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Computer Science Laboration 1

Task 1

Task 1 first instructed us to connect our components on the breadboard as in fig.1a on the laboration instruction (see image 1a), using Arduino sketch we set our Adafruit trinket to loop between HIGH and LOW output with a delay of 1000ms. Confirming the correct output we used the LED which lit up only on HIGH output.

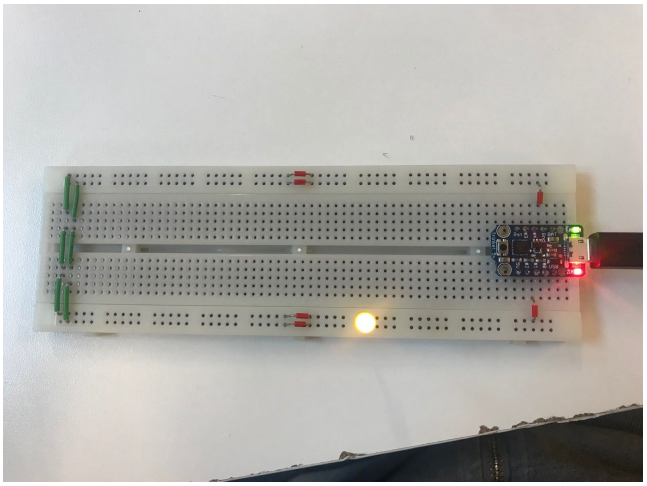

Image 1a

Later we were instructed to add a NAND gate and connect our components as fig.1b (see image 1b), checking if the NAND gate works correctly. The LED should not be lit if the NAND gate gets an input of two HIGH's(two 1's) and should in other cases be lit. Using Arduino sketch we set both pin4 and pin3 outputs first as HIGH and then looped one of the pins between HIGH and LOW making the LED flash in cycles. We also checked with two LOW inputs resulting in the LED glowing as expected.

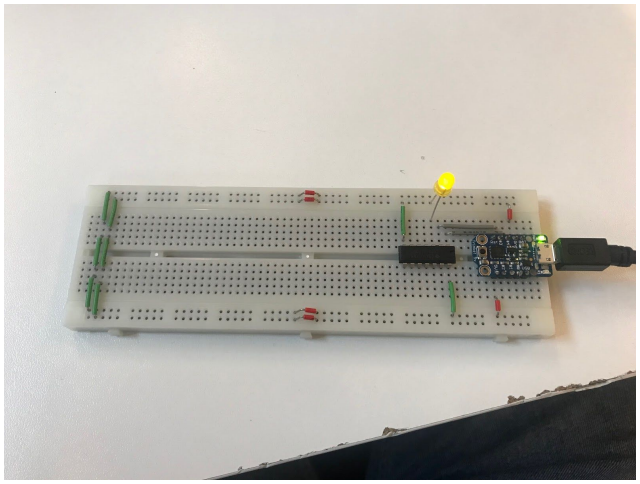

Image 1b

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Task 2

In task 2 we were instructed to create a XOR gate for sum and a AND gate for carry using maximum 4 NAND's and 1 NOR gate. Before connecting the components we sketched a gatechart as seen in image 2a, first creating the XOR gate using 4 NAND's and then going through the gate logic to see where to connect the NOR gate for the AND gate from figure 2 in the lab instruction.

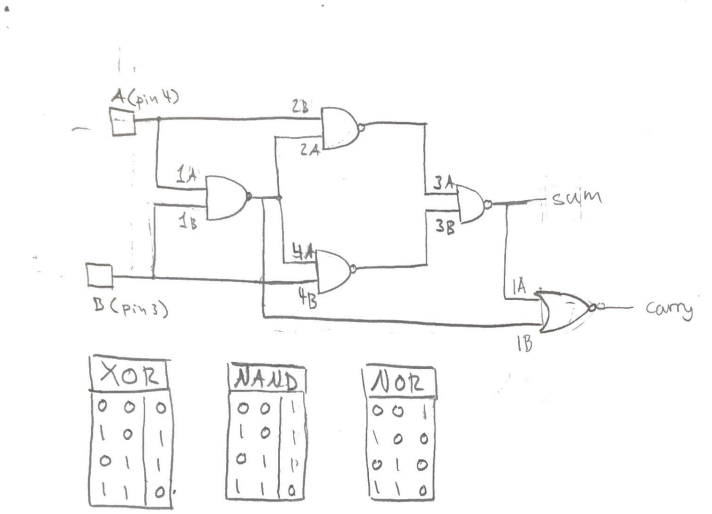

Image 2a

After figuring out the gate logic we used the manuals given to us in the lab instruction to connect all the wires and logic on the breadboard (see image 2b).

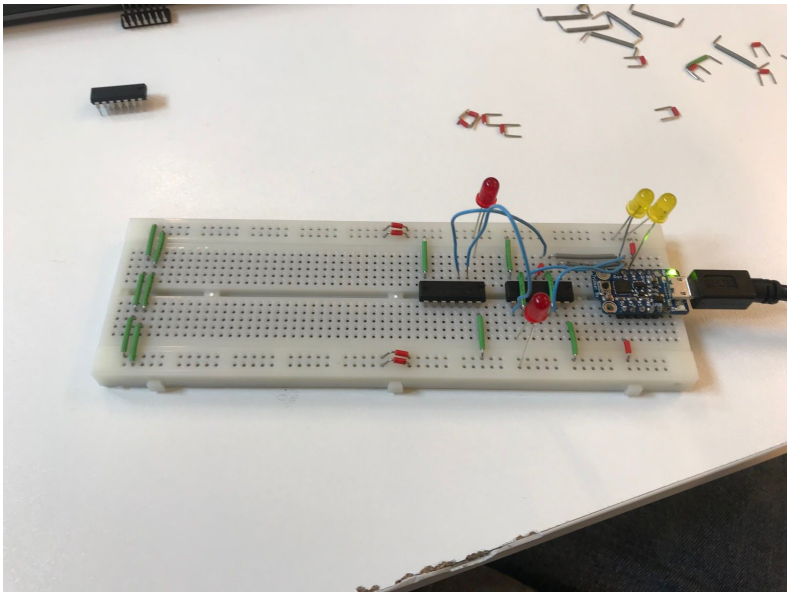

Image 2b

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And then to confirm that our logic is correct we wrote the sketch in Arduino that is included in the zip folder and called “sketch_sep21a”. We start the sketch by doing both A and B high, that means ones comes out of pin 3 and 4 from the Adafruit. We represent the output from A and B with the yellow LEDs, when the LED is lit that means the output is 1 and not lit means a 0. The right LED is A and the left LED is B. When the highest red LED in image 2c is lit that means the CARRY bit is 1. And when the lowest red LED is lit that means the SUM is 1 To see the result when A and B is high watch image 2c. We confirmed that we got the result we wanted by looking at table 1 at the same time.

A	B	SUM	CARRY
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

Table 1

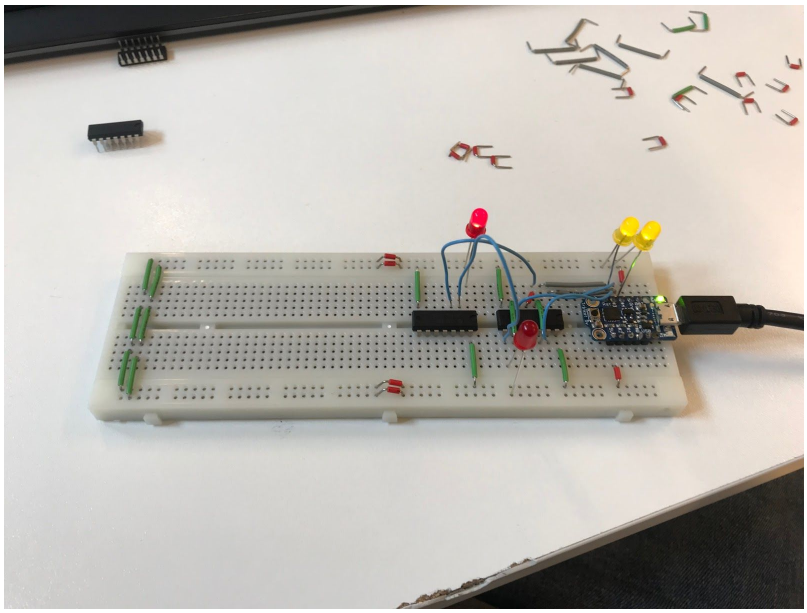

Image 2c

Then we repeated the process for when A is low and B is high (see image 2d), when A is low and B is low (see image 2b), when A is high and B is low (see image 2e).

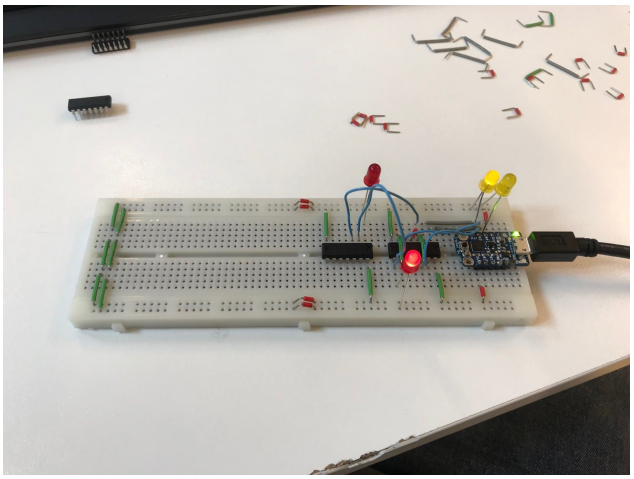

Image 2d

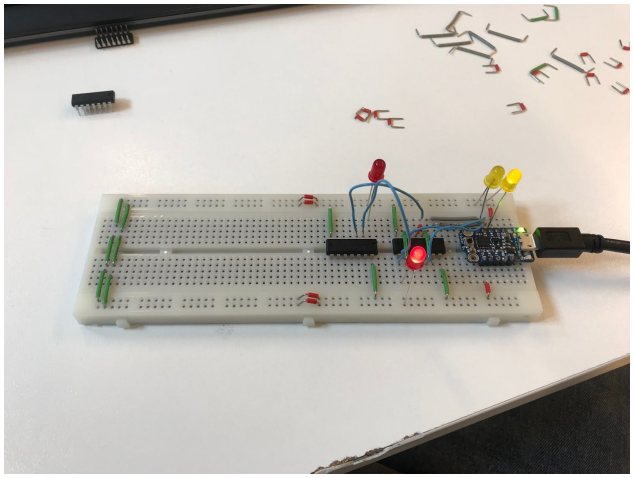

Image 2e

As seen in the images we got the expected result.