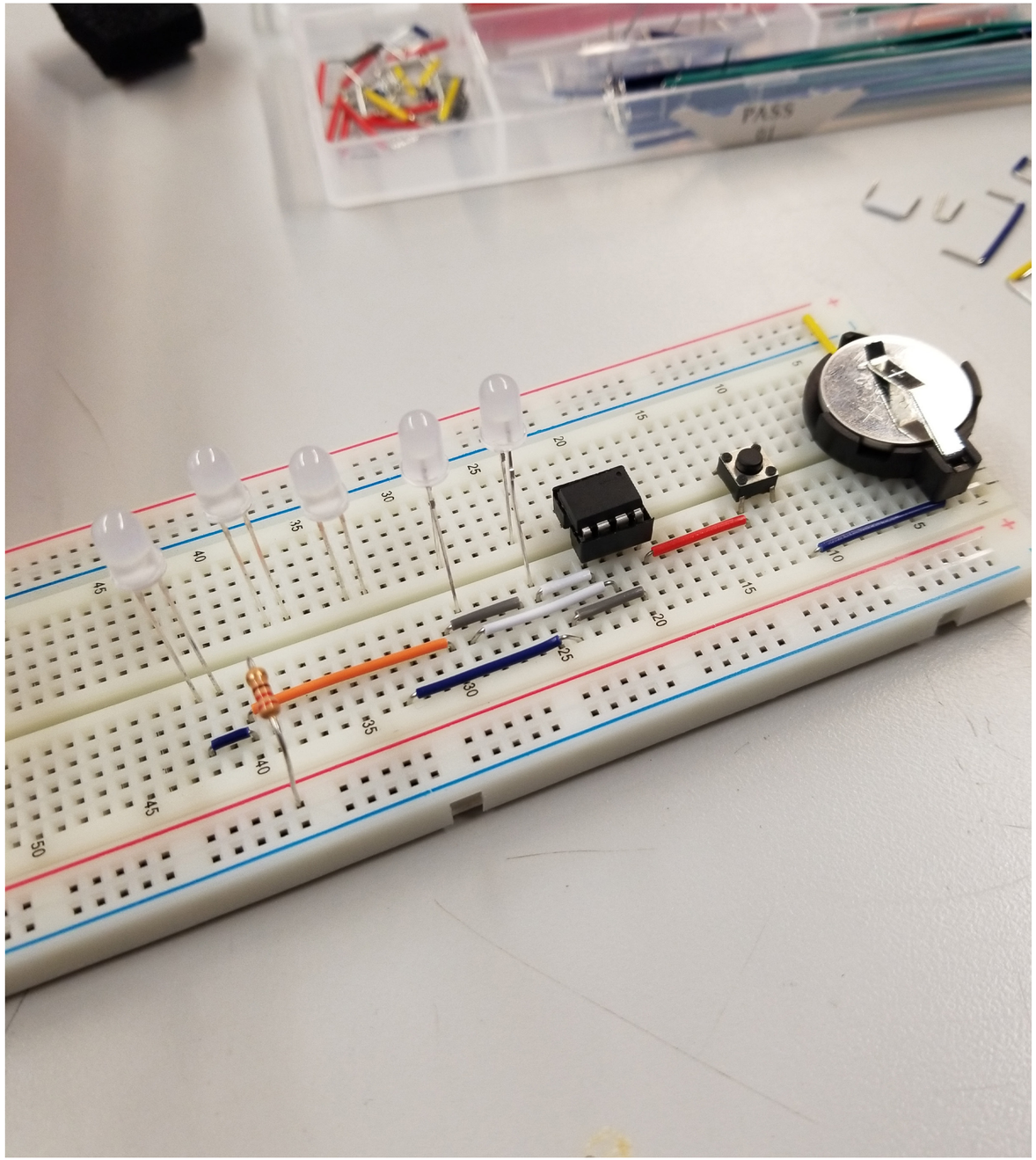
Etude 2: Perceptron-P

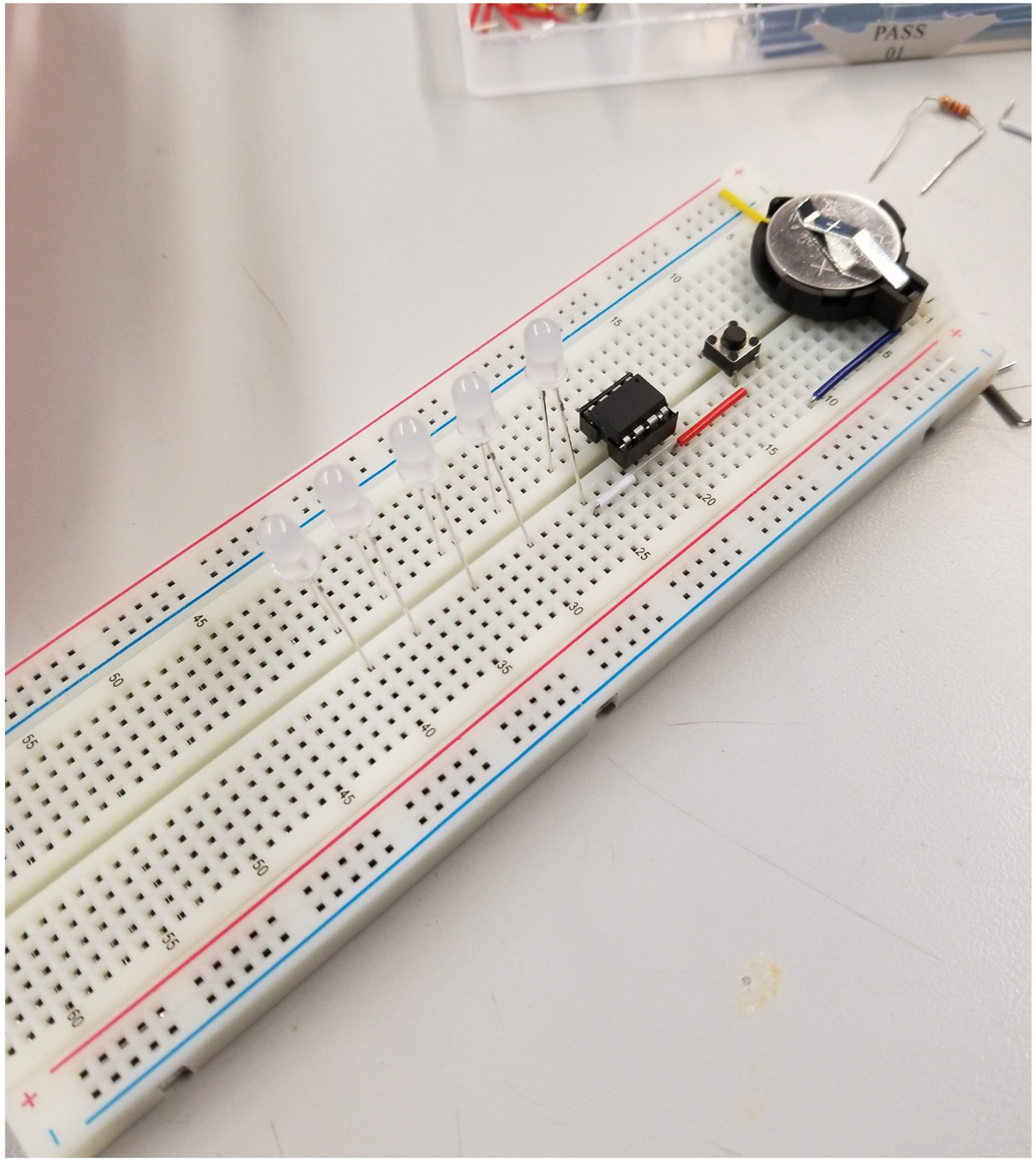
Cart 360 - Fall 2018

Valerie Bourdon

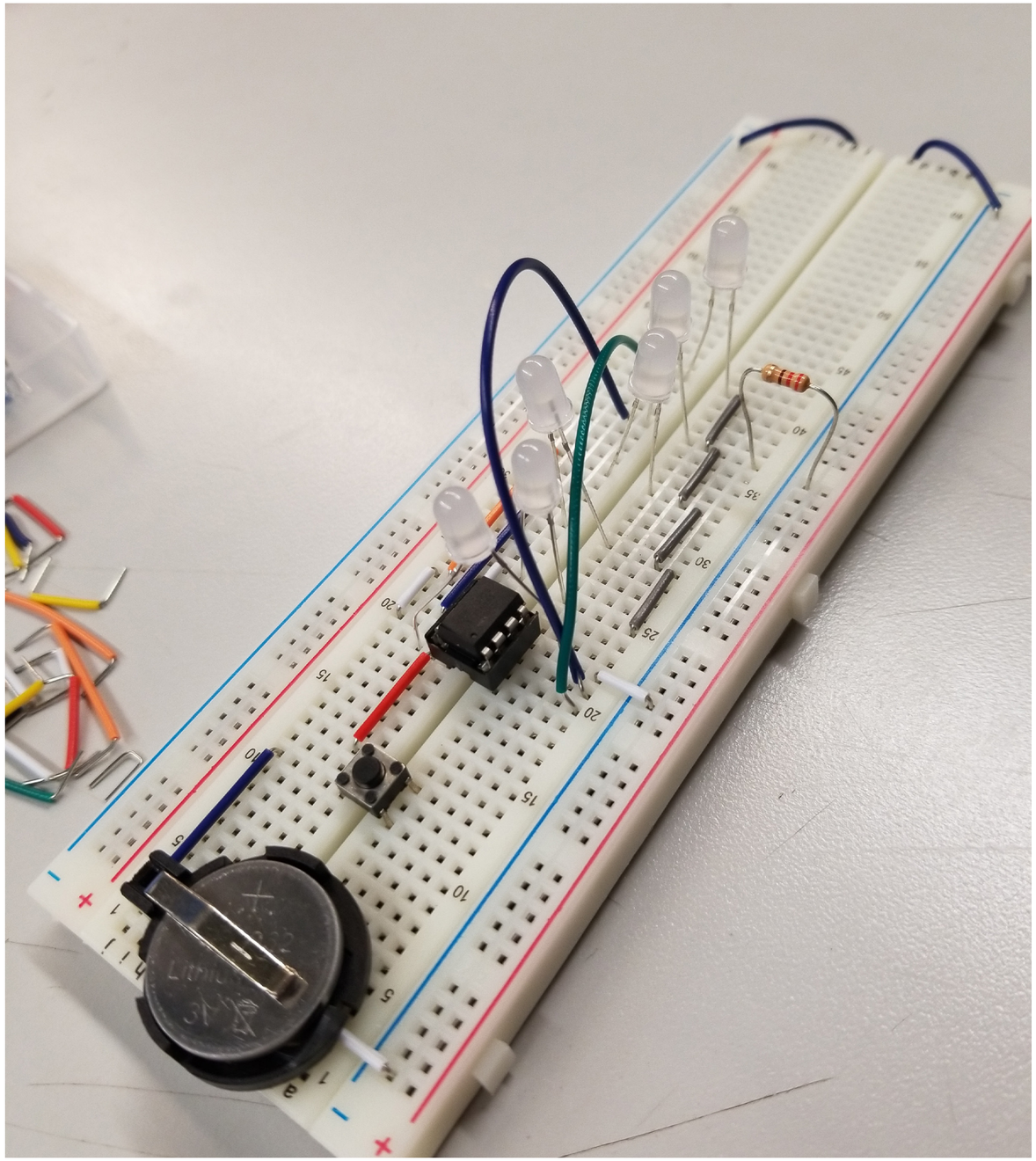
Part One: Perceptron-P



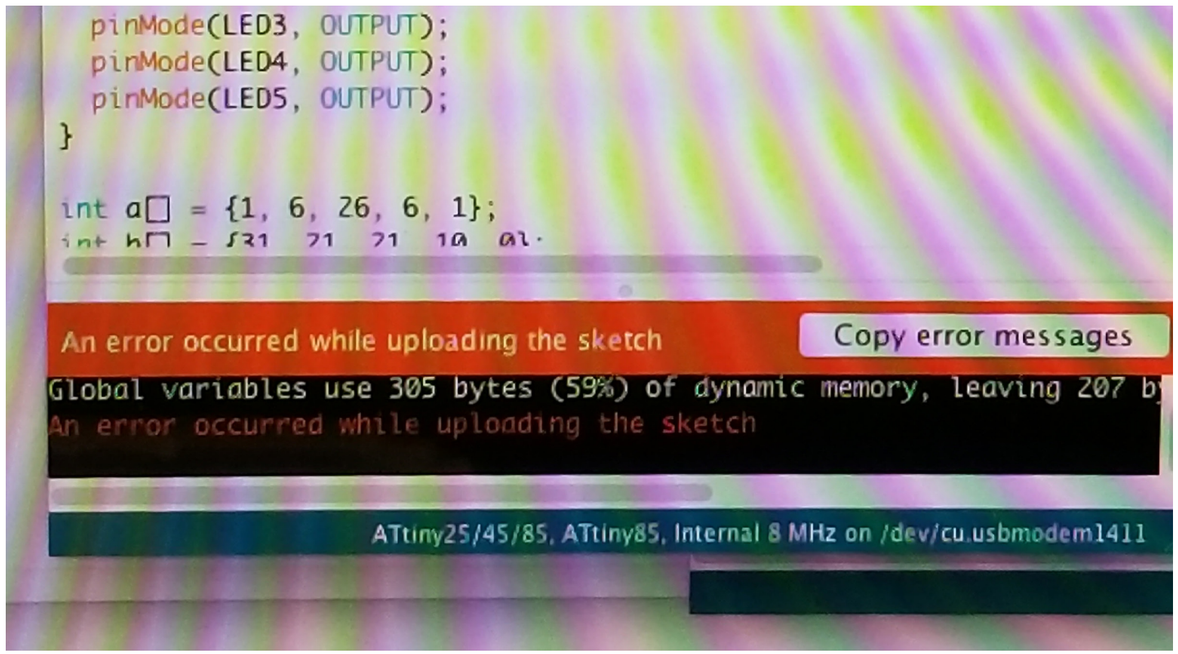
At first, I was trying to make the circuit look as close to the Fritzing diagram as possible.

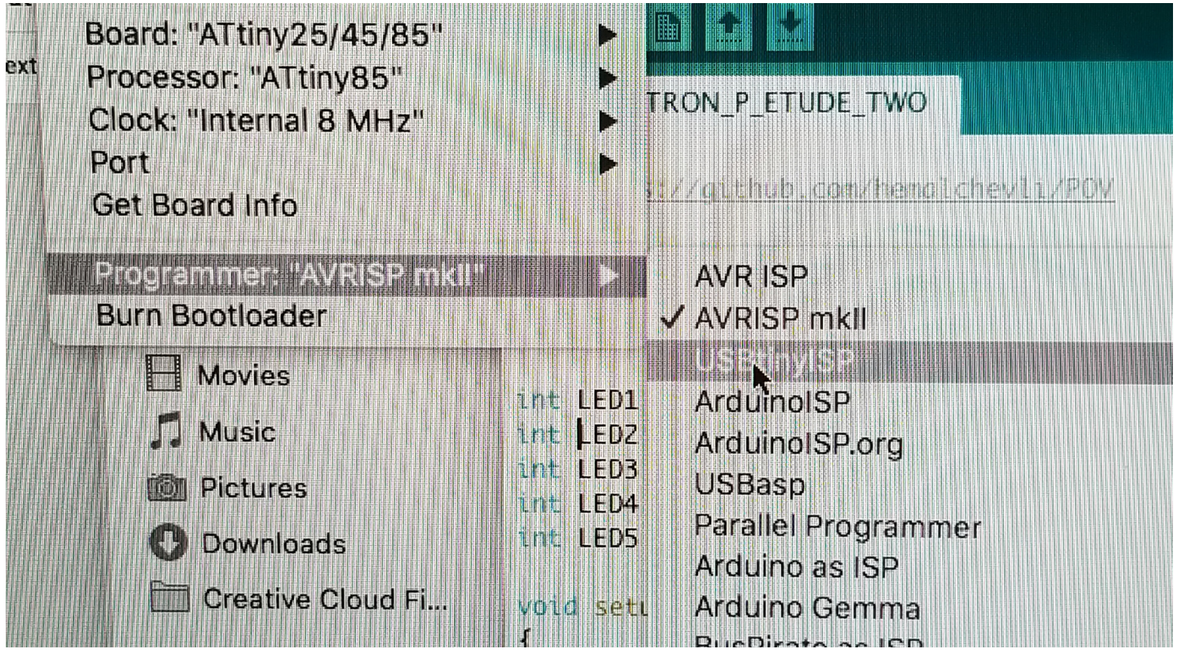


I was told the Fritzing diagram wasn't accurate, so instead of copying it wire-for-wire, I began trying to understand the logic behind the circuit to recreate it. I pulled out the wires where I didn't understand what was going on and studied the circuit for a bit.

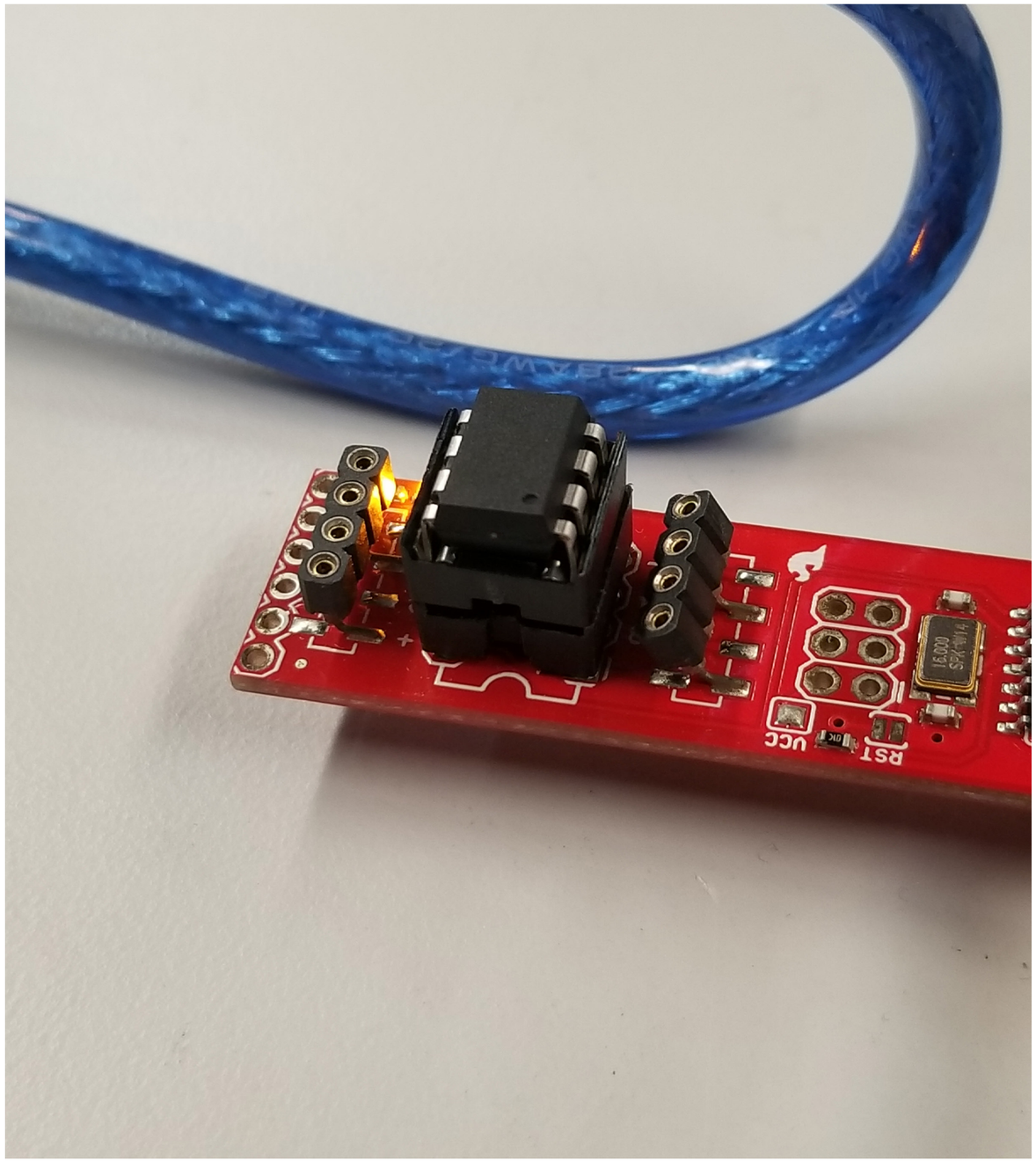


I realized that the anodes of each LED connect to a unique node. On the cathode side, the LEDs follow a step sequence back to ground through a resistor.

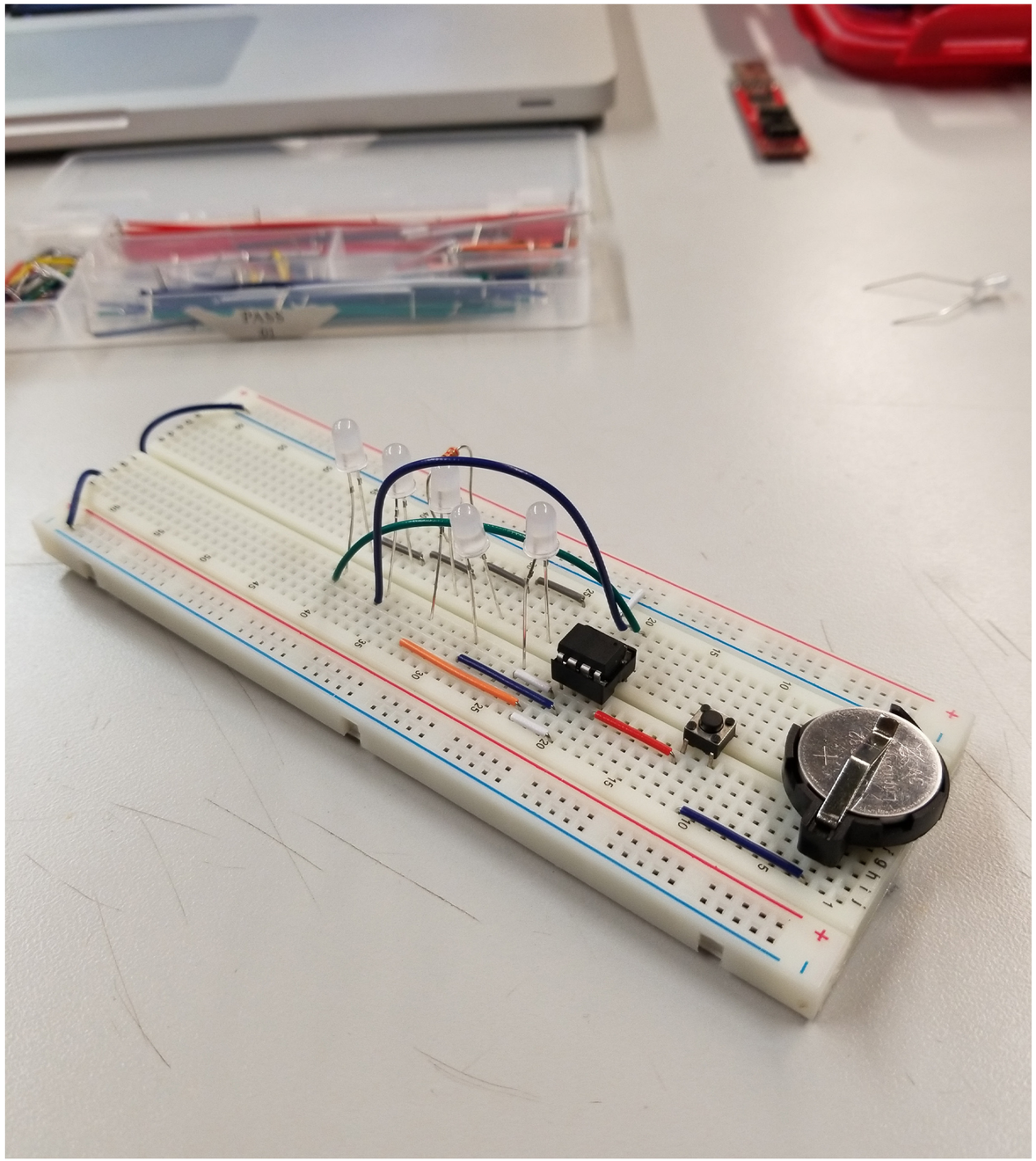




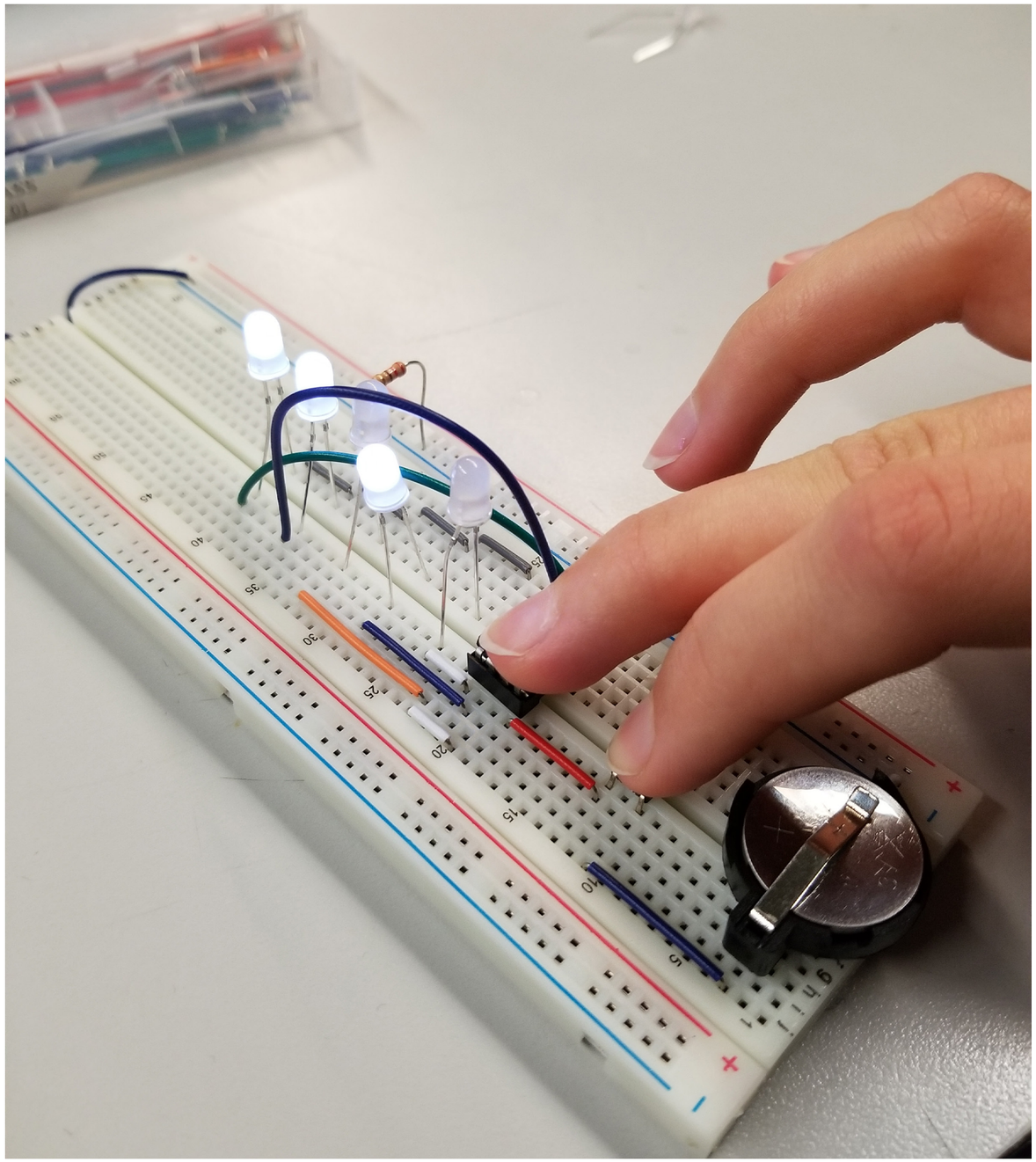
There was a little mishap with my settings in the Arduino IDE. Quickly fixed.



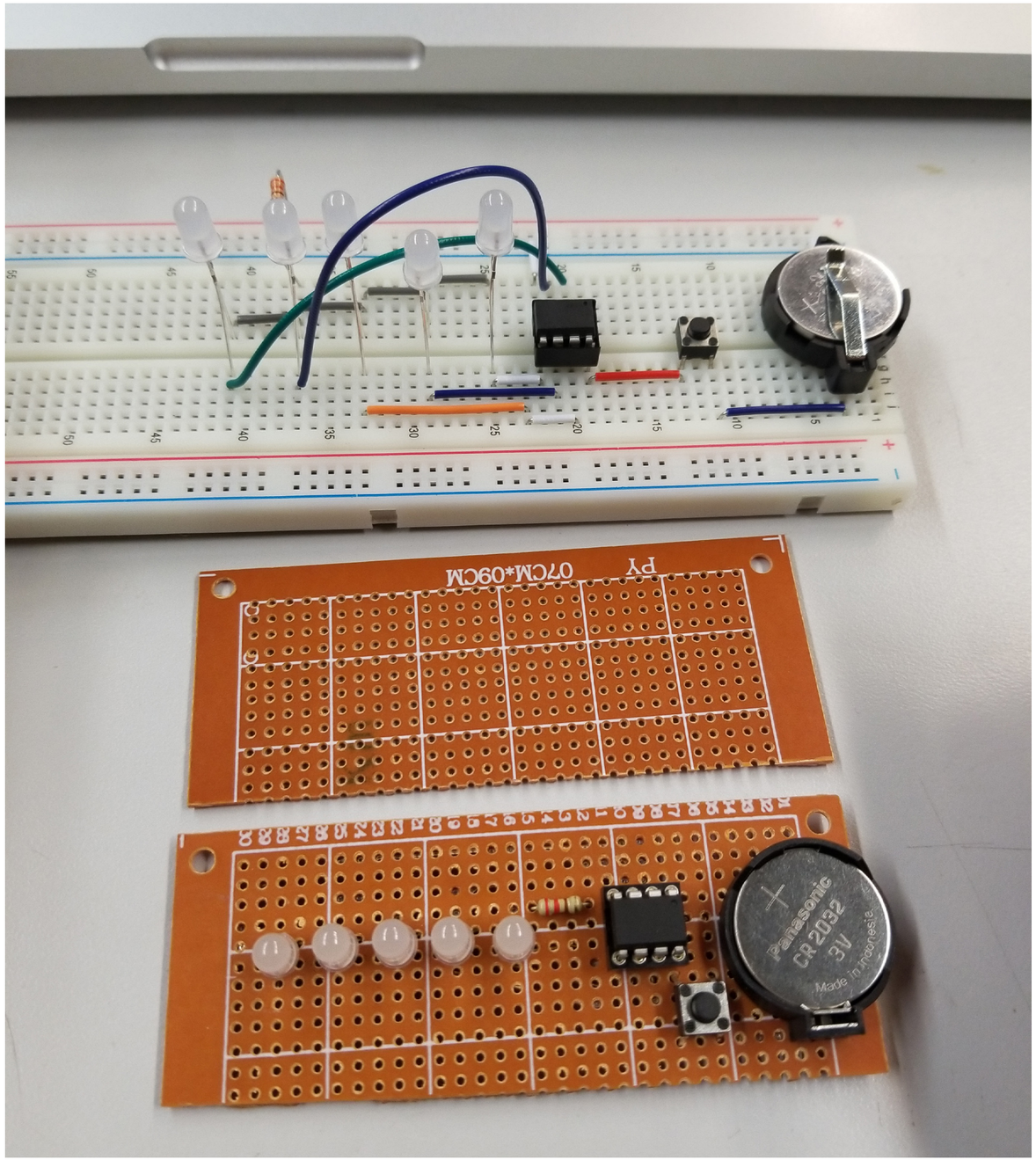
Uploading the program to the ATtiny85. I saw Codrin nearly set his on fire, so I was careful to put mine in in the correct orientation.



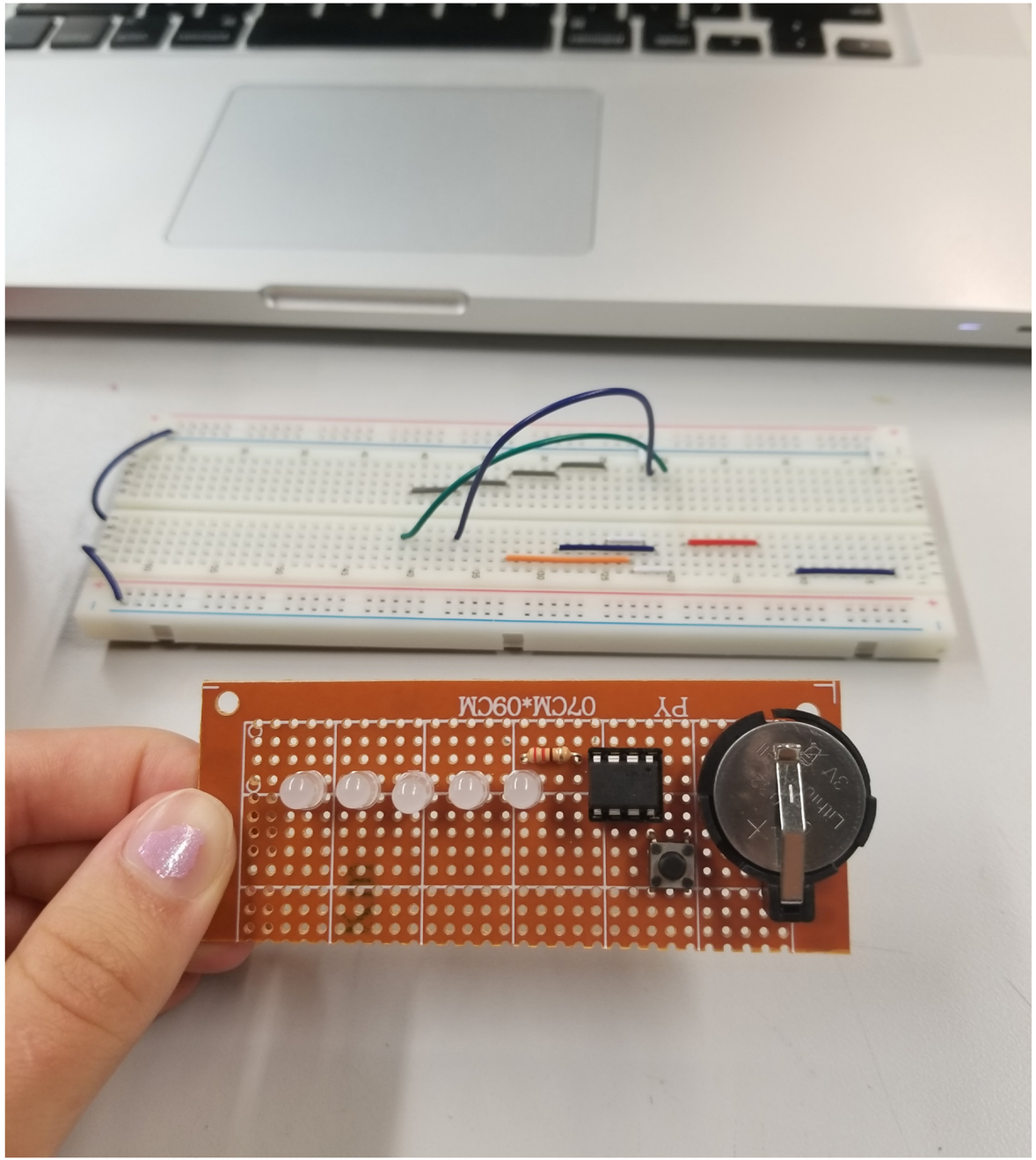
The final circuit on the breadboard.



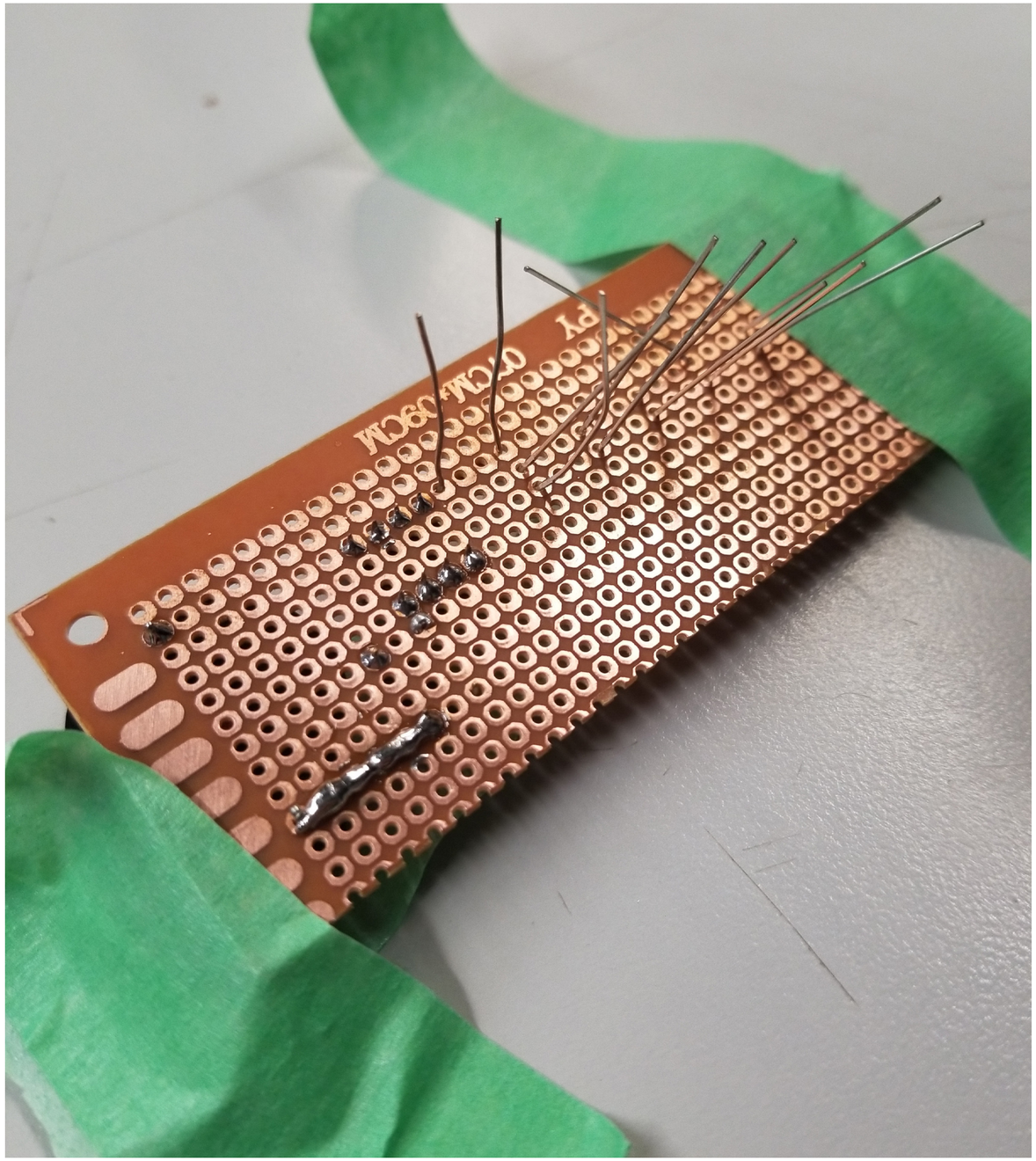
Works on the breadboard! I probably should have used colour coded wires, but I went for tidy instead.



Taking the components out of the breadboard and onto the actual plate was very daunting. I feel like the set up on the breadboard is unintuitive to understand what the real circuit will look like.

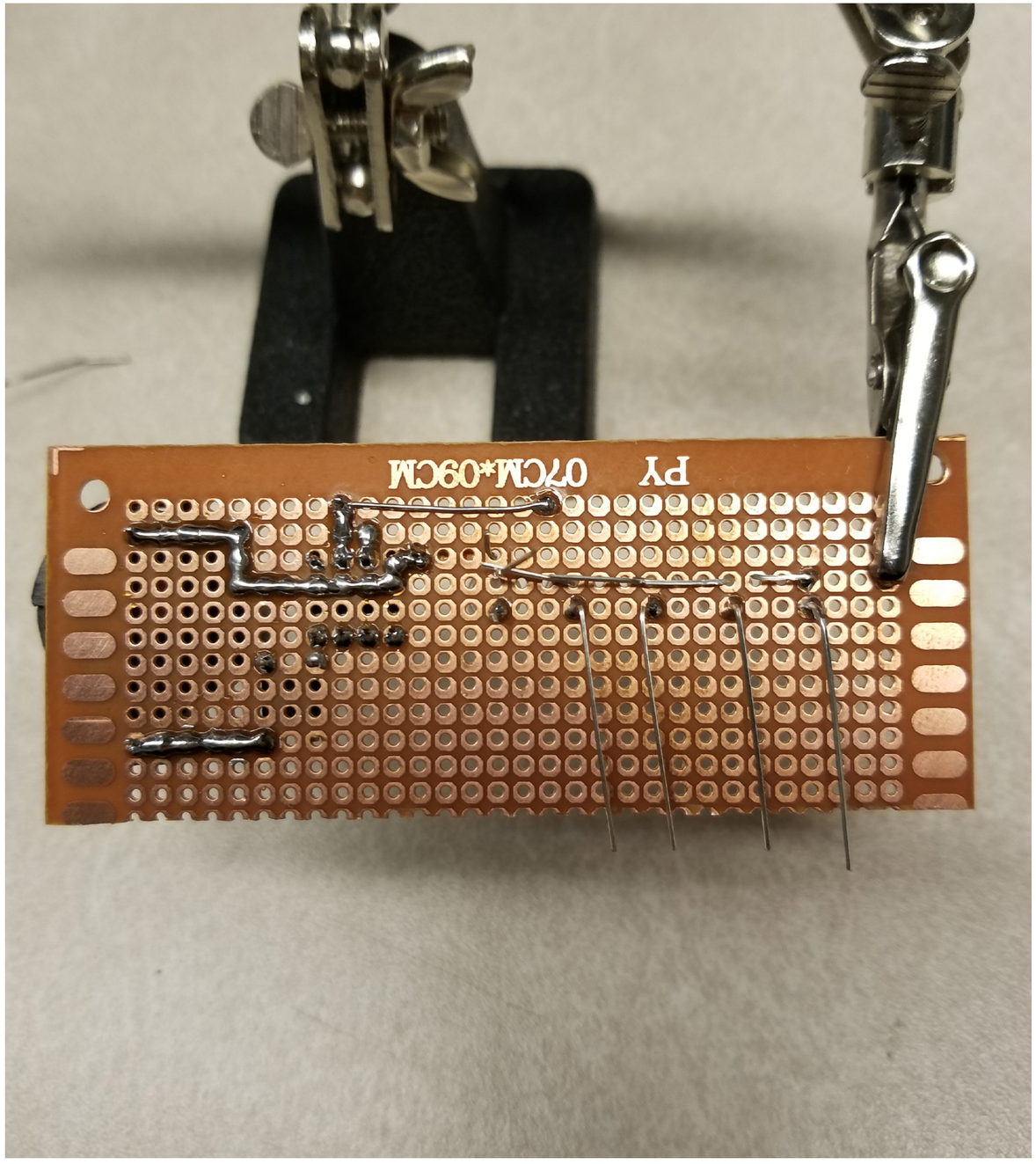


Took the components off the circuit out of the breadboard and placed them into position on the plate.



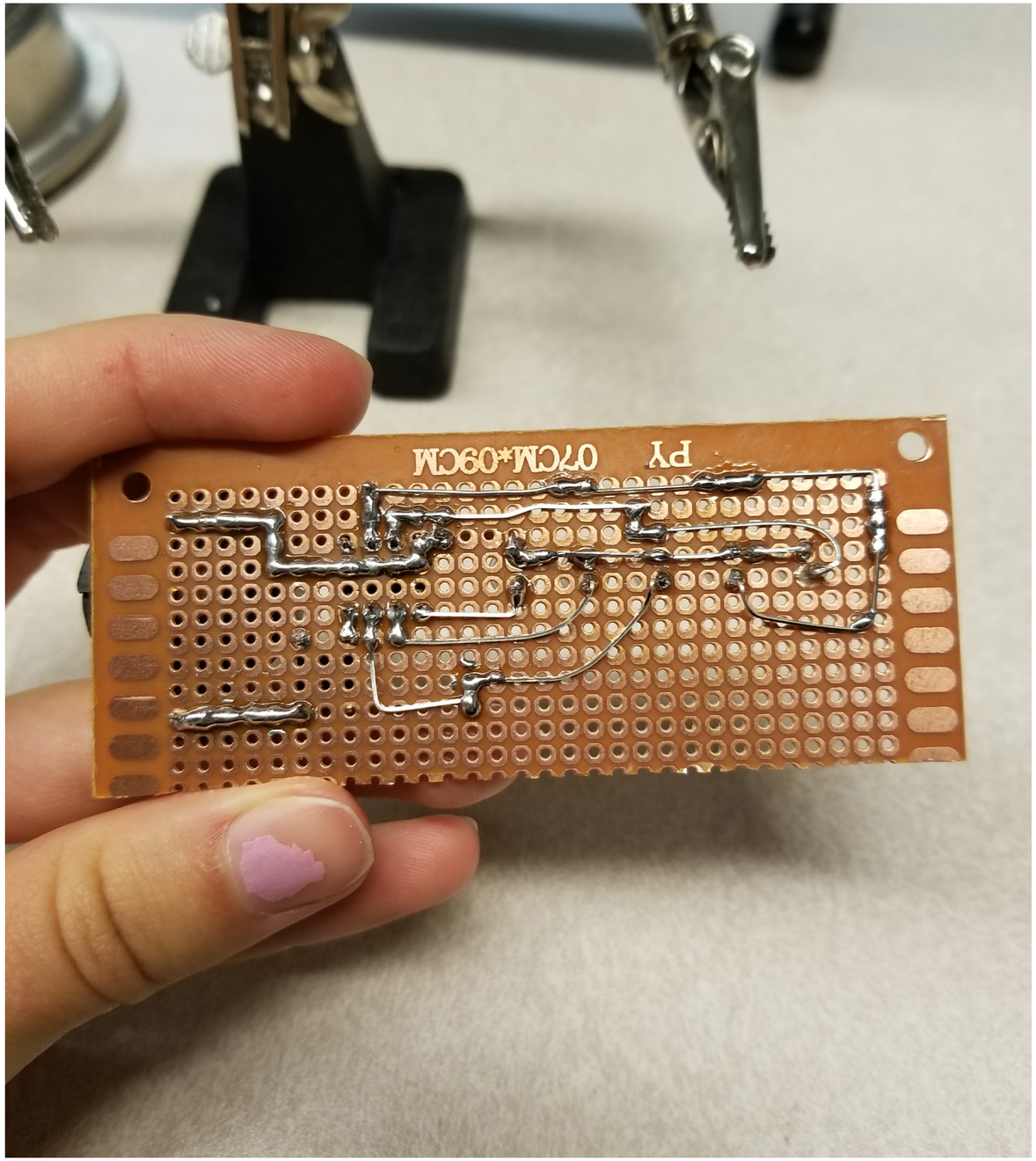
Taped everything down and begun soldering. I quickly noticed that while the tape was very useful to hold the components down, my board was still shifting around on the table uncomfortably. I was also told to remove the battery while soldering, since the heat from the soldering gun was turning on my LEDs.

I grabbed some clamps to hopefully make my life easier. I was able to hold the circuit higher up, and adjust the angle more quickly from this point on.

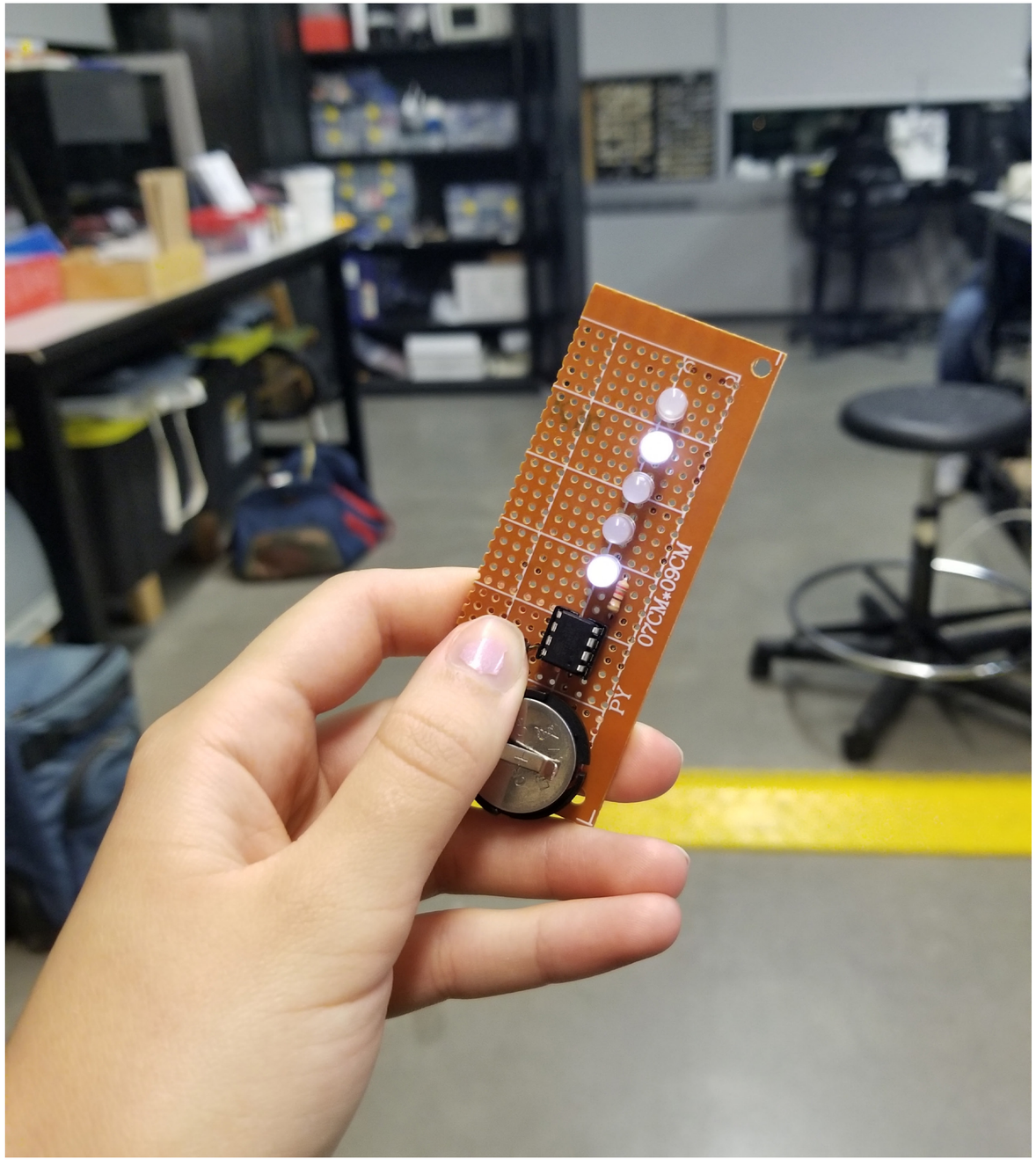


Looking at the example, I realized that the extra cut wire from the LEDs and resistor were being used as wires between the pieces of solder.

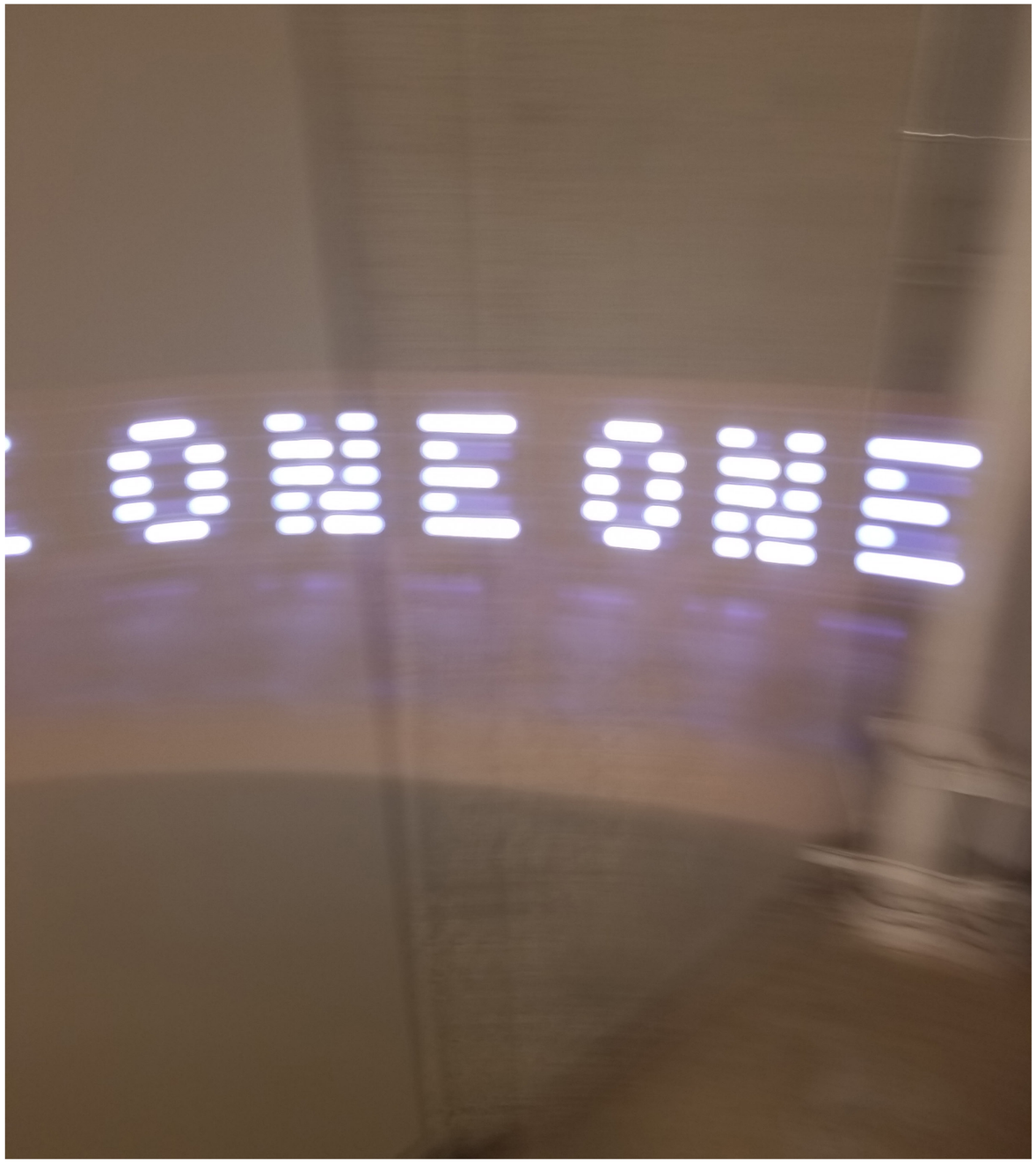
When soldering long wires down, the heat would sometimes separate the wire from the board and send the solder flying off at my face like a sling-shot. To avoid this, I put two blobs at the end of each wire, and at the corner of each wire.



The final circuit all soldered down. I was very careful in making sure things had plenty of room so that wires or solder wouldn't touch where they shouldn't, and made sure all the solder was touching where it should.

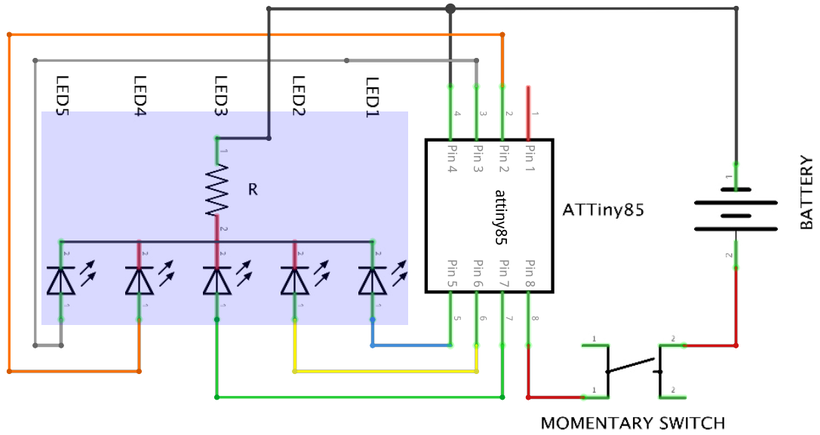


It lives!

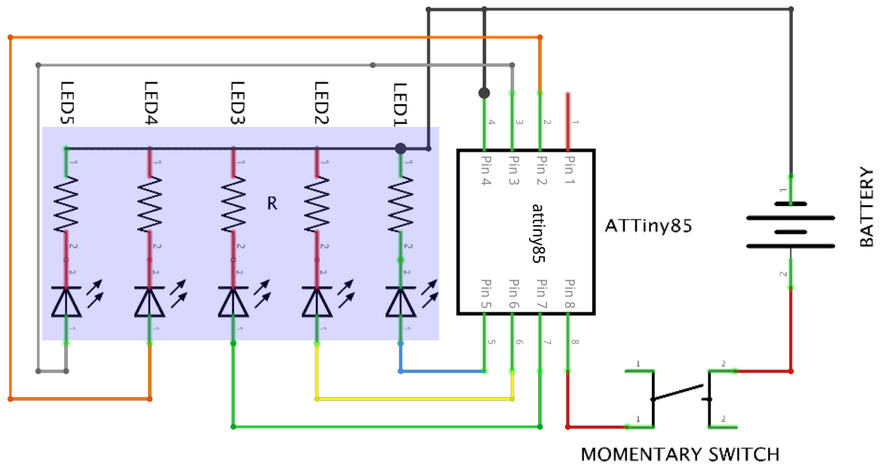


Testing the circuit in the sensor lab with a new message, “one”. I found it a bit strange that the letters appear in all caps, but must be written in lower case within the code.

Part Two: Perceptron-P (Etude-Two Alternate Circuit)



Electronic Schematic of Perceptron-P (Built Circuit).

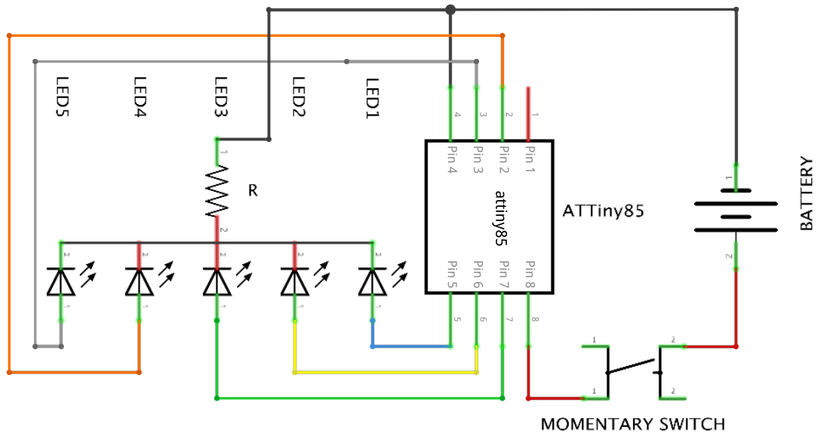


Electronic Schematic of Perceptron-P (Alternate Circuit).

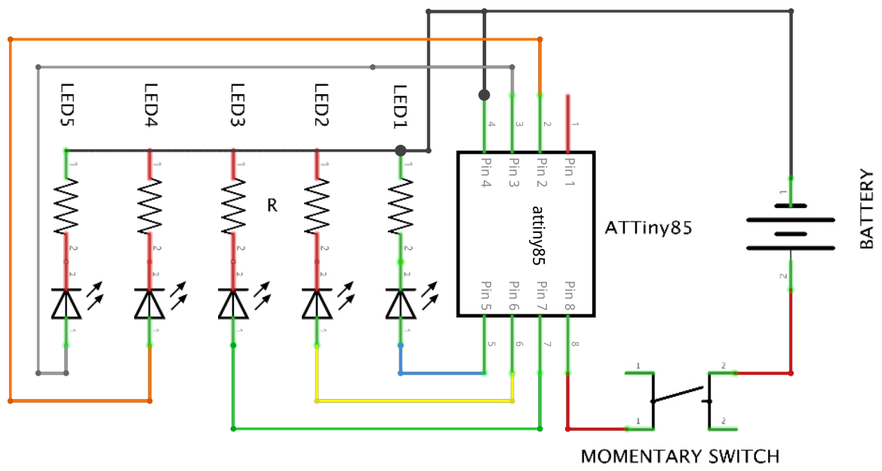
Compare and contrast the Electronic Schematics of the Built Circuit to the Alternate Circuit. Determine the feature(s) that distinguish these two circuits – what makes them different? Why?

The original has the cathodes of the LEDs in a step-sequence with one resistor at the end, which is sent into pin 4. The LEDs are in series, meaning that they all share a common node and that the same current is flowing through them.

The altered circuit has a resistor after each LED, which is also sent into pin 4. While it may look like they are in parallel, the LEDs are still in series, meaning that all five resistors are causing a drop in current throughout the circuit.



Electronic Schematic of Perceptron-P (Built Circuit).



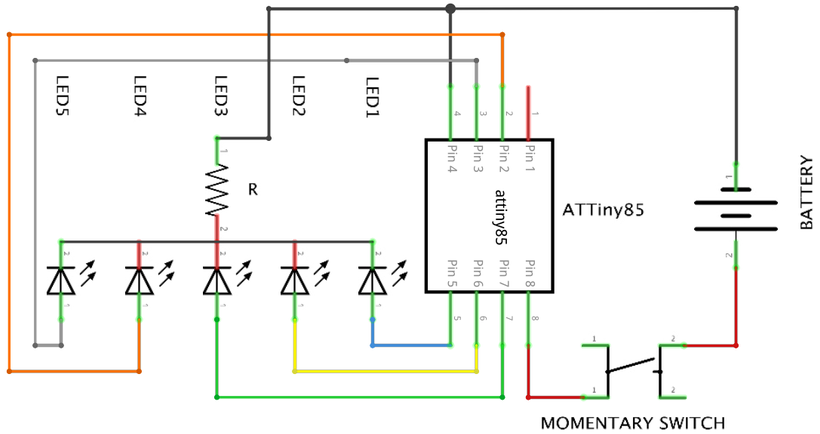
Electronic Schematic of Perceptron-P (Alternate Circuit).

Which of the circuits presented would be more reliable circuit – Why? What is occurring with the V/I/R in the area(s) that you have discerned as important?

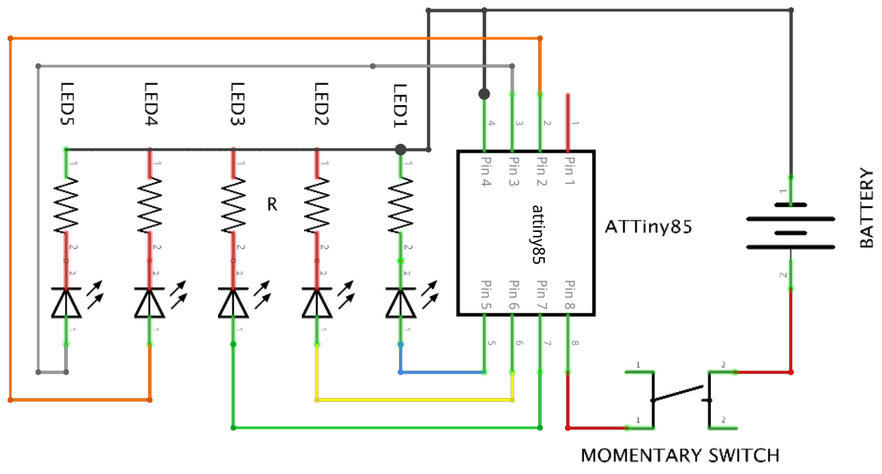
While the original circuit is more power efficient, the altered circuit would be more reliable in case of a surge in power, or a resistor failure.

Power efficiency: each component, including LEDs and resistors, consume some power. On the original circuit, let's say each LED and resistor causes a power drop of 1V. There are five LEDs and one resistor in series. You would therefore need +6V to power these components. On the altered circuit, there are five LEDs and five resistors in series. You would therefore need +10V to power these components. This logic leads me to believe that the alternative version of the schematic consumes more power. You would need a battery with more charge to power the alternate circuit.

Resistor failure: the original circuit relies on one resistor, while the altered on five. If one resistor fails on the altered circuit, there are still four others backing it up. If it fails on the original, there will be no working resistor in the circuit.



Electronic Schematic of Perceptron-P (Built Circuit).



Electronic Schematic of Perceptron-P (Alternate Circuit).

How would you further extend the Perceptron-P, what would you introduce to the Perceptron-P in order to make the experience more meaningful? Draw the modified circuit in Fritzing.

Rather than change the circuitry to make the experience more meaningful, I think the main problem is that the product feels incomplete in its design and use.

For one, I found that my thumb would turn off the circuit when held the wrong way. A better casing with care to detail would improve the experience of using the Perceptron-P.

There also isn't much to look forward to in the experience, it's at most a cool trinket at the moment. Perhaps having someone else code a message that you must discover to gamify the experience would make it more meaningful. It could also potentially be used as a prop for a performance piece following a dancer, displaying a poem that can tie in thematically to the blinking lights and difficult legibility.