

What an Audio Filter Does

An audio filter is an electronic circuit that amplifies or attenuates a specific range of frequency components. The purpose is to eliminate unwanted noise from the audio signal and to improve the output signal's tone.

Filters are a special type of amplifiers, otherwise known as passive circuits, that have frequency dependent output. Its construction, frequency response, or both can classify the filter.

Construction wise, there are two filters, passive filter and active filter. Passive filter's components don't use a power supply while an active filter's components would use a power supply.

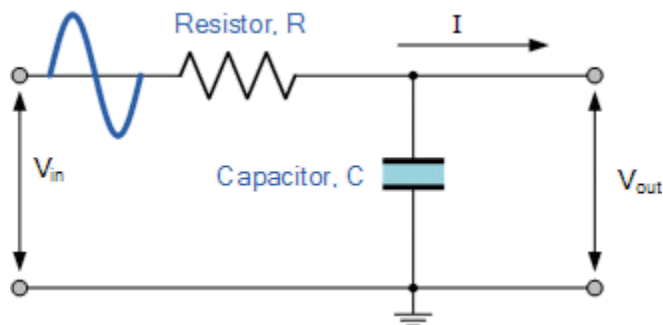
On the frequency response side, there are 7 filters: High Pass filter, Low Pass filter, Bandpass filter, Bandstop filter, Notch Filter, Allpass filter, and Equalization filter.

Each filter has a purpose to modify the audio signal it receives which is a major part for the audio electronics and telecommunication world.

RC Low Pass Filter

The RC low pass filter uses a resistor and capacitor as the most common version. It's possible to use an inductor. The resistor is in the path of the signal while the capacitor is parallel to the load. The Low Pass filter removes high frequency sounds from the audio signal. It allows low frequencies to pass through. This filter gets used to remove unwanted noise, an example being hissing or unwanted resonance.

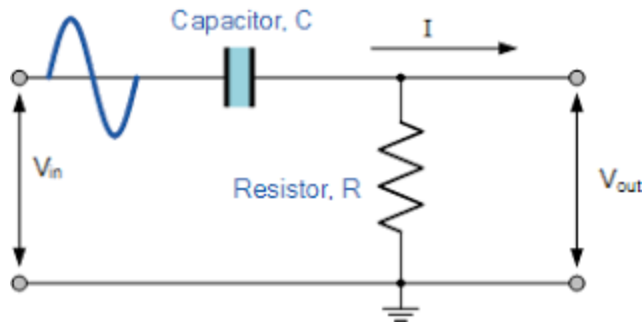
RC Low Pass Filter Schematic (Passive)



RC High Pass Filter

The RC high pass filter is the reverse. Instead of the resistor being in the path of the signal, it's the capacitor, the resistor is parallel to the load. So it allows high frequency sounds to pass through but for a low frequency sound, it is harder for it to pass through. This filter gets used in speakers for the sub bass sound that is outside of range.

RC High Pass Filter Schematic (Passive)



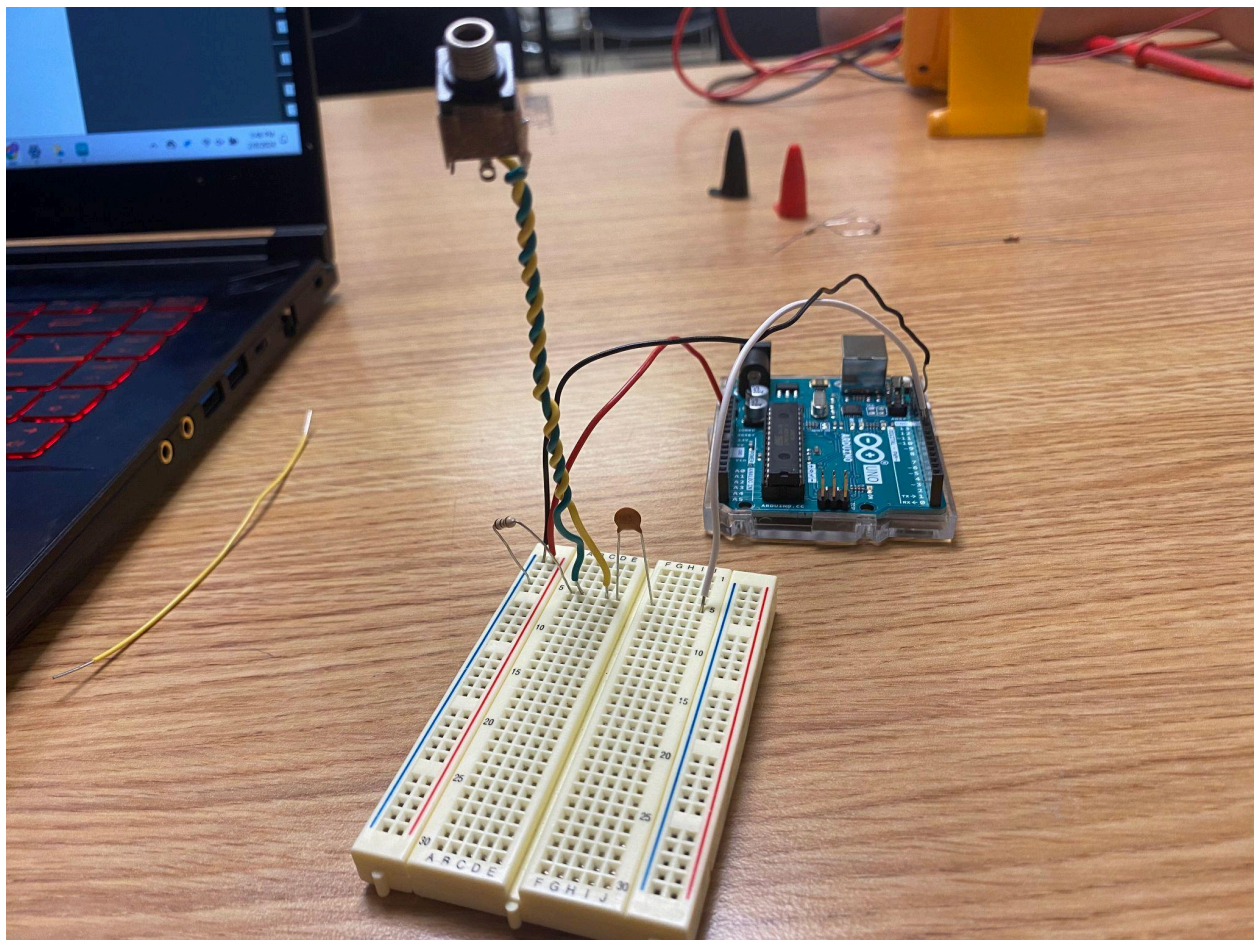
Filters Recommended for Arduino Mozzi Output

One of the filters recommended for the Mozzi Output is the low pass filter. Regarding the requirements that are suggested, having a roll off frequency under 6kHz is viable. The circuit would include a 270 ohms resistor and a 100n capacitor.

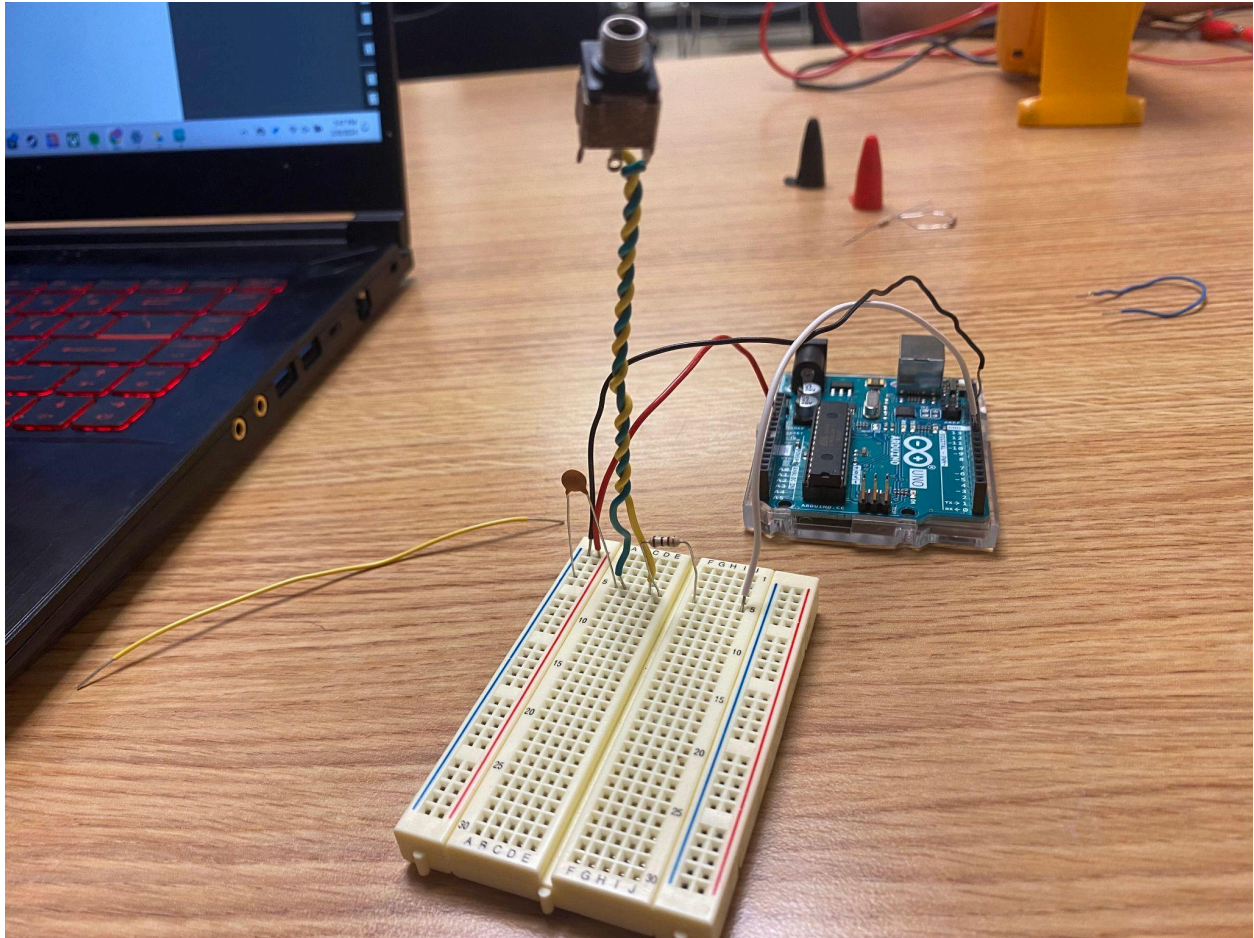
There are also some suggestions if you need to use standard mode, which is to use the notch filter, it's also possible to use both together in a circuit.

Breadboard

RC LOW PASS FILTER @ 10kHz



RC HIGH PASS FILTER @ 50kHz



References

1. <https://www.analogictips.com/basics-of-audio-filters/>
2. <https://www.allaboutcircuits.com/technical-articles/low-pass-filter-tutorial-basics-passive-RC-filter/>
3. <https://www.allaboutcircuits.com/textbook/alternating-current/chpt-8/high-pass-filters/>
4. <https://sensorium.github.io/Mozzi/learn/output/#::~text=For%20Mozzi%2C%20an%20RC%20filter,than%20straight%20from%20pin%209.>
5. [https://www.izotope.com/en/learn/6-ways-to-use-a-low-pass-filter-when-mixing.html#::~text=A%20low%2Dpass%20filter%20\(also,of\)%20higher%2Dfrequency%20signals.](https://www.izotope.com/en/learn/6-ways-to-use-a-low-pass-filter-when-mixing.html#::~text=A%20low%2Dpass%20filter%20(also,of)%20higher%2Dfrequency%20signals.)