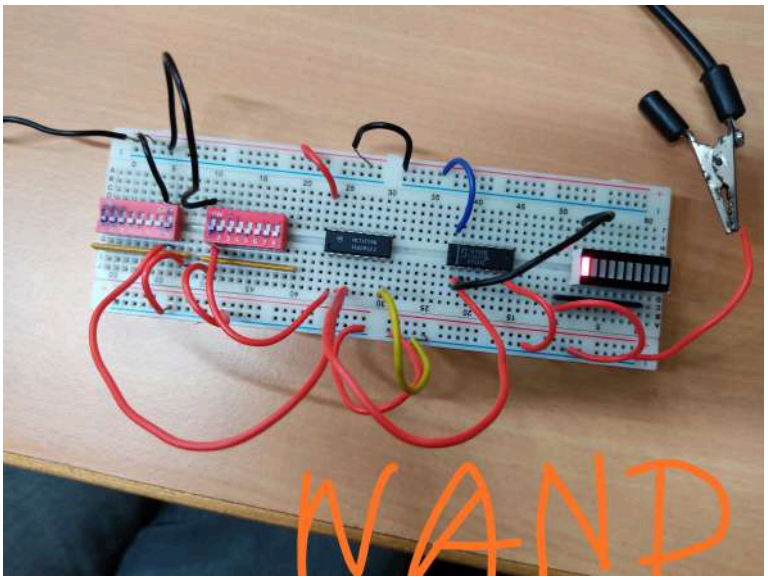
NAND:



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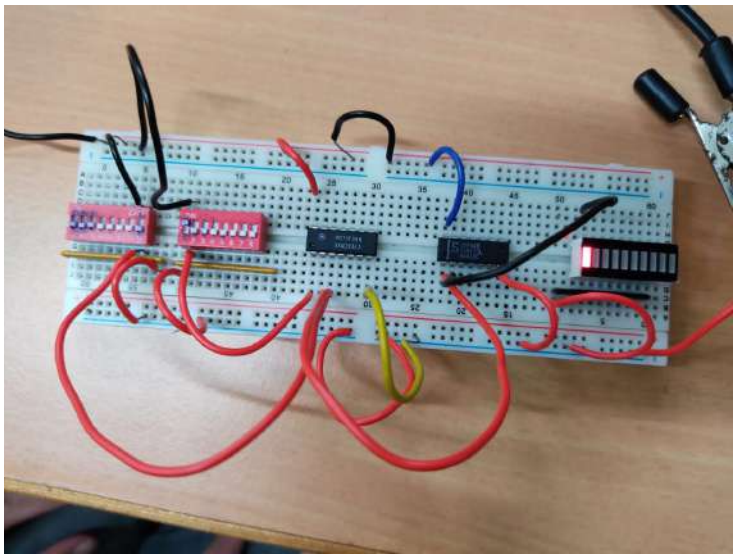

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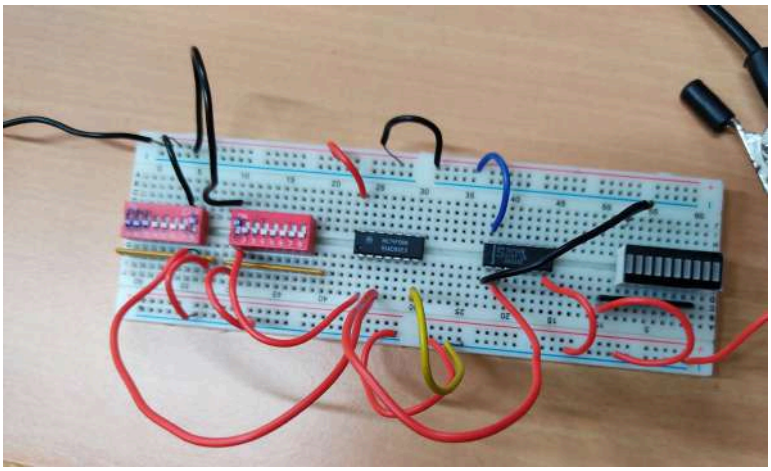

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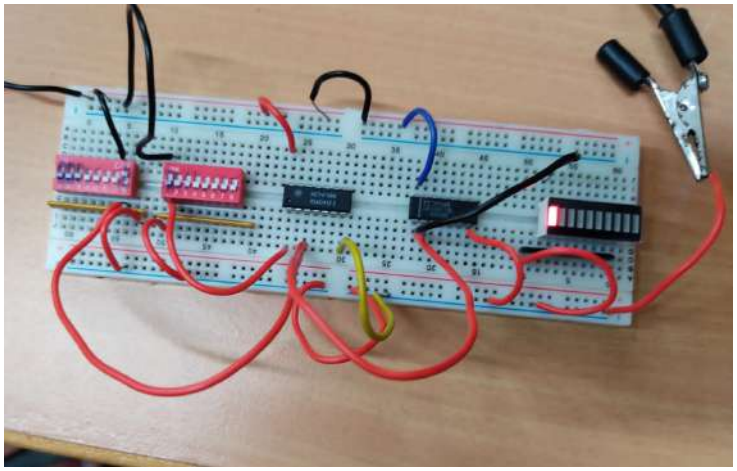
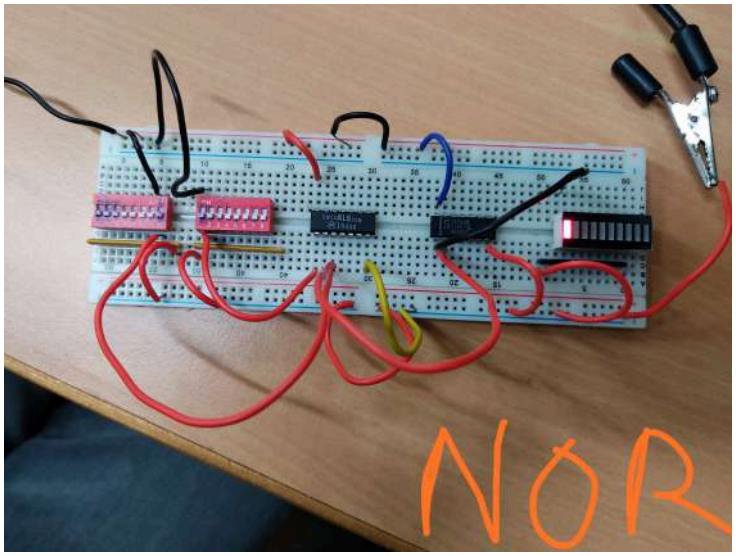


1_0 —> 1

NOR:



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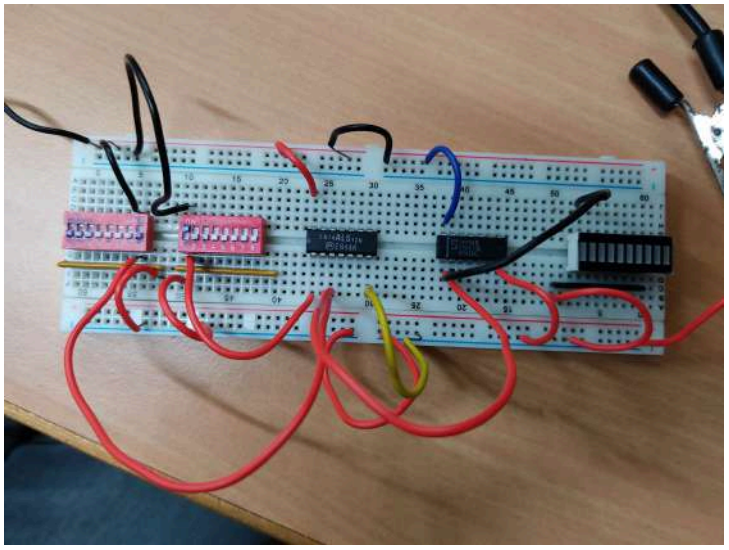

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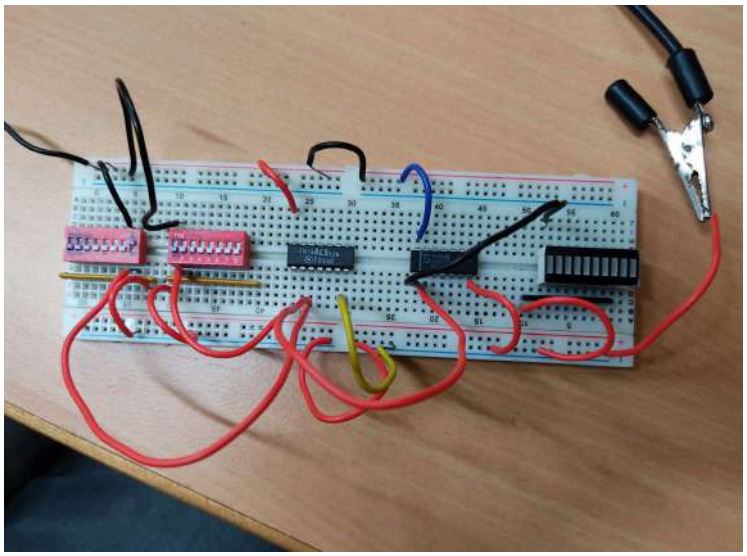

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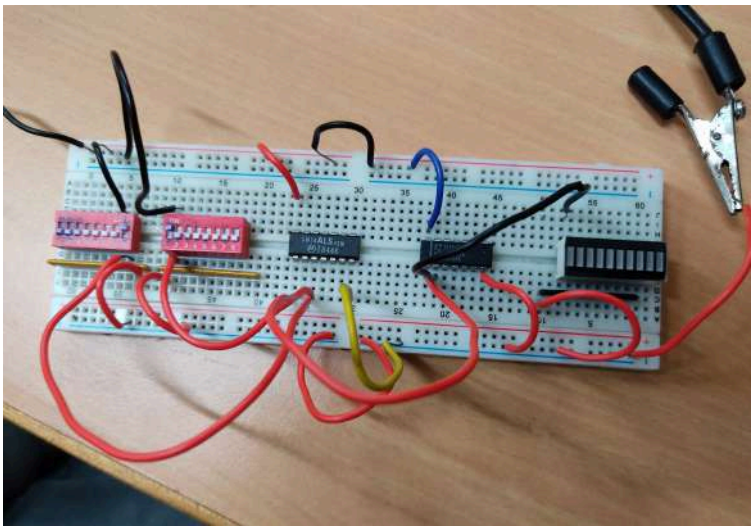
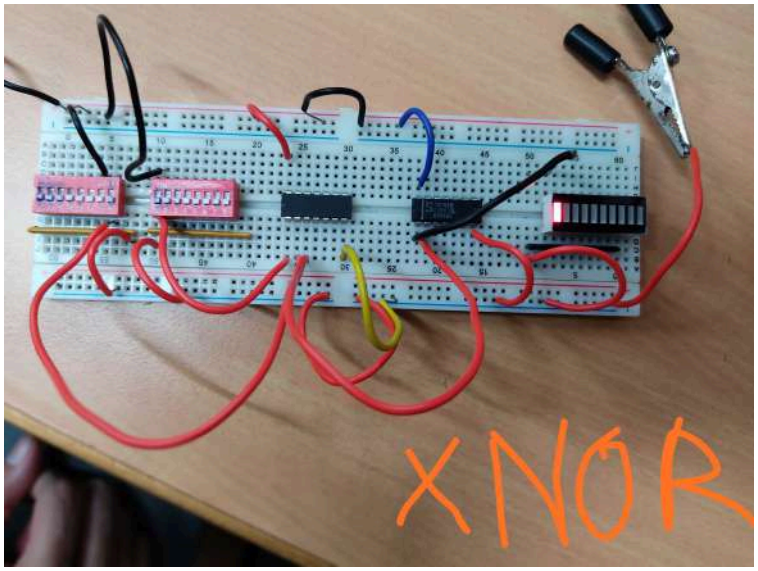


1_1 —> 0

XNOR:



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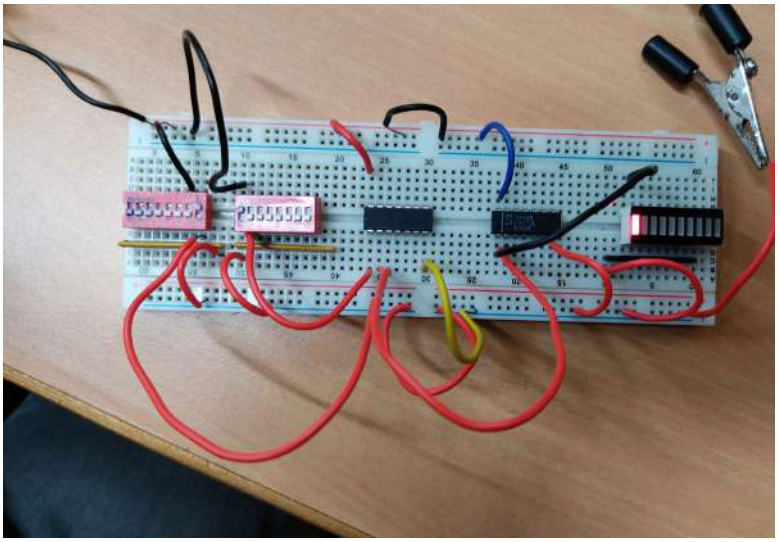

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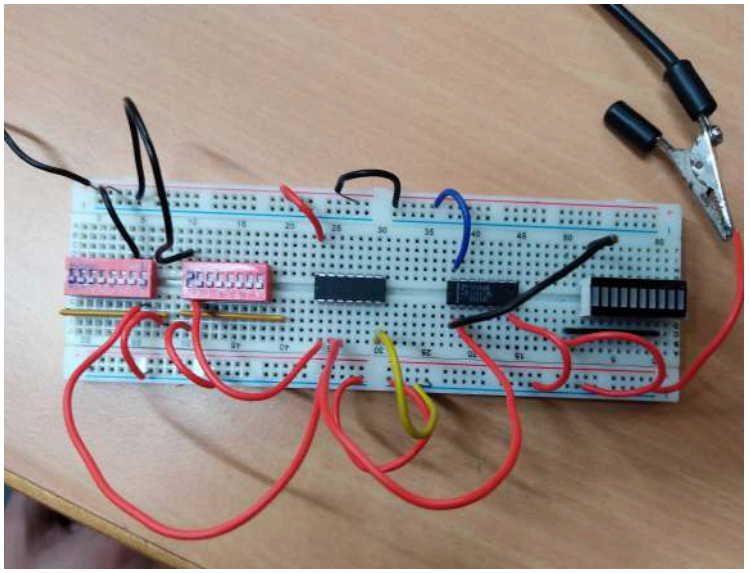

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