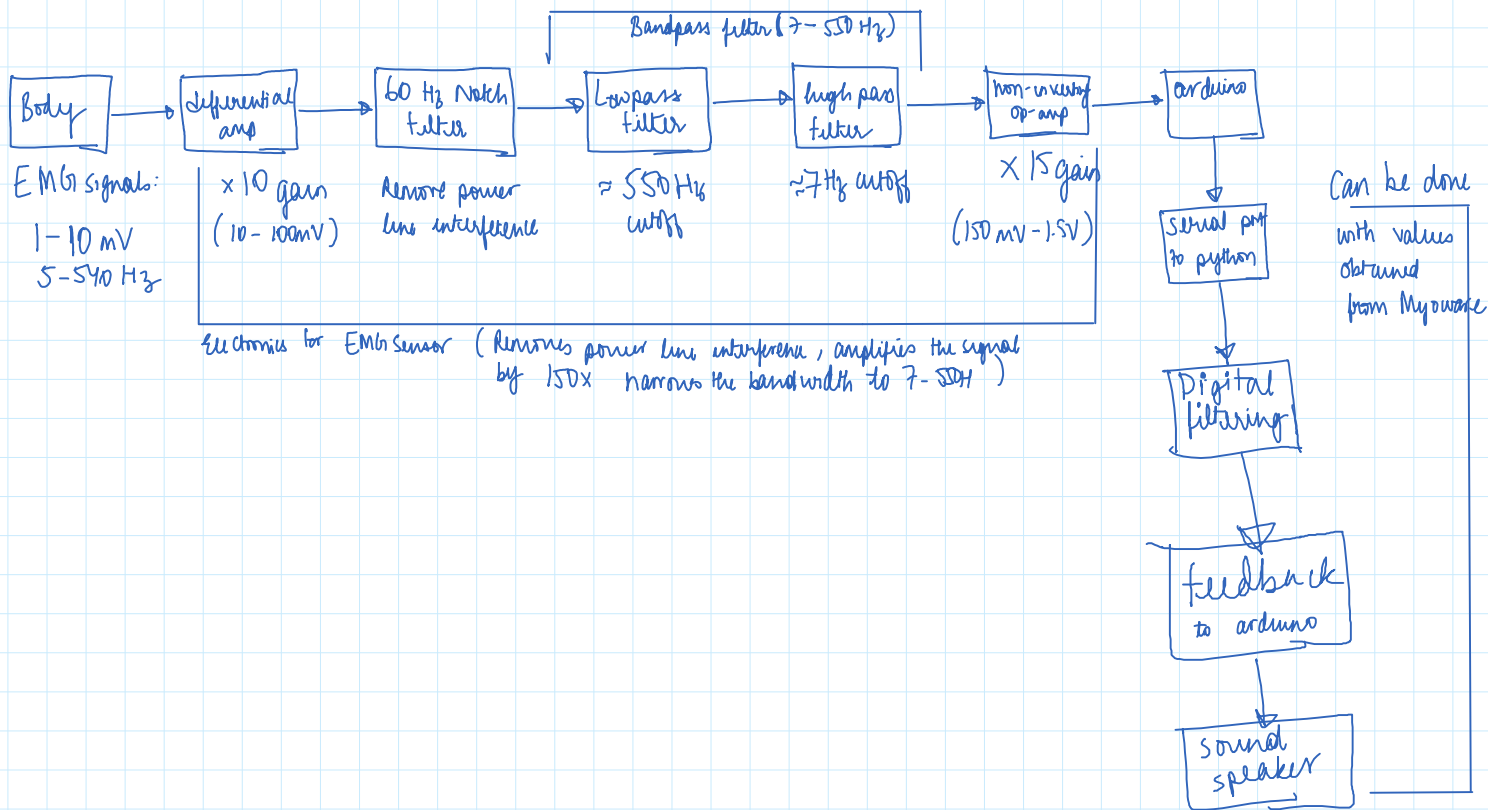


Master Workflow

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Characterizing the Circuit.

* EMG: 0 - 10 mV

* cutoff : 20 Hz - 450 Hz [exact cutoffs are subjective but good starting point]

* eliminate power line interference (60 Hz)

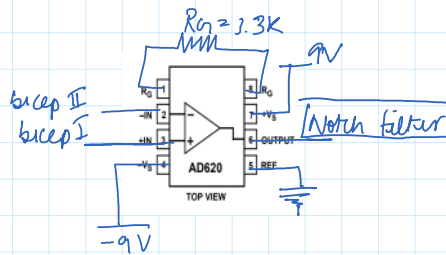
* gain requirement: adjustable from 175 to 340 [$\times 10$ from stage I, $\times 175-34$ stage II] :

assuming 10 mV signal 1.75 V to 3.4 V read on arduino: arduino limit around 4.01 V.

Stage 1: Instrumentation Amplifier

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Stage I Gain = 15x
Determining component: R_g
(33k)



Instrumentation amp: $\frac{10V}{V}$
(15V/V)

gain 1.5V (realistic max)
3V (abnormal max)

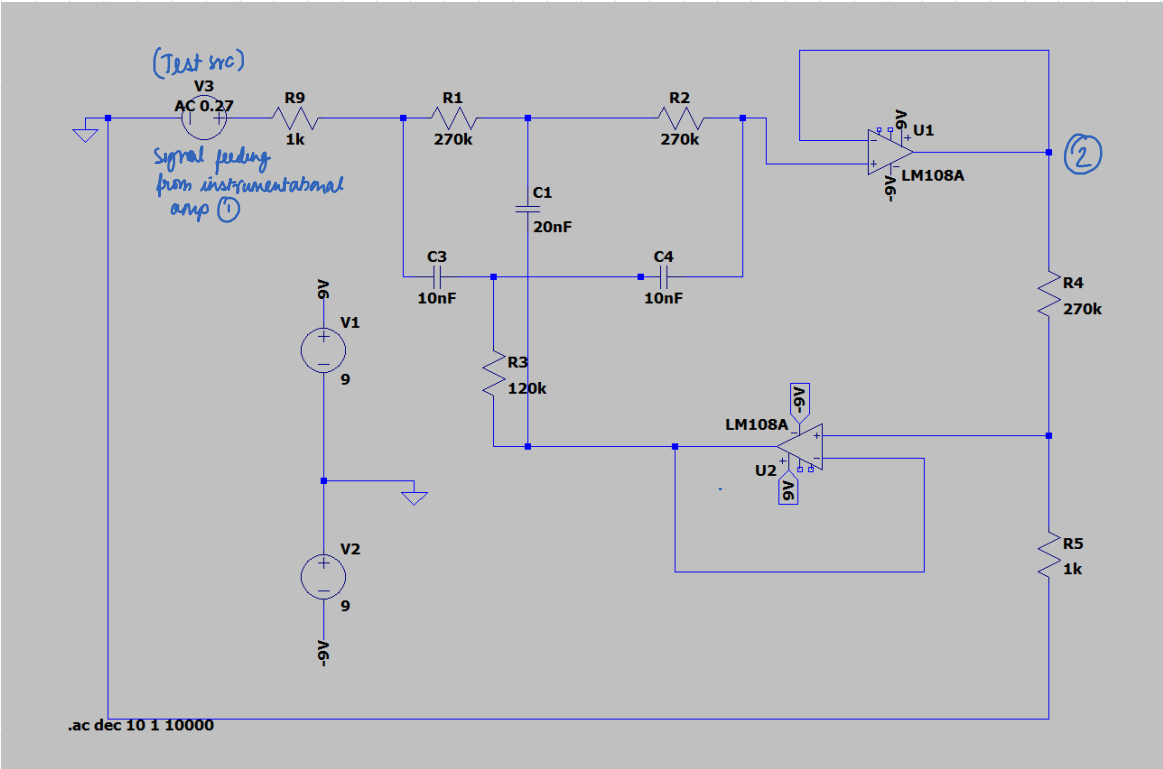
$$1 + \frac{49.4k}{R_g} = 10$$

$$R_g = \frac{49.4k}{9} = 5.488 \approx 5.5k$$

with 33k: $1 + \frac{49400}{3300} = 15.8V/V$

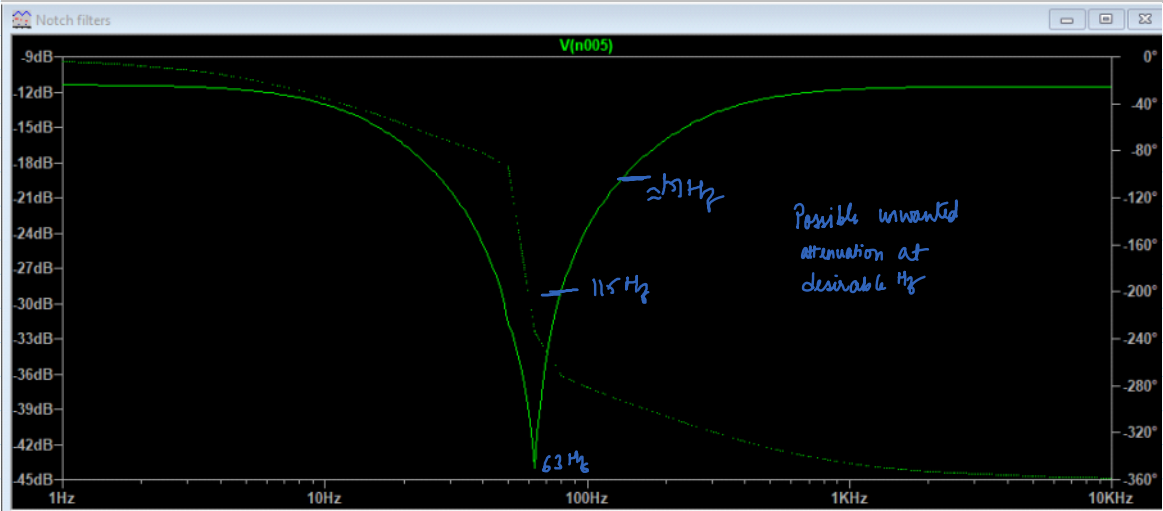
Stage 2: 60 Hz Notch Filter

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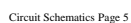
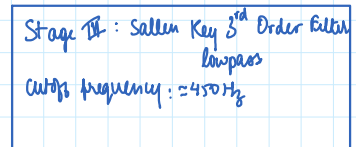


Stage 2: Active Twin T Notch filter
No gain

[Active Twin - T - Notch Filter Calculator \(changpuak.ch\)](#)
[Twin-T Notch Filter Design Tool \(okawa-denshi.jp\)](#)

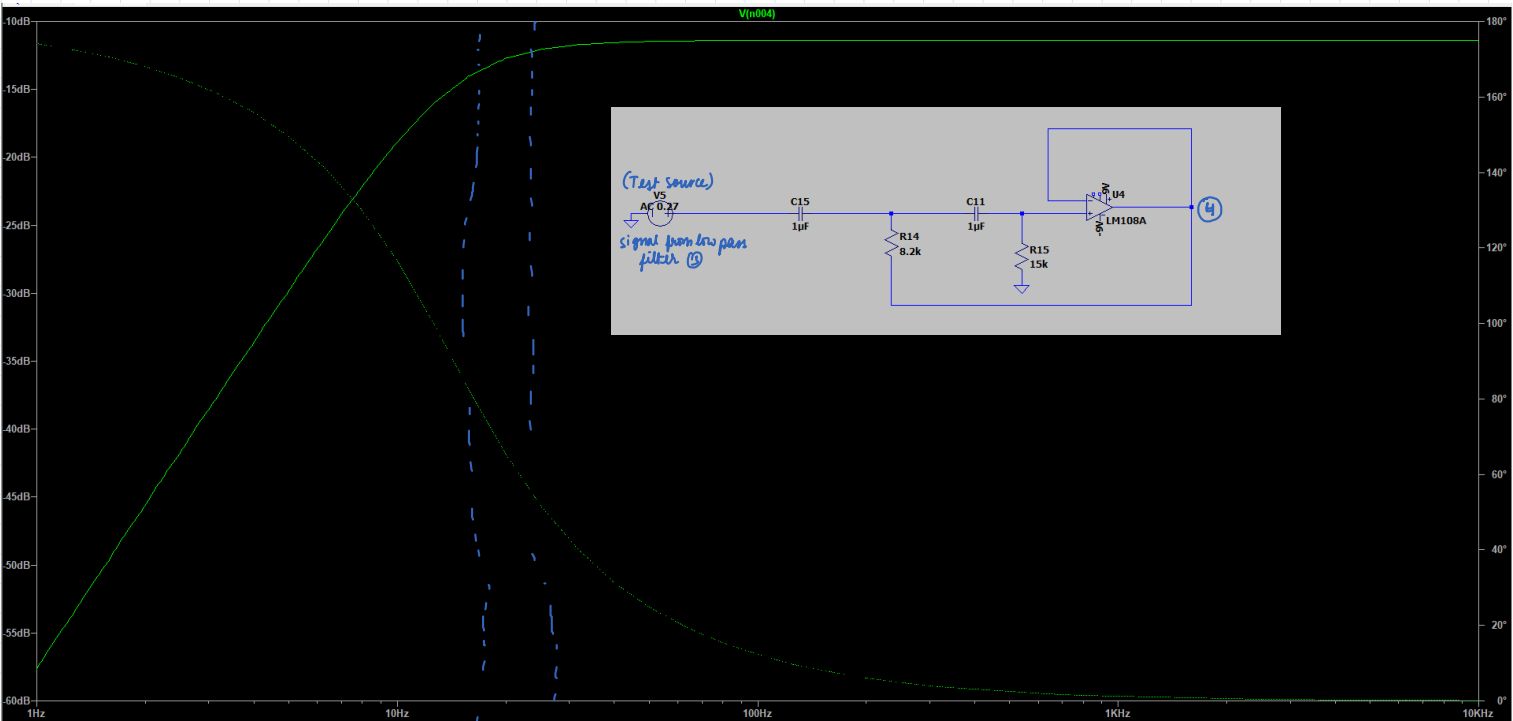


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Stage 4: 2nd Order Sallen Key High Pass Filter

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Stage IV : Sallen Key 2nd Order Filter
highpass
Cutoff frequency : $\approx 17 \text{ Hz}$

15Hz
120Hz

Stage 5: Non Inverting Op-amp

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Stage V Non-inverting op-amp gain.

$$1 + \frac{R_{12}}{R_{13} + R_{14}} \text{ where } 0 < R_{14} < 1k$$

$$1 + \frac{33k}{1k + 0} \geq \text{Gain} \geq 1 + \frac{33k}{1k + 1k}$$
$$34 \geq \text{Gain} \geq 17.5$$

