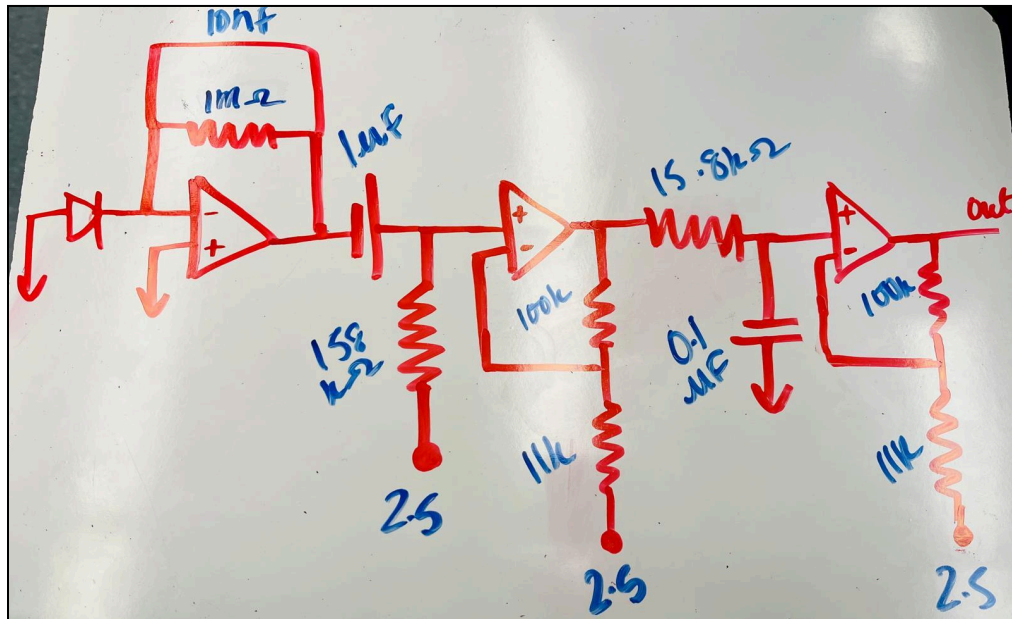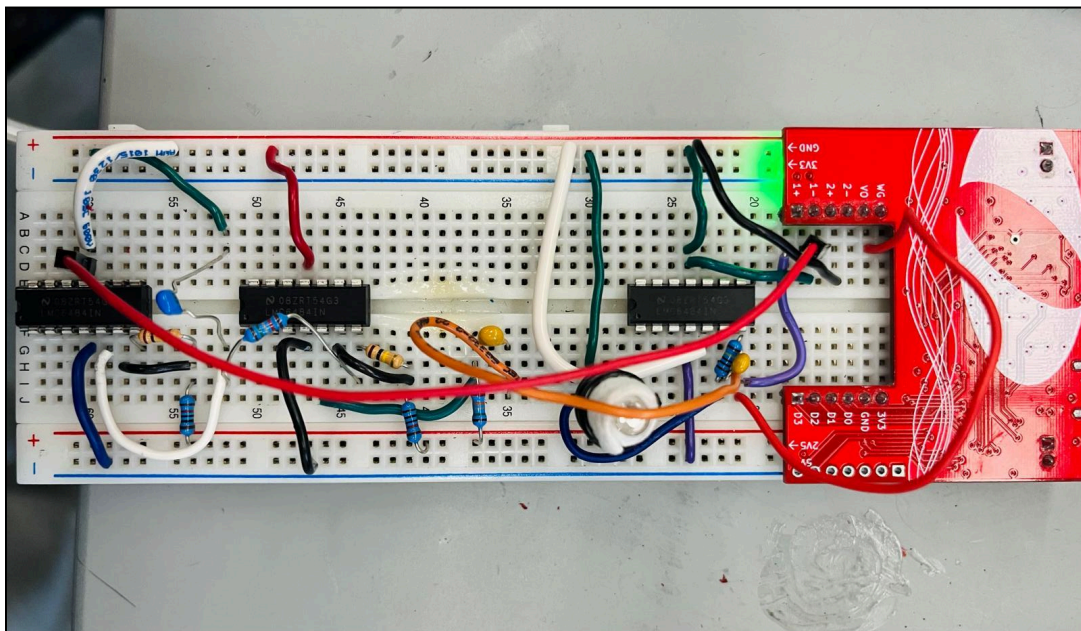Lab 7- Pulse Oximeter
Kuhu Jayaswal
3rd April, 2025
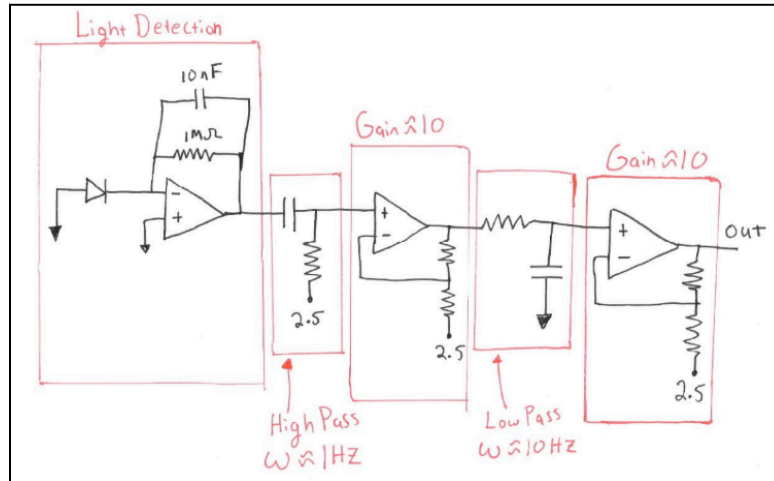
Circuit Schematic:

Circuit Picture:

Explanation for Resistor & Capacitor Values:

Equations Used:

Cutoff Frequency: $\quad f = 1/2\Pi RC$

Gain: $\qquad (V_{out}/V_{in}) = gain * (R_1 + R_2)/R_2 \qquad\qquad$ where $R_1 > R_2$

Using the given schematic from the lab, the process to find the resistor and capacitor values was basically through "plug and chug" and simple substitution of variables.

Note: did the calculations on a whiteboard, but forgot to take pictures sorry!

- High Pass Filter:
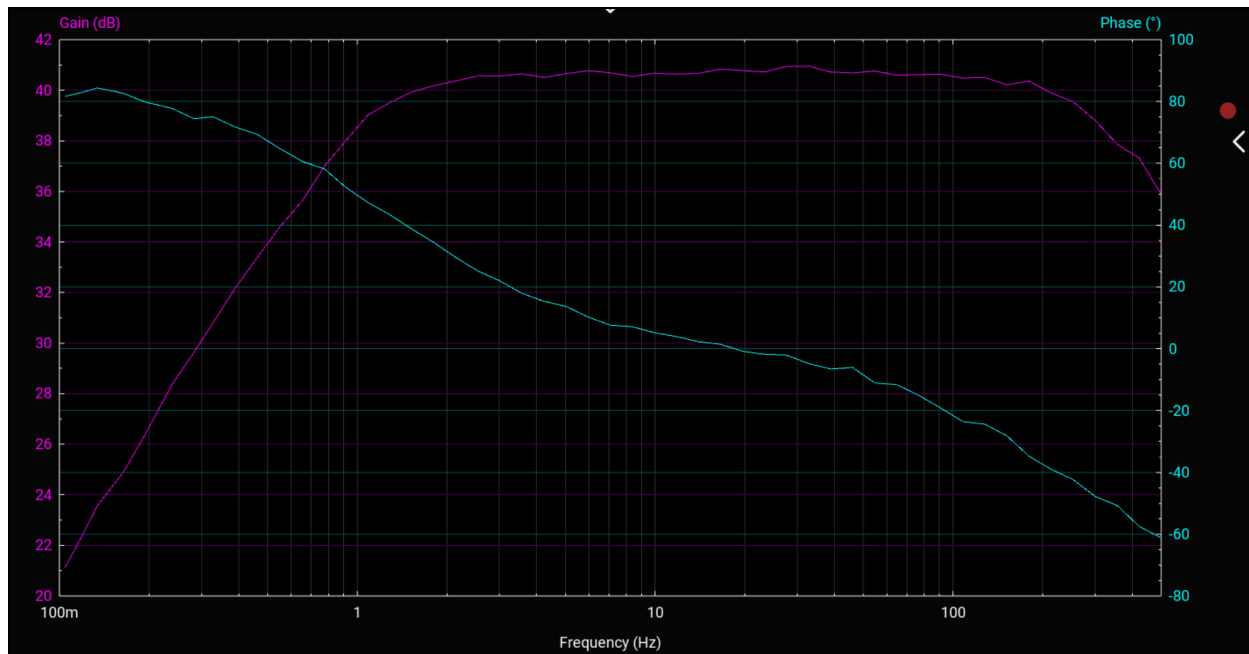$$f = 1 \, Hz, \; C = 1\mu F \qquad \Rightarrow \qquad R = 158k\Omega$$

- Low Pass Filter:
$$f = 10 \, Hz, \; C = 0.1\mu F \qquad \Rightarrow \qquad R = 15.8k\Omega$$

- Op-Amps (both):
$$V_{in} = 5V, \; V_{out} = 2.5V, \; R_1 = 100k\Omega, \; gain = 10 \qquad \Rightarrow \qquad R_2 = 11k\Omega$$

Bode Plot:

Caption: Gain vs. frequency showing band-pass behavior from ~1 Hz to ~100 Hz, ideal for detecting pulse signals.

Trace of Pulse:
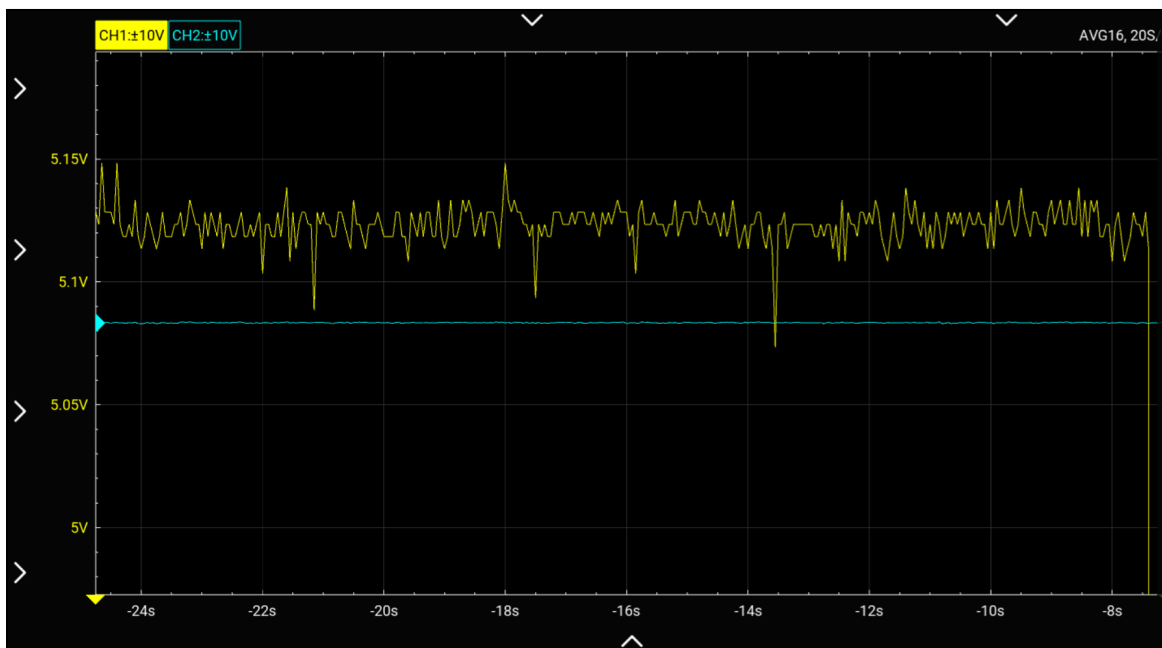
Caption: Voltage signal from finger showing clear pulse waveform after filtering and amplification.