ISIM Lab 6- Blood Pressure
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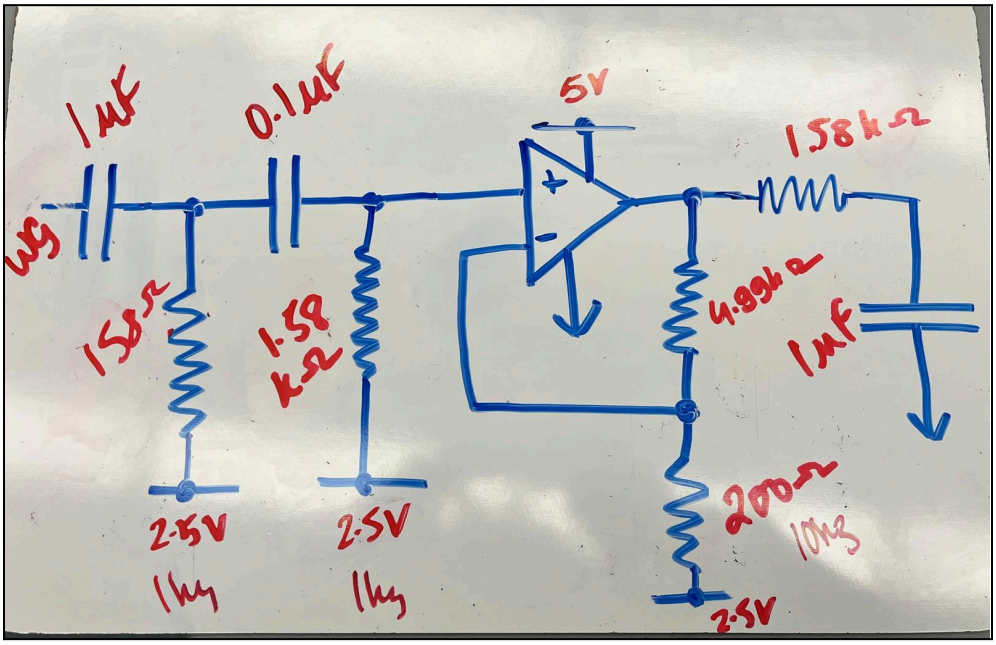
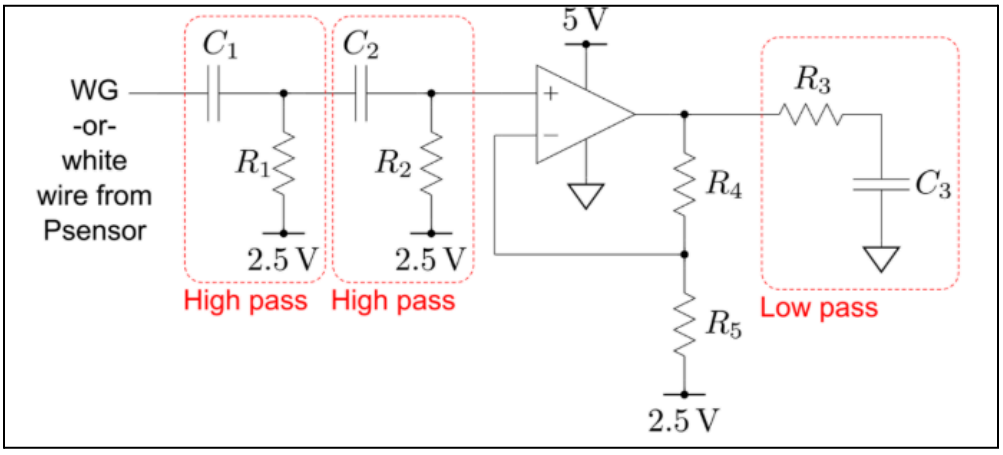
3/27/25

Circuit Schematic:



Description of Circuit:



My circuit (as drawn) fits within the layout above. Basically, this circuit filters and amplifies the blood pressure signal using two high-pass stages (cutoff frequency is 1 Hz), followed by a non-inverting amplifier with a gain of 25. A final low-pass filter (cutoff is 10 Hz) reduces high-frequency noise.

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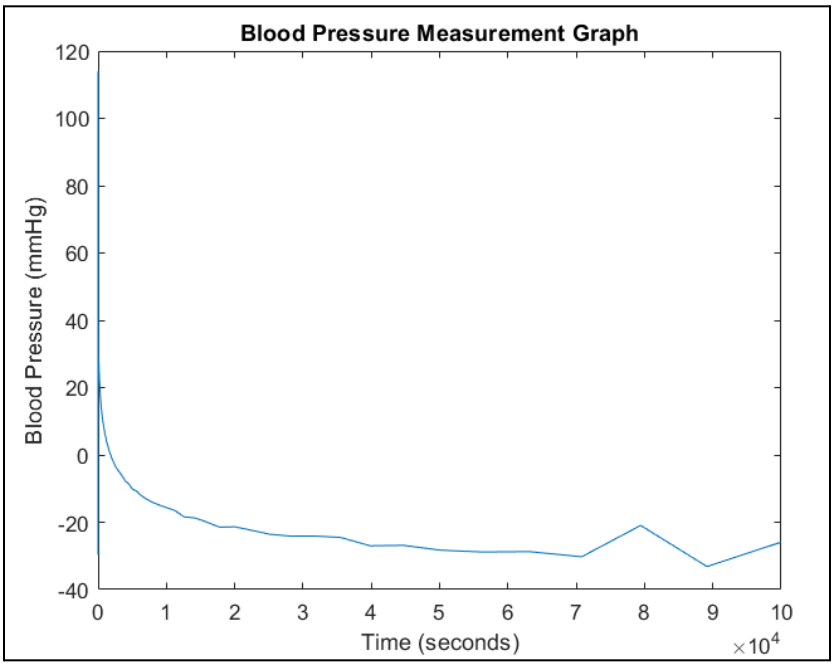
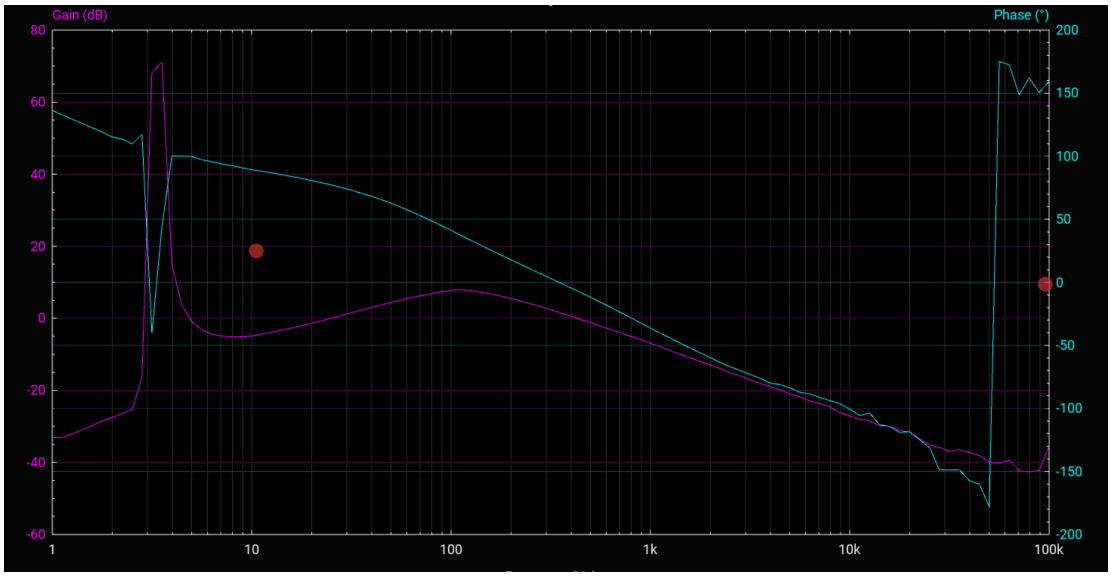
Advantage of 2.5 V as the reference (over 0V) for the 2 high-pass filters:
Using 2.5 V as the reference instead of 0V allows the signal to be centered within the op-amp's available voltage range (0 to 5V). Since the op-amp cannot output voltages below 0V or above 5V, referencing 0V or below would be clipped. By referencing the signal to 2.5 V, the pulse waveform can swing both above and below this midpoint, giving a clean amplification in both directions. This ensures that the full waveform is preserved without alteration or disturbance..

Final Blood Pressure Plot:



Caption:
Blood pressure measurement over time. The pressure drops as the cuff deflates. The mean arterial pressure can be estimated from the point where the pulse peaks.

Bode Plot:



Caption:
Bode plot (amplitude and phase) of the final circuit, showing bandpass behavior with a gain of 25. Cutoff frequencies are approximately 1 Hz for the high-pass filter and 10 Hz for the low-pass filter.