Curb College
Master of Science in Audio Engineering
April 11, 2019, 3:30 - 5:15 p.m.
MC 413

Moderators:
Wesley A. Bulla, Ph.D. and Doyuen Ko, Ph.D.

Session 1
3:00 - 4:45 PM

3:00-3:15

Room Acoustic Measurements: Harton Recital Hall, Belmont University
Corey Fant, Ryan Miller, and Michael Fohn
Faculty Advisor: Doyuen Ko, Ph.D.

For this project we measured the acoustics of Harton Recital Hall, a small solo ensemble performance hall in Belmont's Massey Performing Arts Center. Sine sweeps recorded at three locations in the hall using EASERA software we're used to measure various objective acoustic parameters such as room frequency response and reverberation time. Results were compared to objective parameters attained by recording a balloon pop impulse response and the overall acoustics of the hall were analyzed.

3:15-3:30

Auditory Localization: Time-on-task Accuracy
Marina Tawdrous
Faculty Advisor: Wesley Bulla, Ph.D.

3:30-3:45
Mitch Hoger

3:45-4:00

The Listeners Ability to Distinguish High-Resolution Audio
Julianna Welgoss
Faculty Advisor: Wesley Bulla, Ph.D.

Although digital compression is by no means a new concept to audio engineering, it has more recently developed into a guideline that is required specifically for the mastering engineer to follow. Compressing a file to a lower quality is always going to change the sound, but is this change as noticeable as industry professionals suggest it is? The following study compares high-resolution audio to its compressed form, and seeks to find if listening groups are able to identify the original high-resolution file from its compressed form.

4:00-4:15

ABX Discrimination of Short-Time Fourier Transform Lengths for Non-negative Matrix Factorization Noise Removal using Sennheiser HD 595 Headphones

Ryan Miller
Faculty Advisor: Wesley Bulla, Ph.D., Eric Tarr, Ph.D.

Non-negative Matrix Factorization (NMF) is a commonly used method for audio source separation in applications such as polyphonic music separation, automatic speech recognition, and noise removal. While NMF has been widely researched in the last 20 years, NMF lacks the ability to perform artifact-free separation of audio mixtures. Previously, additional algorithmic components have been presented as a means to improve the effectives of NMF with varied success. This paper, however, seeks to examine how an inherent property of the NMF algorithm, the Short-Time Fourier Transform (STFT) window length, affects perceptible differences in noise removal performance. An ABX listening test using headphones compared speech separated from two different noise sources, white noise and conversation noise, at different STFT lengths to determine if there was a statistically significant perceptible impact. It was found that listeners are easily able to discriminate different STFT lengths, with slightly better performance when using white noise.

4:15-4:30

Room Acoustic Measurements: Starstruck Entertainment, Nashville

Grace Riordan Julie Welgoss, and Victor Pacek
Faculty Advisor: Doyuen Ko, Ph.D.

For our measurement we took impulse responses of the main lobby of Starstruck Entertainment. The space consisted of a very large room (~60x60x20 feet) with several overlooking balconies and bordering hallways. The walls were all wood and glass with a tile floor and a glass ceiling. We measured the IR at three different position being close and far on-axis, and from the 2nd floor balcony behind the loudspeaker. Using Sabine's equation, we estimated the room's T60 to be 3.57 seconds, and each calculated IR yielded T30 values of around 2.3 seconds at 1 kHz, affirming our T60 value. Clarity was slightly reduced overall from adding distance to the on-axis measurements, and dramatically reduced with our balcony measurement. We also saw expected results of the balcony measurement existing in an entirely reverberant field as it yielded significantly lower IACC and STI values, and significantly higher LF and ST values. Overall, the magnitude responses of each position showed incredible diffusion and spectral balance. Comparing the balloon pop via iPhone mic to our omnidirectional mic proved that the balloon pop could generate a somewhat accurate response from this space, though the response of the iPhone mic itself led to some serious high-end roll-off that would be undesired for most applications.

4:30-4:45

Soundbar Technology

Julia Perla
Faculty Advisor: Wesley Bulla, Ph.D.

This paper is a pre-execution of the investigation and the assumptions on claims made on the Soundbar. The general claim is that "TV speakers suck, but not everyone has the room—or the budget—for an A/V receiver and six or more loudspeakers. A soundbar can fit under or in front

of your TV, and a good one will knock your socks off." Since there are many soundbar choices, soundbar companies claims for the best soundbars are that they give a better virtual sound with wider stereo without rear speakers of a 5.1, it's truly immersive experience, delivers surround-sound experience, can create object-oriented audio similar to Dolby Atmos or of DTS:X of 5.1.2, creates elevated sound, sound source width, is least obstructive in a home theatre, has a sleek design, has a minimalist approach, and is the most affordable and best for a budget compared to other home theatre systems. But most of these claims do not provide evidence that soundbars actually can execute any of these claims and specifically create the sound of surround sound, which makes us as an investigator look at these claims on how the soundbar supposedly replicates surround sound, and what's in-store for the soundbar and its new endeavors into the market.

4:45-5:45
BURS Keynote