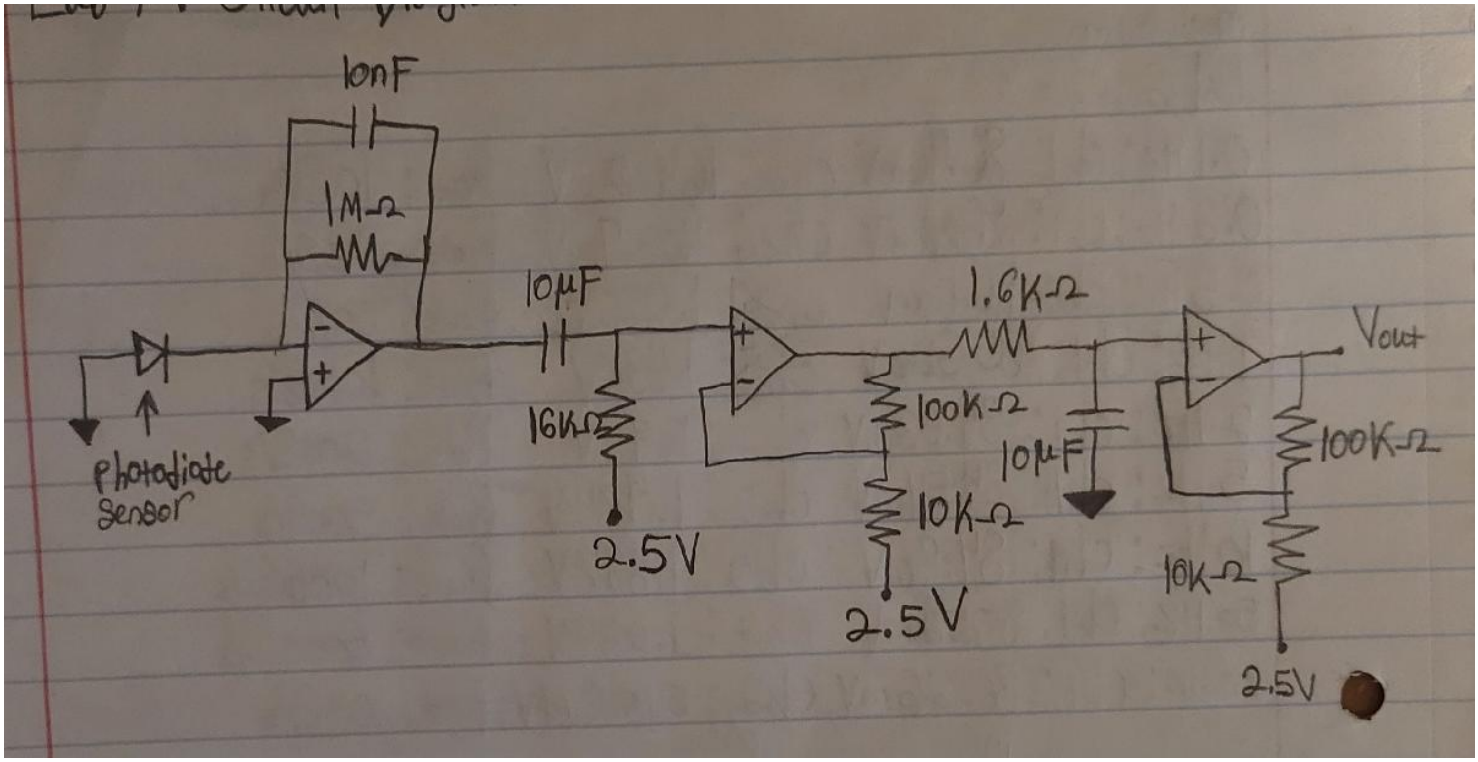
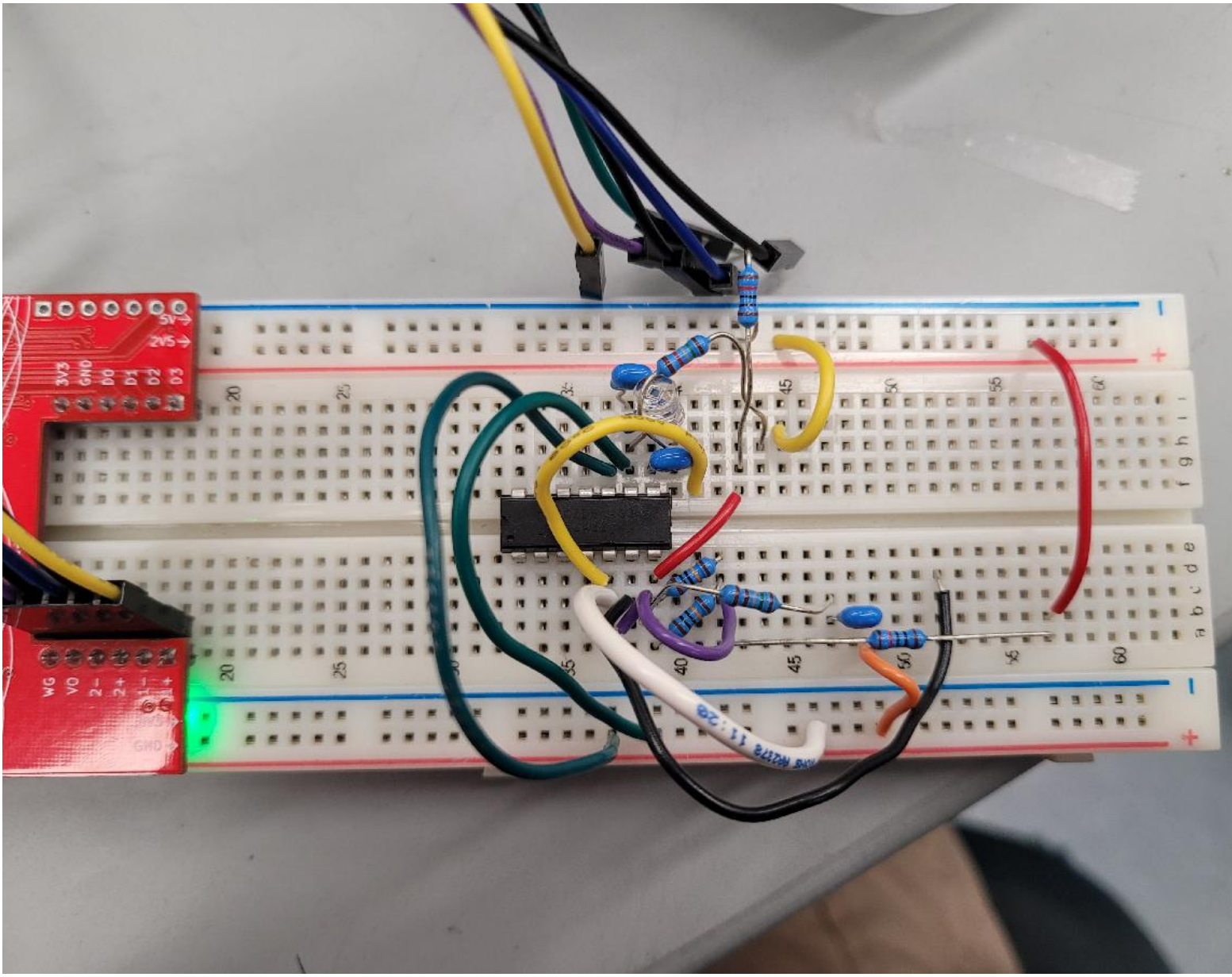
Lab 7

Final Circuit Schematic and Photo

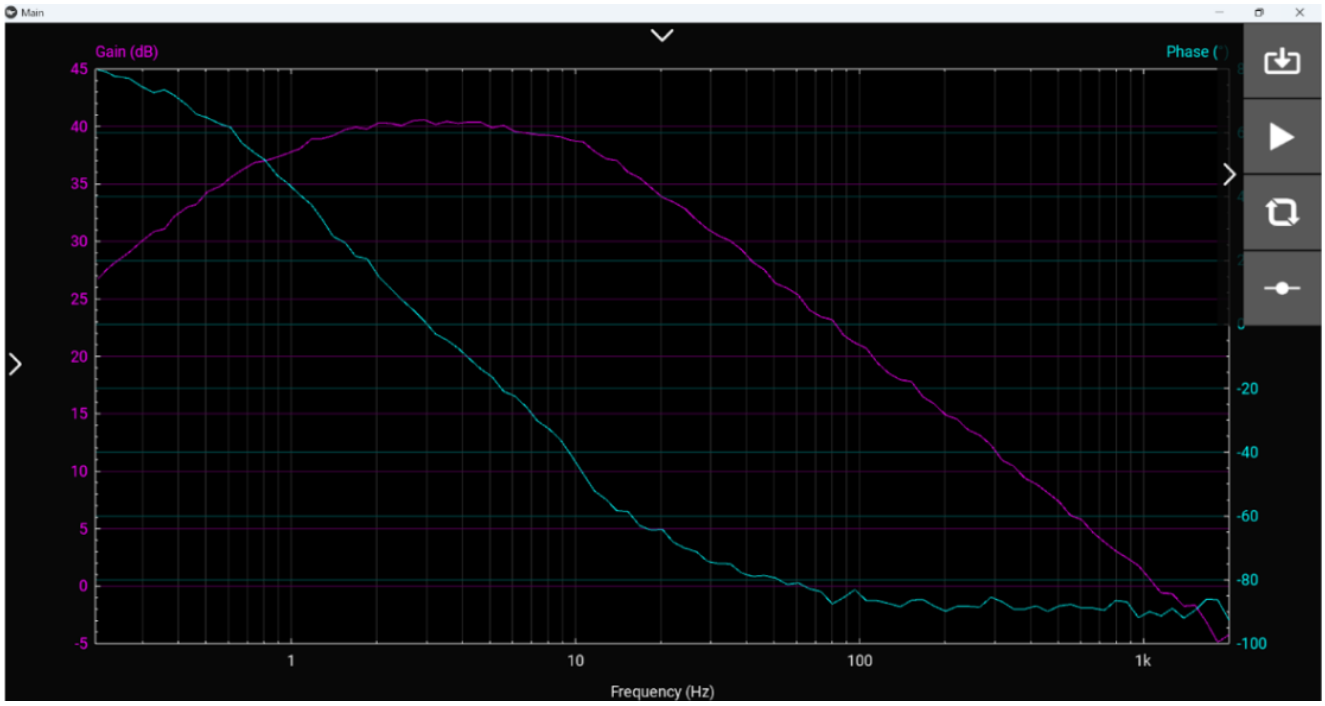




Selecting Resistor and Capacitor Values

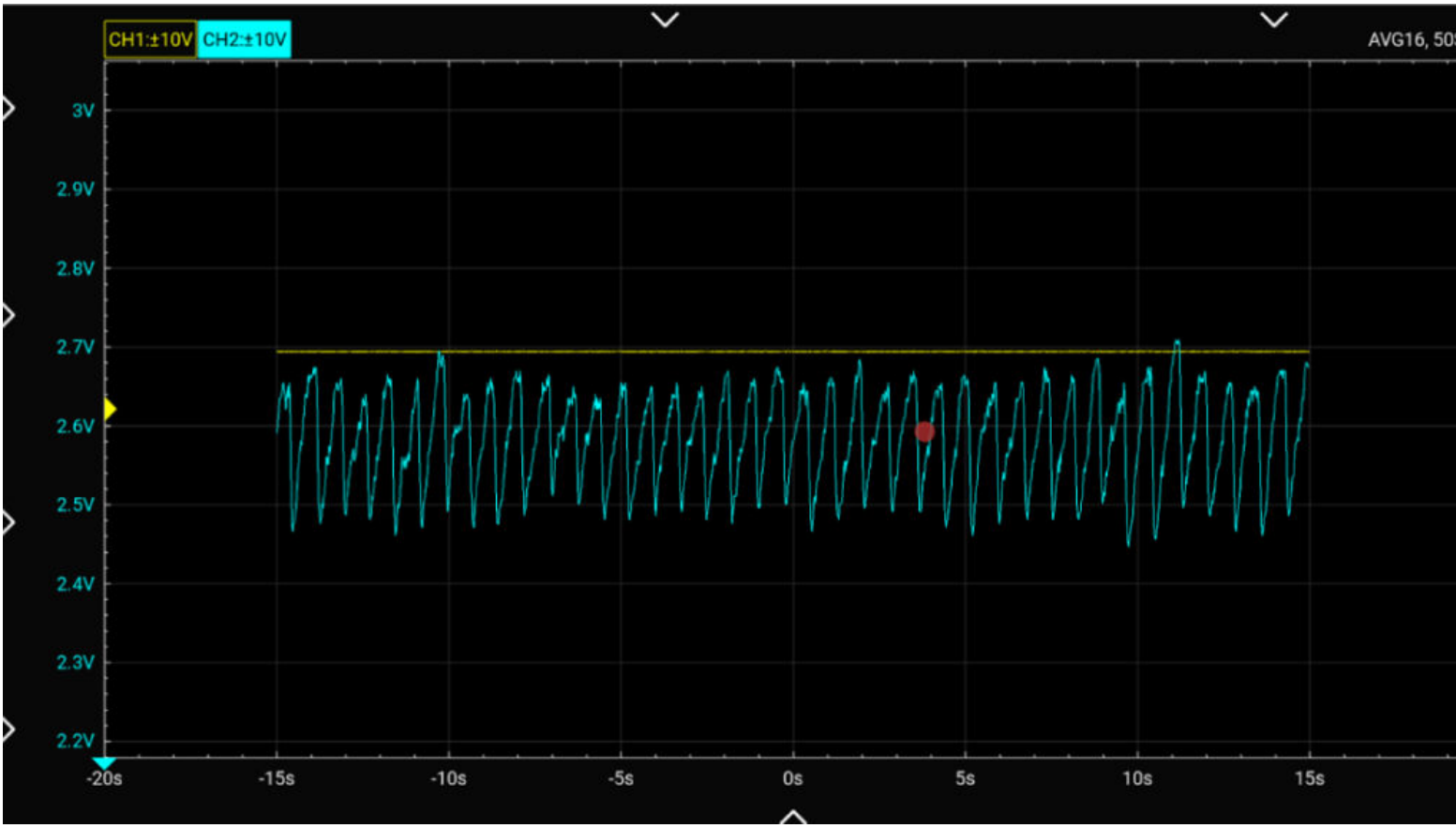
To determine the resistor and capacitor values, I applied the formula for the cutoff frequency of a filter, f = 1/(2πRC), to establish the desired cutoff frequencies of 1 Hz and 10 Hz. For a cutoff frequency of 1 Hz, I selected a capacitor value of 10 µF, resulting in a resistor value of approximately 158 kΩ. For a cutoff frequency of 10 Hz, I chose a capacitor value of 1 µF, yielding a resistor value of around 1.58 kΩ. Additionally, to achieve an amplifier gain of approximately 10, I used the gain equation, Gain = (R1 + R2)/R2, where R1 >> R2. With this, I determined resistor values of 100 kΩ for R1 and 10 kΩ for R2.

Bode Plot



The bode plot (Gain (dB) vs. Frequency (Hz)) for the pulse oximeter to observe the cut-off frequencies of the circuit.

Scope Trace of Pulse



A scope trace of a pulse using the pulse oximeter circuit.