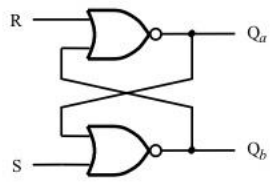
The purpose of this lab was to create a four bit adder using only NAND gates

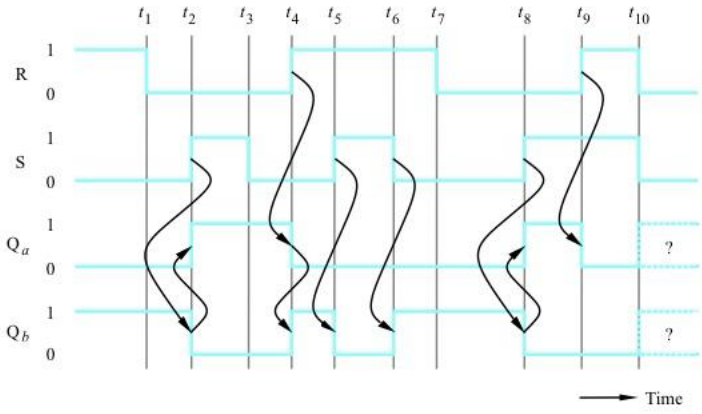
Introduction



(a) Circuit

S	R	Q_a	Q_b	
0	0	0/1		(no change)
0	1	1/0	1	
1	0	1	0	
1	1	0	0	

(b) Truth table



(c) Timing diagram

In the diagram , it shows how to make the circuit with NOR gates.
As you can see it goes up flattens goes down flattens and repeats.
The going up part is called a flip flop while the going down part is called counters .
The truth table demonstrates that S and R cannot both be empty and that at least one of the inputs must be one for the circuit to work.

Materials

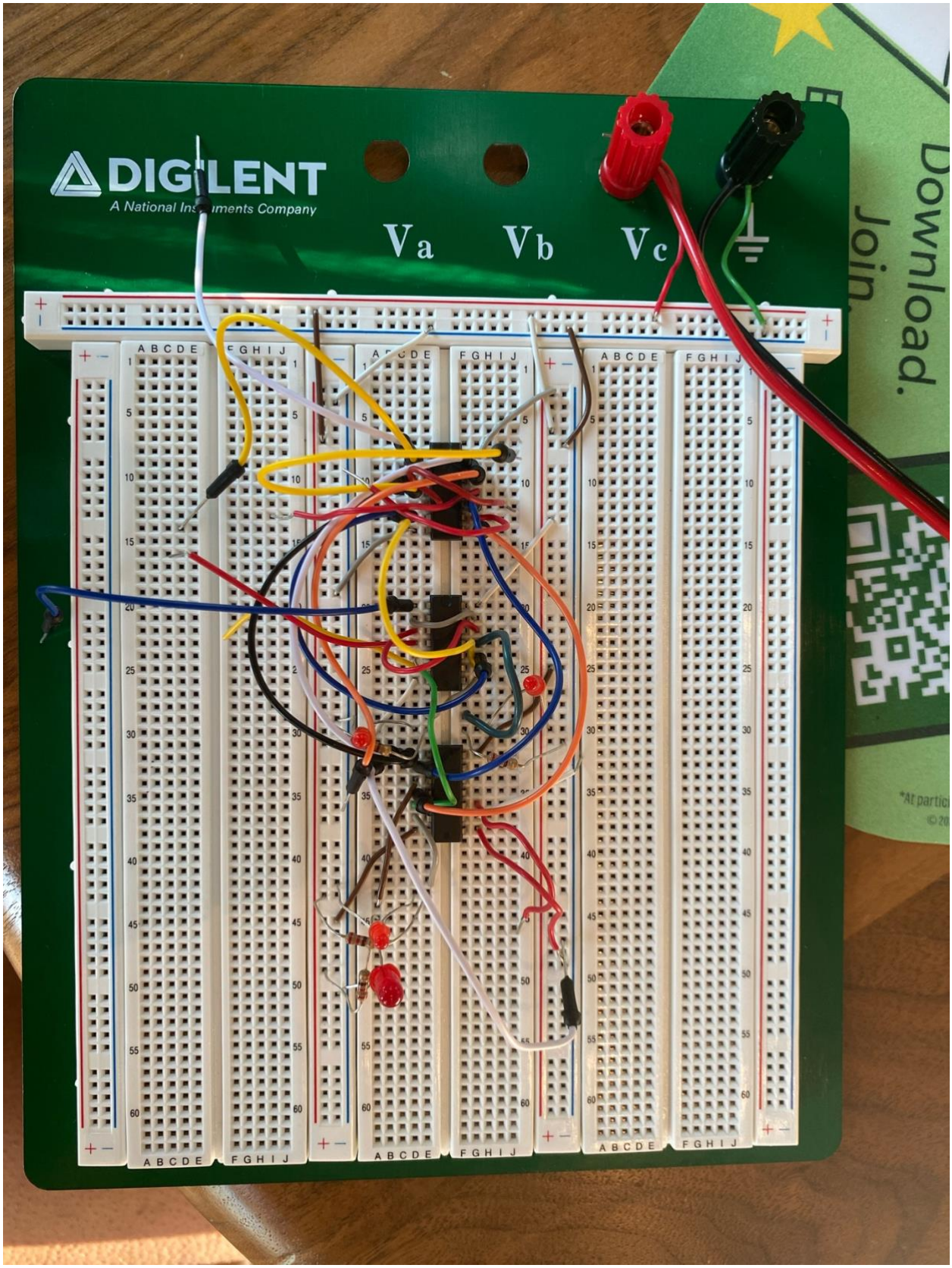
- breadboard
- Wires (varies sizes)
- IC 74HTC00 gates (3)
- Led (4)
- Resistors (4)

Procedure

The main point of the procedure to make sure you connect the wires into the correct spot the truth table to stay true . Below is the list of wires and what to connect with.
1 connects to C (empty wire)

1 connects to I4 (empty wire)
1 connects to 9
2 connects to 3/I3 (empty wire)
2 connects to C’ (empty wire)
2 connects to 7
3 connects to 10
3 connects to C (empty wire)
3 connects to 2/I3 (empty wire)
4 connects to 9/I2
4 connects to 5
4 connects to C’ (empty wire)
5 connects to C (empty wire)
5 connects to 8
6 connects to I1 (empty wire)
6 connects to C’ (empty wire)
6 connects to 10
7 connects to S4 led (empty wire)
7 connects to C’ (empty wire)
8 connects to S1 led (empty wire)
8 connects to 4/I2
9 connects to S3 led (empty wire)
10 connects to S4 led (empty wire)
11 connects to C (empty wire)
11 connects to C’ (empty wire)

Results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Conclusions

The learning goal of the lab was to figure out how to make a 4 bit shifter on a breadboard using only NAND gates. The hardest part for me was to figure out how to connect a part of the NAND gate to the I when it needs to connect to another NAND gate. Other than that the it's just a lot of information to put into the breadboard.