Signals and Systems Final Project Proposal
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For our final project, we are interested in creating a “3D sound” system. This is a system where a person can listen to our recording through earphones and have the illusion of being in the space in which the sound originally came from. For example, a famous 3D sound recording is one where the listener feels as though they are in a barber shop, and can hear the barber move around them as he speaks, and the hair being cut from behind their head (https://www.youtube.com/watch?v=8IXm6SuUigI).

The setup of this project would include transforming earphones into binaural microphones, which look like a pair of earphones, but rather than having two speakers attached, it would serve as two microphones. We found instructables of how to do this (http://www.instructables.com/id/Binaural-Earbud-Microphone-AKA-holophonic-3d-ster/?ALLSTEPS).

Once we have these binaural microphones in working order, we can wear them on our ears facing outward to record an experience, then play it back so that a listener can feel like they are there. Combined with a GoPro or other head-held video camera, this could create an immersive recreation of an experience.

However, we would be more interested in recording sounds with a traditional microphone and digitally processing them so that they create a 3D experience. The Glavin Chapel at Babson is a large, open space with hard walls, so sound echoes beautifully. This is where we plan to record our impulses. Once we record impulses from several different directions with the binaural microphones, we can convolve any signal with linear combinations of the impulses in order to create an experience for the listener. Part of the processing would include tricking the listener into thinking that the sounds were moving around them continuously, even though the impulses are coming from discrete locations around the binaural microphones.

For our final deliverable, we would like to have a station set up for people to try on a pair of earphones and listen to our 3D sound. We may also show a video of people listening to our sound and pointing to where they hear the sound move, to show its effectiveness across multiple people.