Final Project Brief Report

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1 Description

We are making a multi-channel audio equalizer whose target frequencies can be adjusted in real time. A standard equalizer takes certain filtered frequencies and amplifies or quiets them, allowing the listener to focus in on bass or treble portions of the song. The sound signal coming out of a headphone jack would be the input for the whole circuit. The signal would then be filtered out or left alone based on their frequencies and whether the channels are built in such a way to be band-pass or band-stop. In the end, a summing amplifier is used to add up various effects at different channels and output the audio.
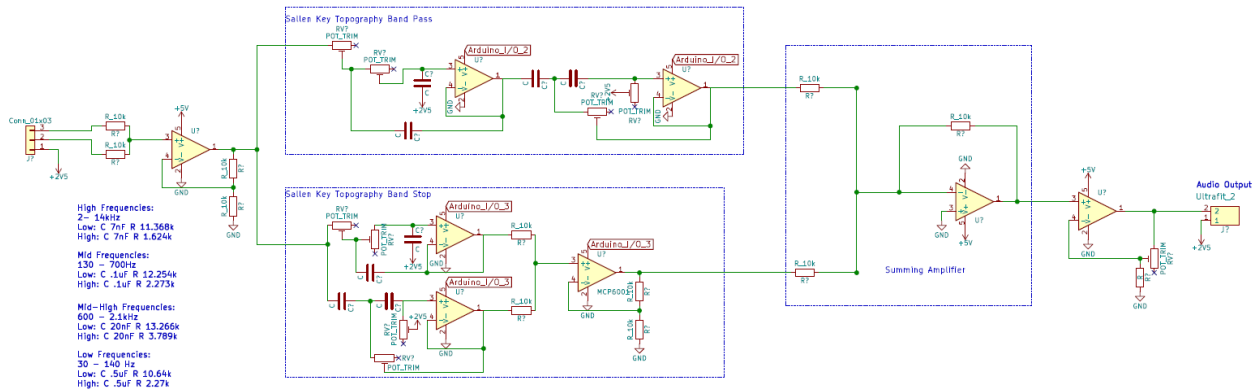

Figure 1: Bode Plot for the receiver circuit

Both the band-stop and band-pass filters make use of the Sallen-Key topology to achieve effectively second order roll-off without unnecessary amplification a regular band-pass filter would have on signal. A Bode plot of the band stop filter targeting the low frequency range noted in Figure 1 is provided below.
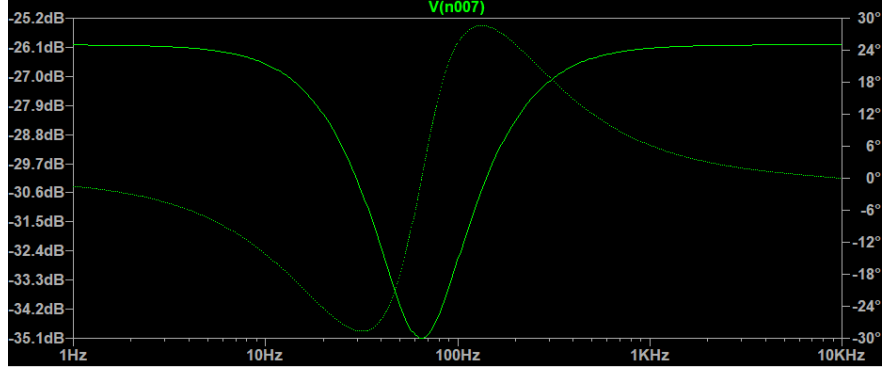
Figure 2: Bode Plot for the receiver circuit

An Arduino microcontroller could help us select which filters we want to impact the output sound. If we want just the drum beat, we could select to only output the "mid-high" filter's specific frequencies. We could then combine whichever channels (including the whole range of complete audio) to get the output audio that we want. The Arduino circuit that would be used is provided below. The output of Arduino would be the power supply of the op-amps. Thus, we can just pull the power supply to ground when we want to remove the effects of a certain channel.
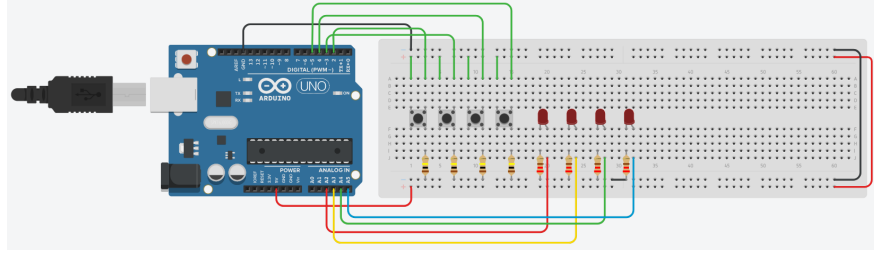

Figure 3: Bode Plot for the receiver circuit