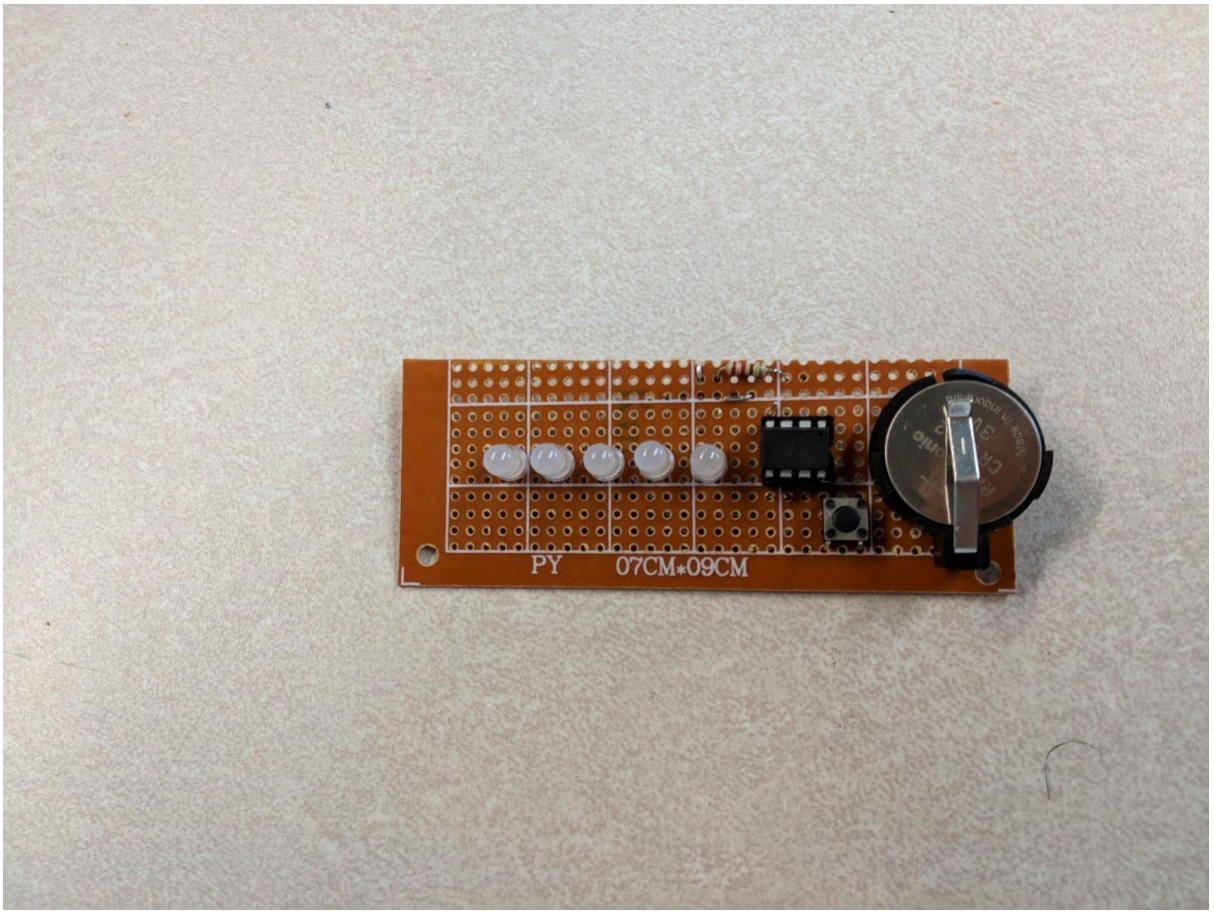
Etude II: Perceptron-P

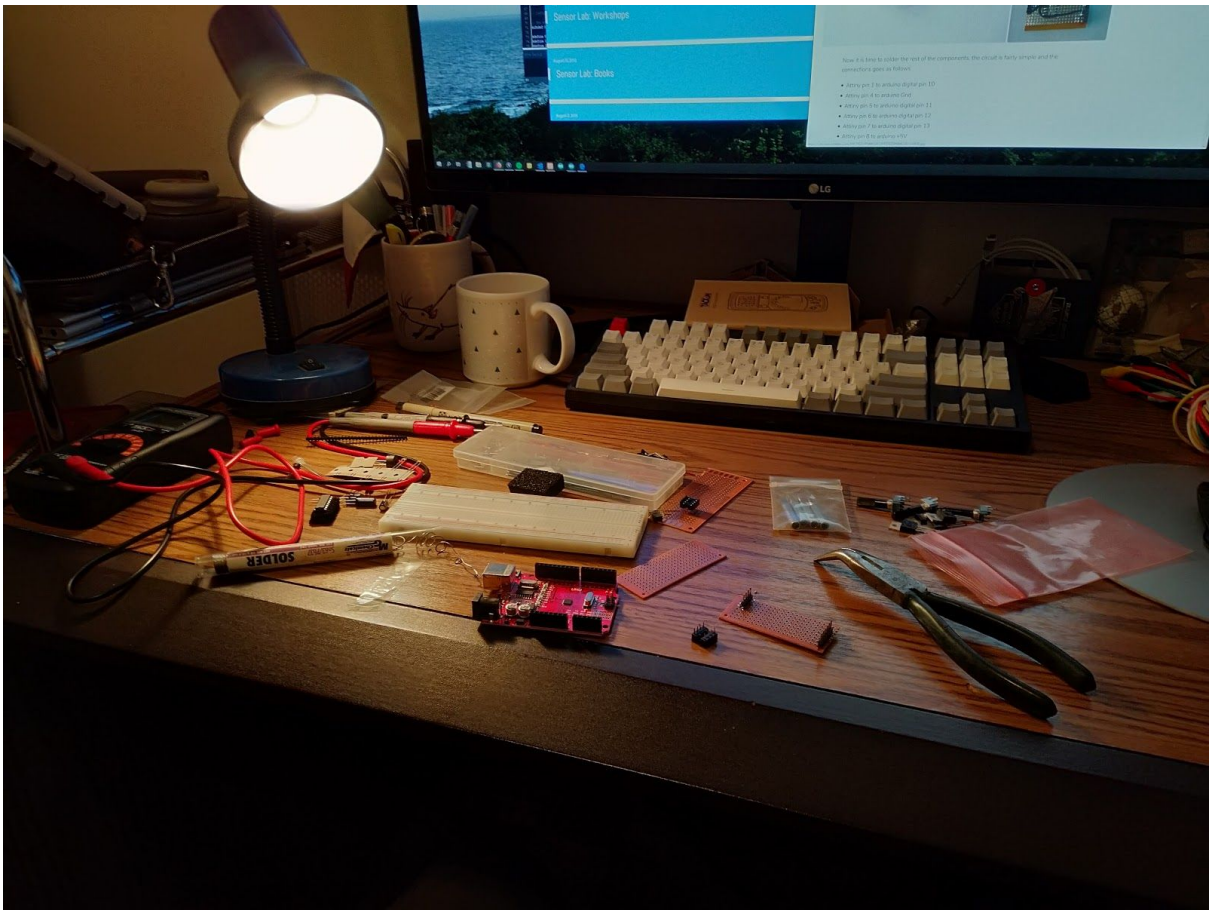
Michael Hemingway | Sept. 28, 2018

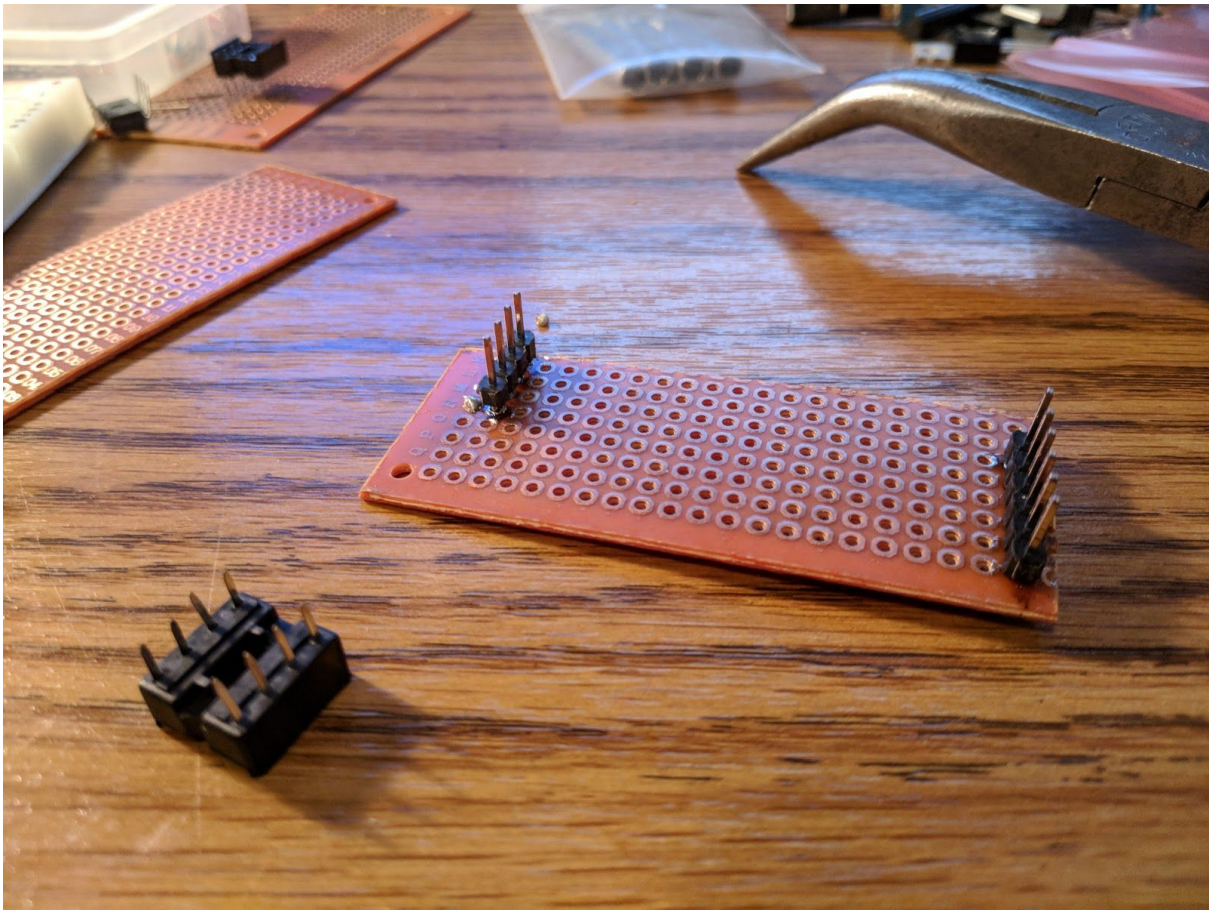
Circuit Design

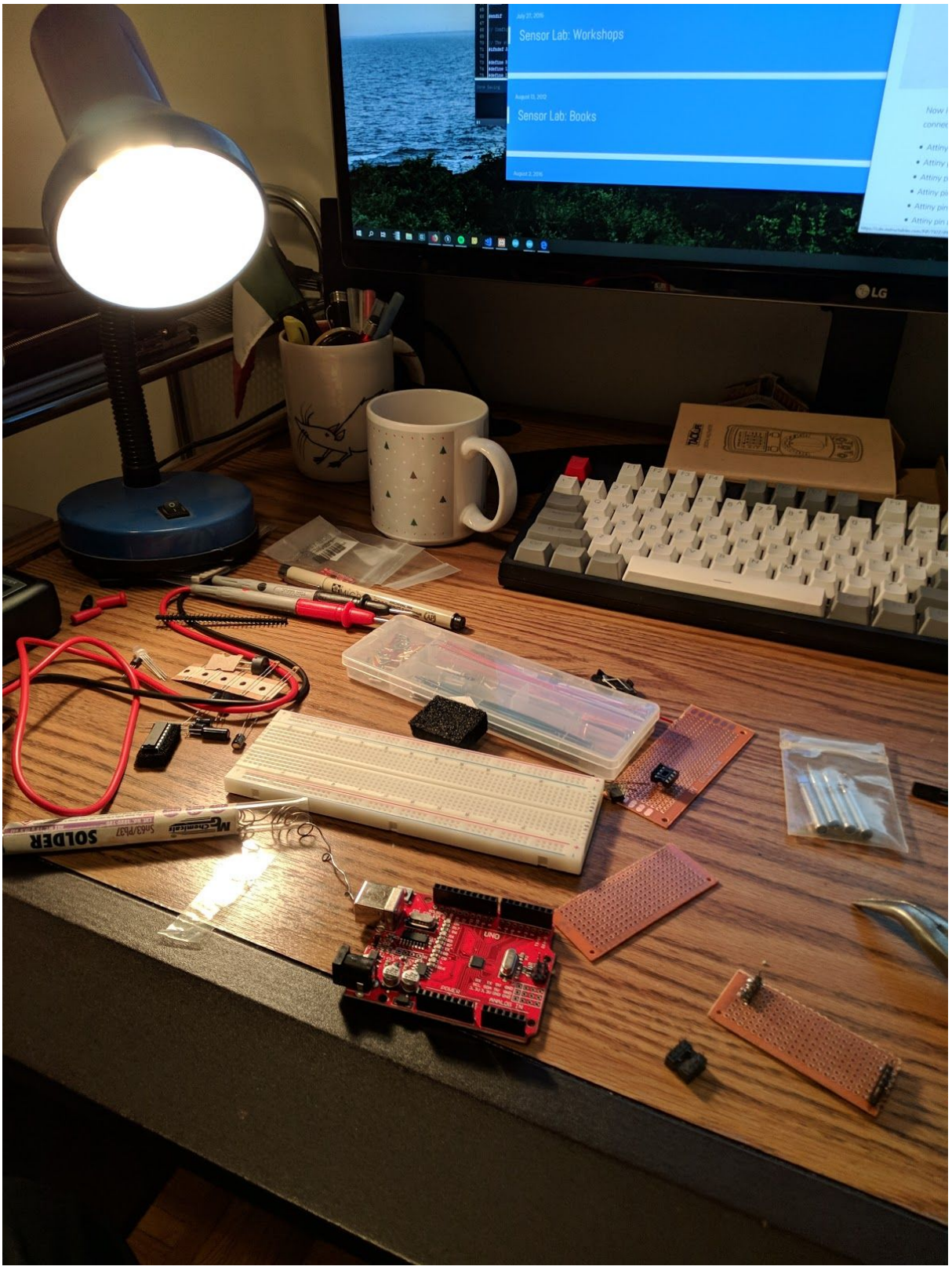


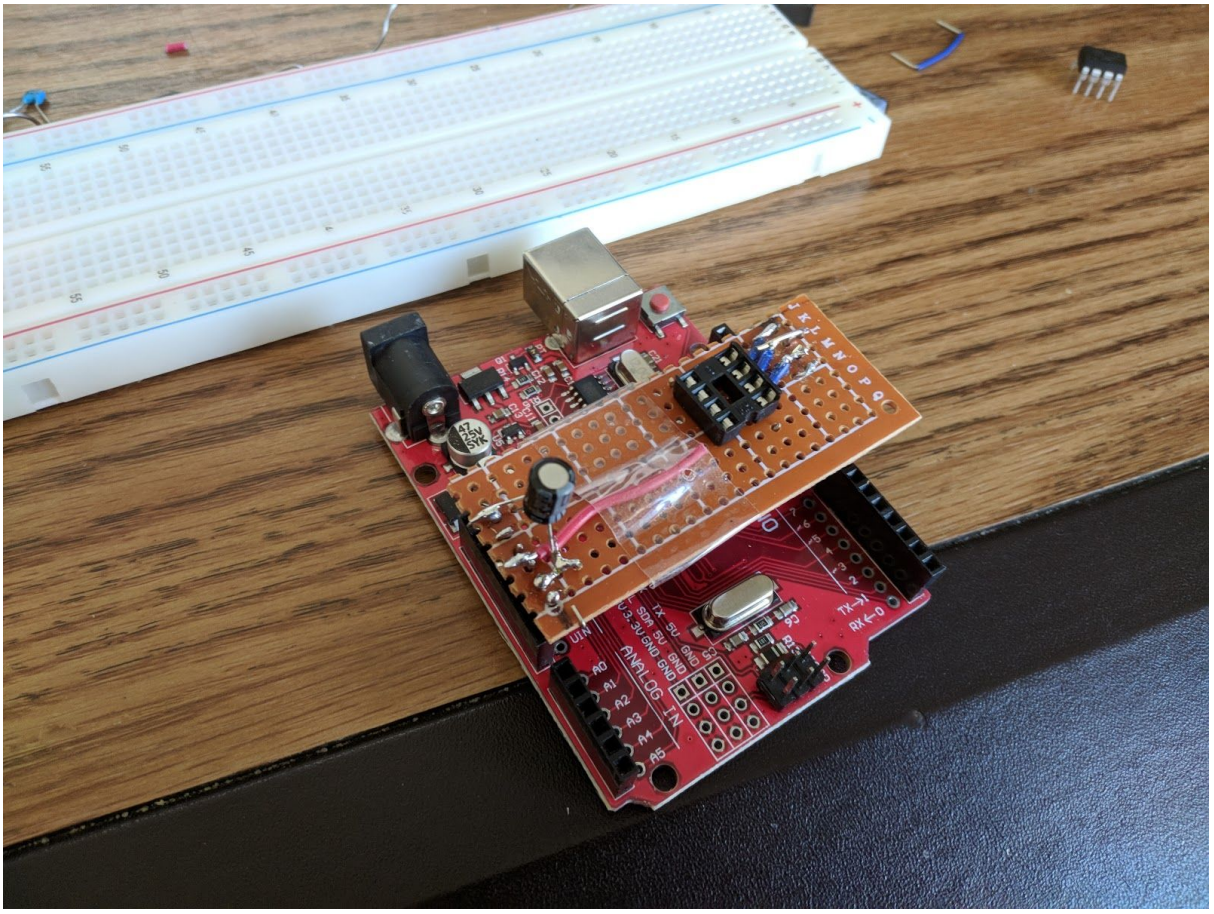
First, the finished product. The chip runs an ever-so-slightly modified version of our reference code with the additional capability to have spaces in the string, as I wanted one and I knew that {0, 0, 0, 0, 0} was likely to be the set of values needed to turn all lights off.

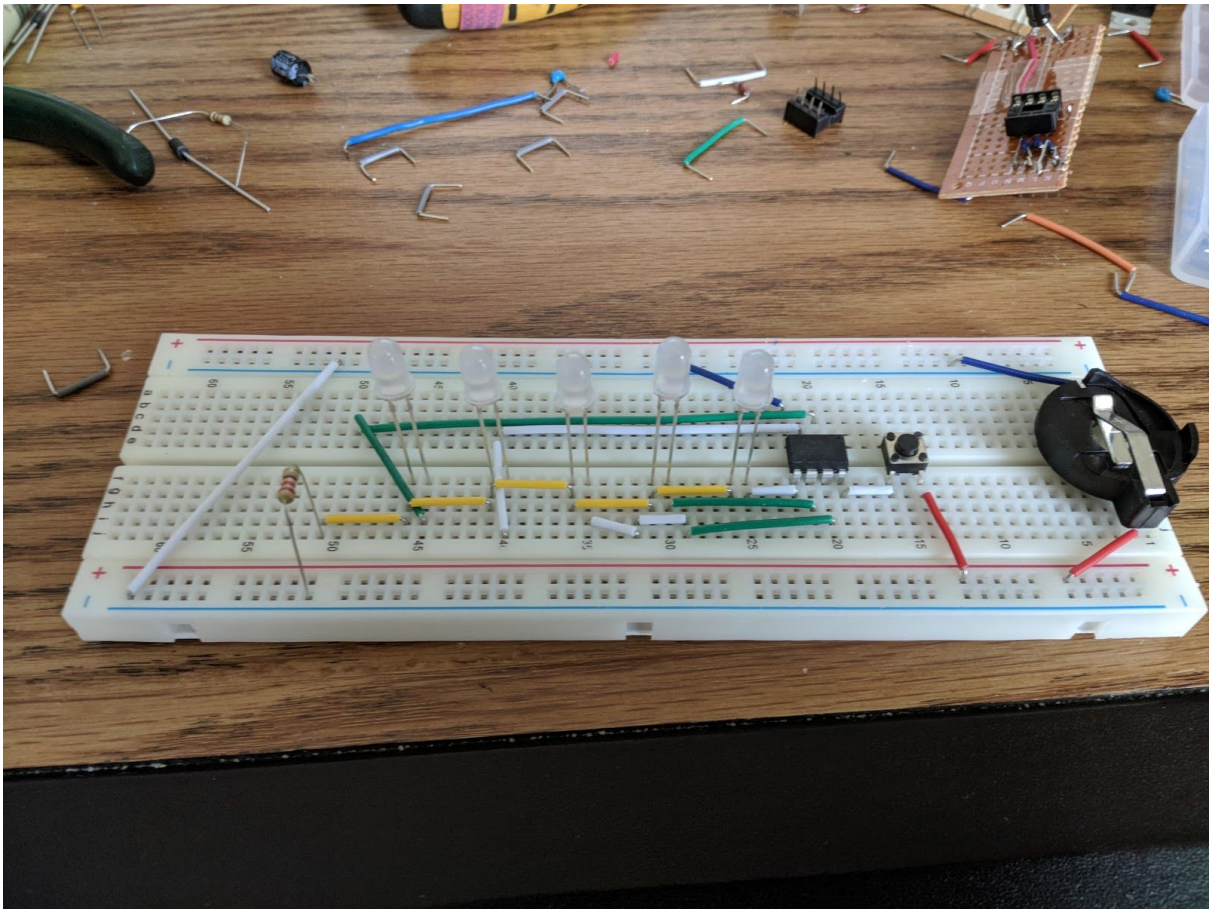
In the following images we can see my attempt at creating my own ATTINY flashing board, but I gave up when my eyes stopped being able to focus so late at night.

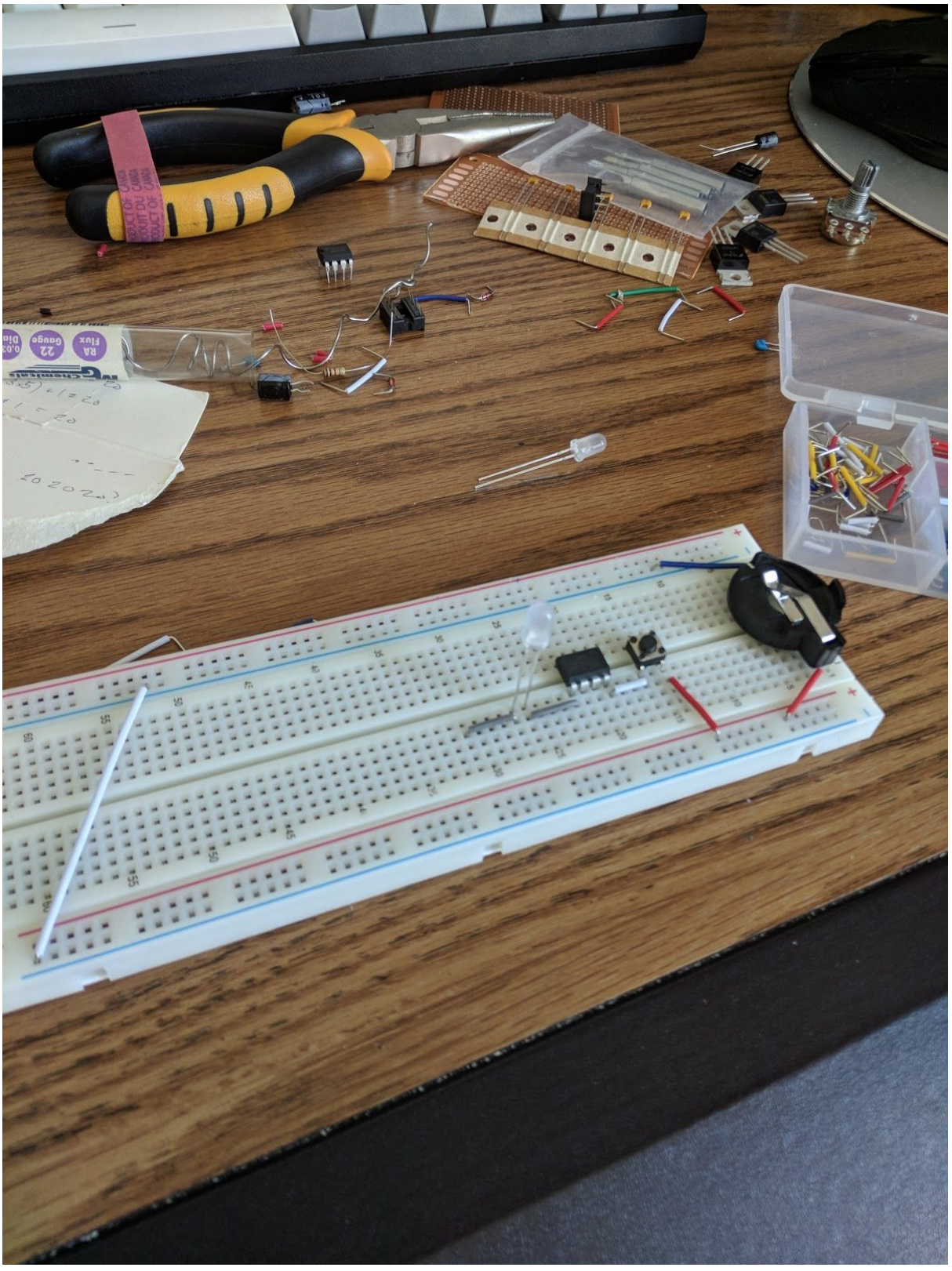

Sensor Lab: Workshops
Sensor Lab: Books
SOLDER



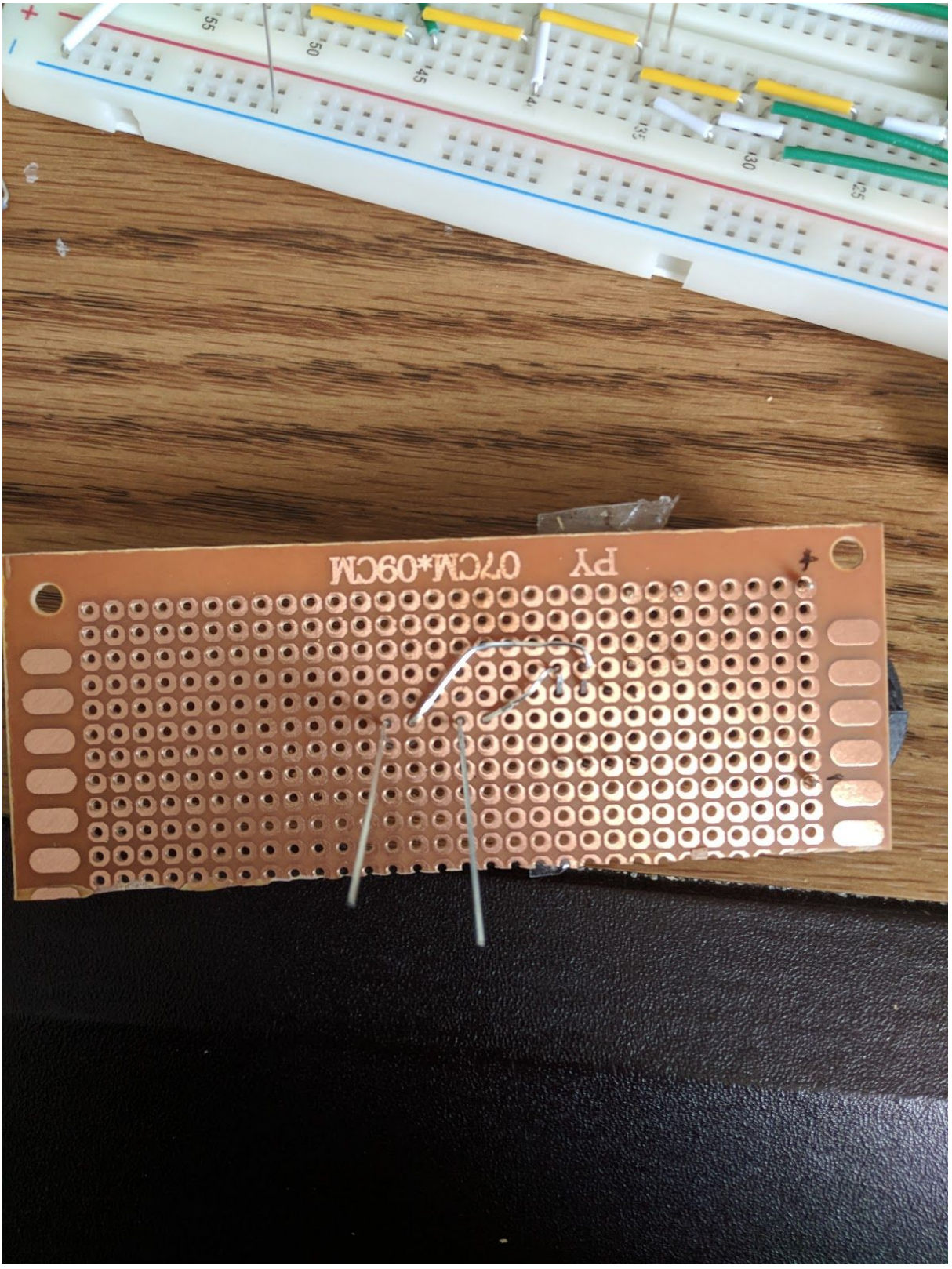

Sensor Lab: Workshops
Sensor Lab: Books
LG
SOLDER
UNO

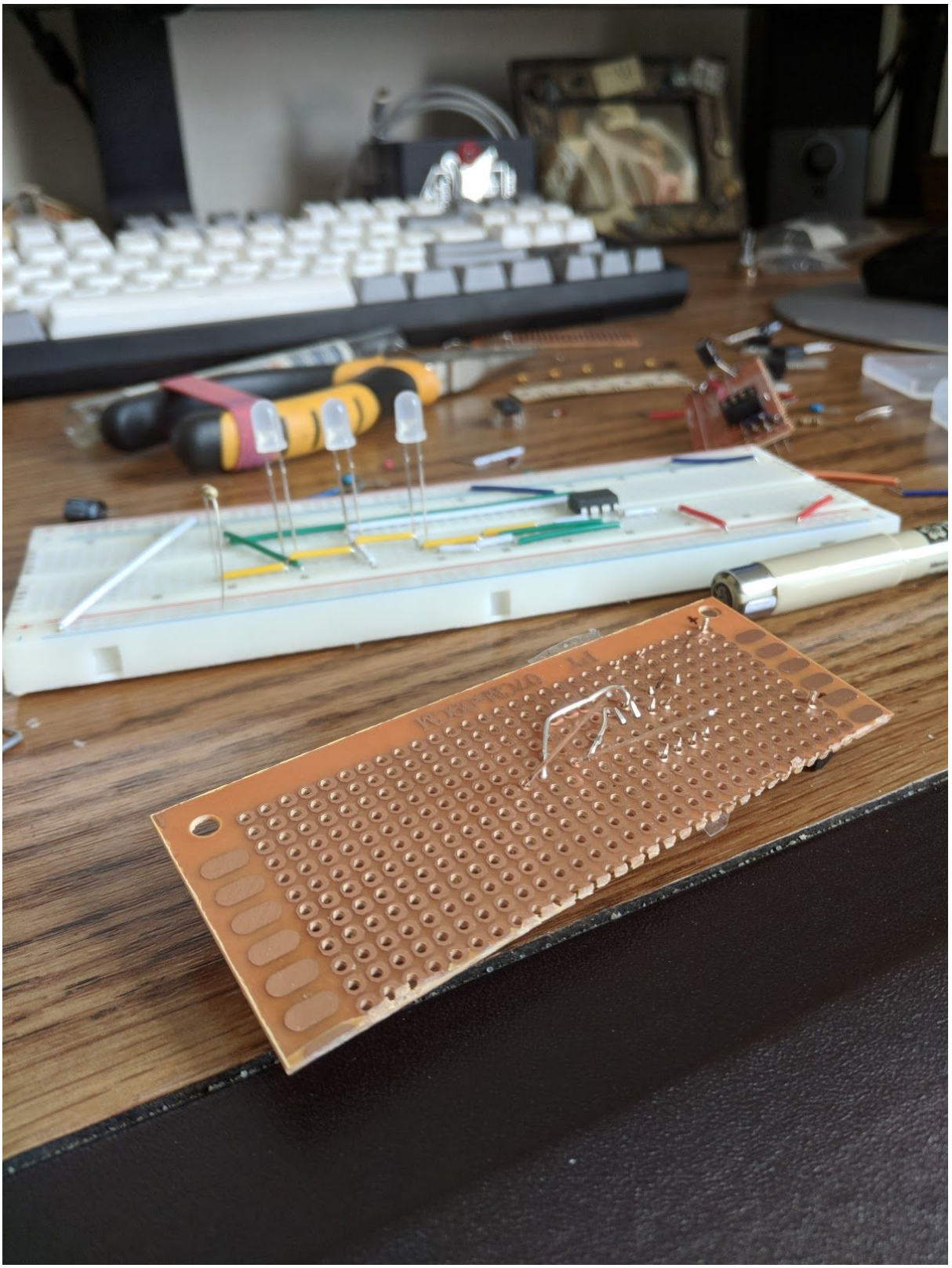

ANALOG IN
TX->I
RX<-O

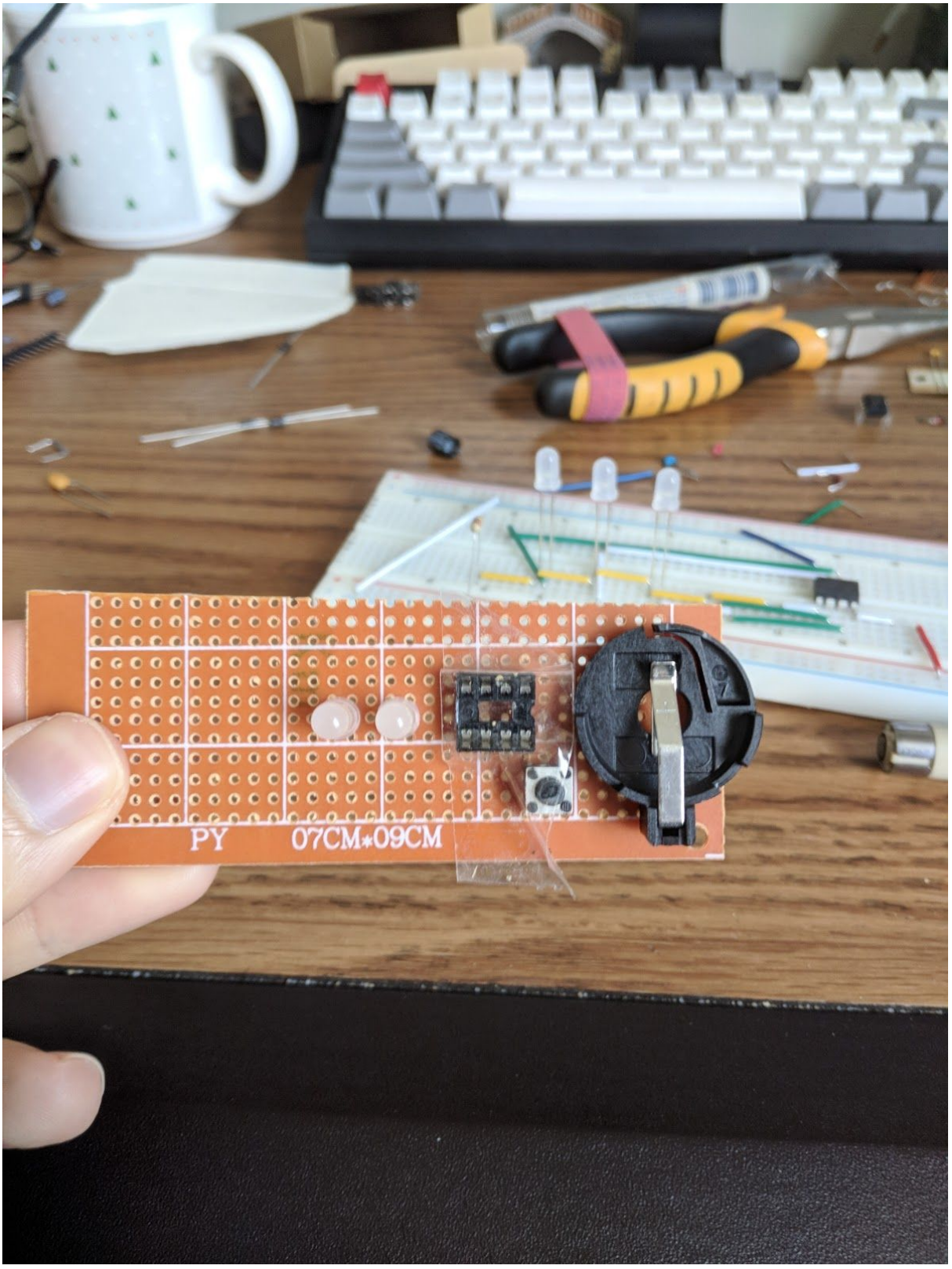


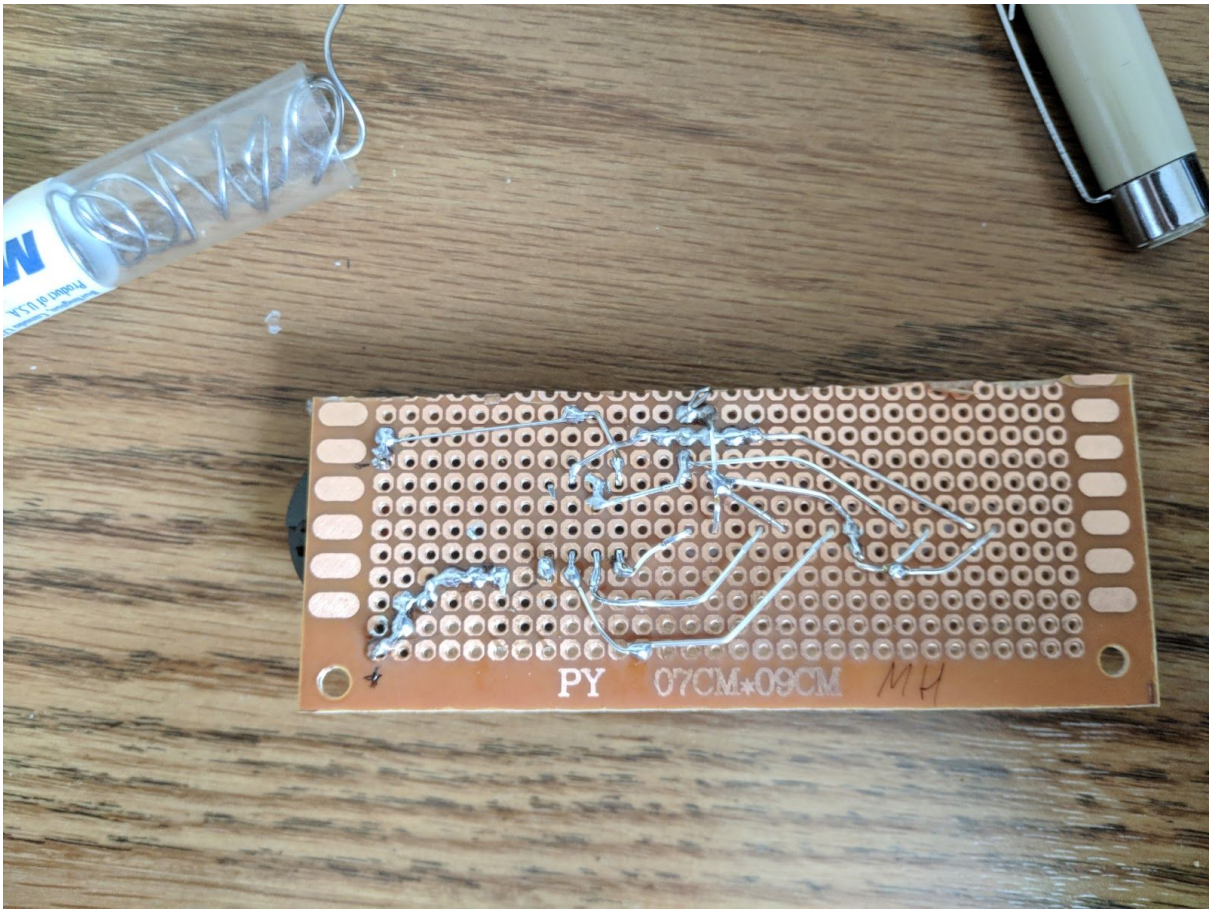


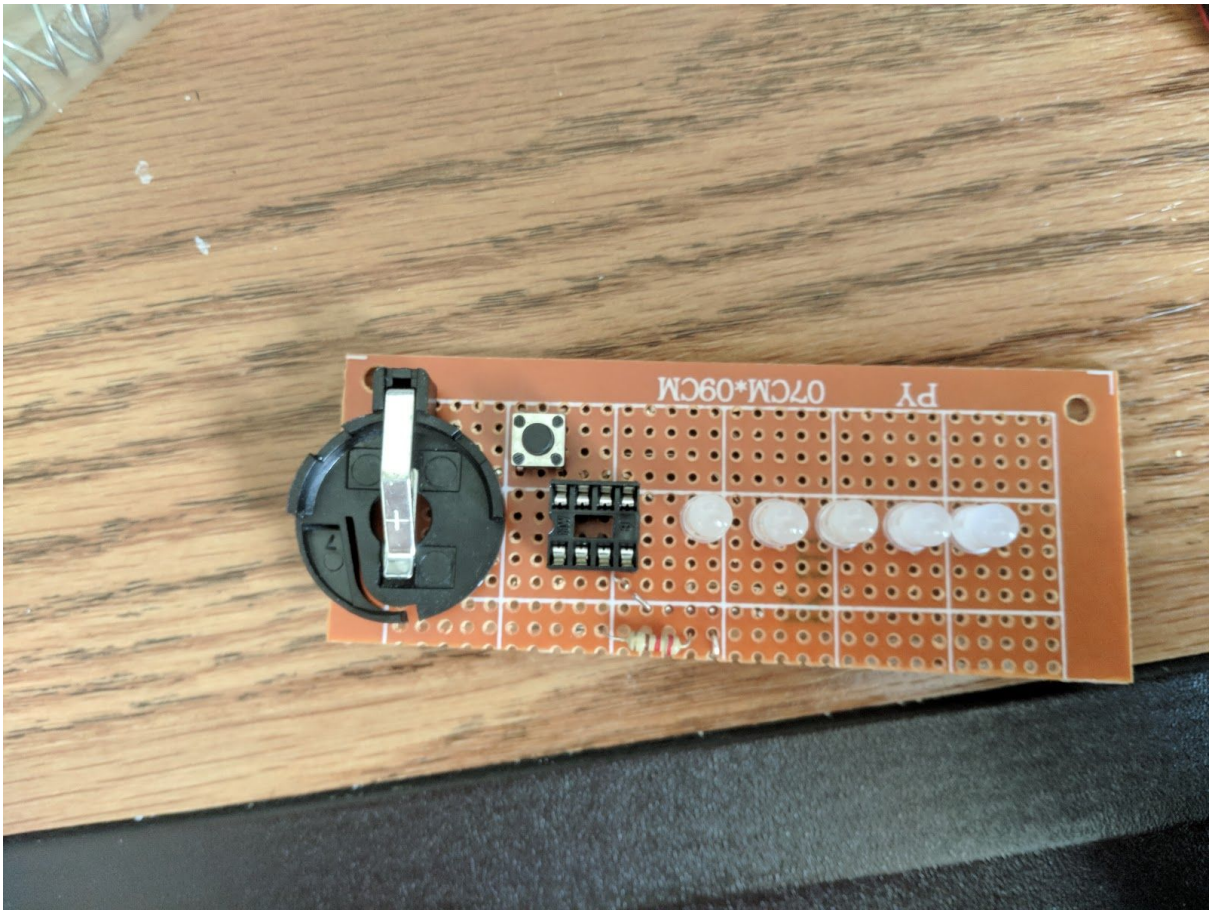
The circuit building process began with dismantling the breadboardboard and placing the components onto the perf.

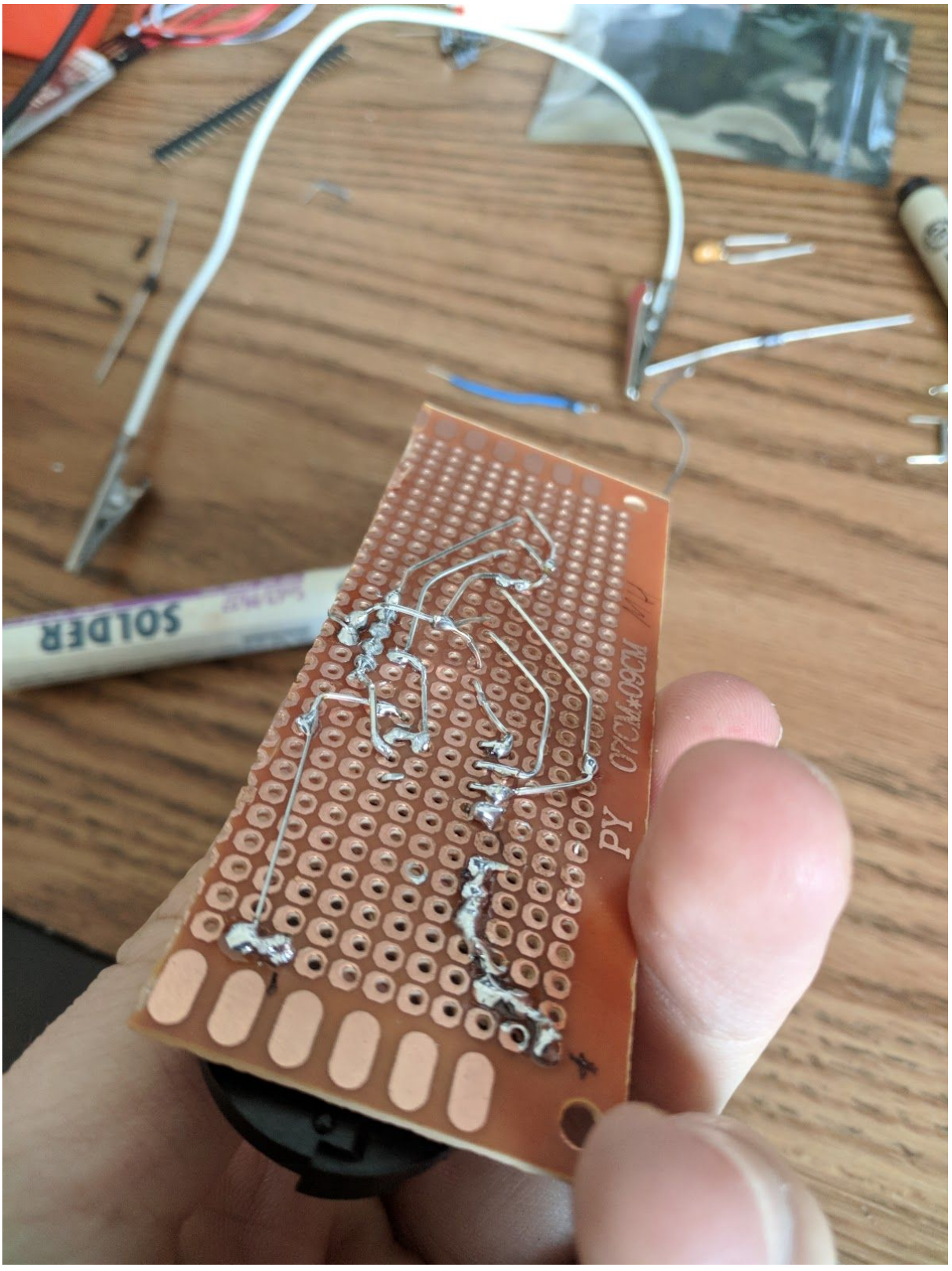

PY 07CM*09CM




PY 07CM*09CM


PY 07CM*09CM


PY 07CM*09CM



Slightly more civil engineering than I expected.

Alternate versus Built

The single difference between the alternate and built circuit is the dedicated resistor design in the alternate. As opposed to the built, each LED has its own resistor placed between its negative lead and ground.

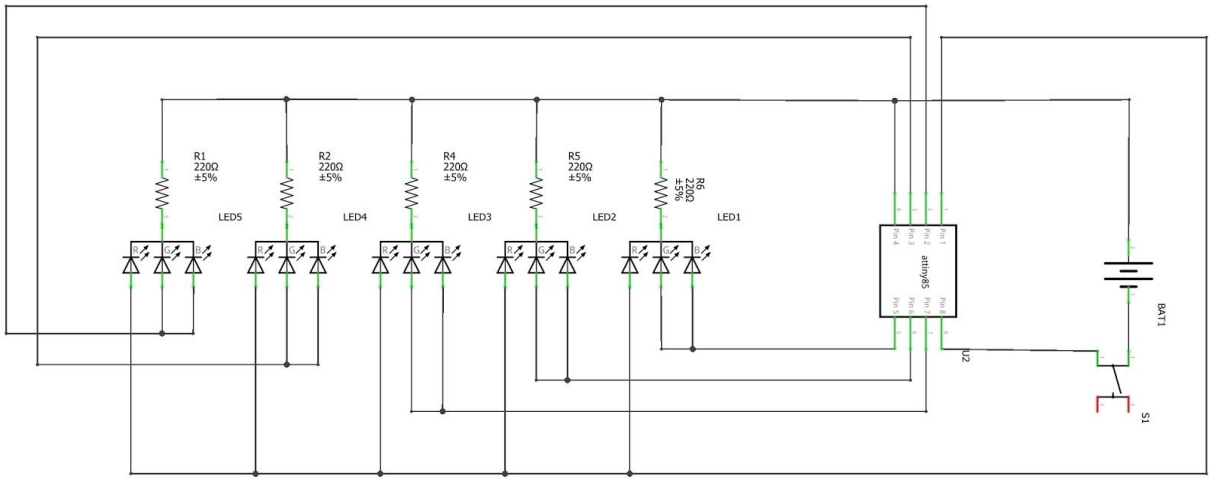
Whilst the built design exhibits a single point of failure in the series resistor, the effect of the Perceptron is broken when even one light is defective, so the added points of failure make it the worst design on the two. Additionally, should BoM be a concern, the built design would be ever so slightly cheaper.
The alternate circuit's total resistance will drop proportionally to the number of resistors and their values following this following rule, and I must assume that this design uses the same resistor value as the reference design, else we could increase the resistor values to achieve similar characteristics as the ref.

$$\frac{1}{Rt} = \frac{1}{R1} + \frac{1}{R2} + \frac{1}{R3} \cdots$$

The increased current we'd find if the resistors were not increased in value to compensate for the parallel design might harm the ATTINY, and wear out the life of the LEDs, but that's unlikely.

The best thing about the alternate circuit is that it would protect against one LED letting through more current than others, as each trace has its own limiting resistor.

Additional Mods



Were I to modify the circuit, I'd use that free pin on the microcontroller to give two colors to the text, making it hopefully easier to read. RGB LEDs with two pins bound to one on the IC and pin 1 on the tiny controlling the last, operating in concert to deliver two colors.