The Audience Is Listening

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Sound waves are vibrations that travel through a medium and are characterized by frequency (pitch) and amplitude (volume). Humans can typically hear between 20 Hz and 20,000 Hz. A speaker is a device that converts electrical signals into sound waves. A pure tone is a sound wave comprised of only one frequency. My project attempts to answer the question: How accurately can speakers reproduce pure tones of different frequencies? To test this question, I played back 11 pure tones through a speaker from lowest to highest frequency while recording the output of the speaker to a digital audio file. The recording was analyzed to measure the amplitude of each pure tone from the speaker. Multiple speakers were tested multiple times. The experiment shows that none of the speakers tested were able to accurately reproduce pure tones of all frequencies and none of the speakers had exactly the same performance. However, there were some trends across all speakers. In general, none of the speakers accurately reproduced pure tones with frequencies below 160 Hz. In general, all of the speakers were mostly accurate reproducing pure tones between 160 and 1,280 Hz. In general, as the frequency of the pure tones exceeded 1,280 Hz the speakers did a better job of reproducing the tones than those below 160 Hz, but not as well as those in the range of 160 to 1,280 Hz. Simply put, all of the speakers did a better job reproducing mid-frequency tones than high or low frequency tones.

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