CSE 481i Sound Capstone

This capstone began with a brief survey of computer audio techniques  
for sound recording and playback, encoding and decoding, synchronization,  
sound synthesis, recognition, and analysis/resynthesis. Students then worked  
in teams to design, implement, and release a software project utilizing some  
of the techniques surveyed.

Physio-acoustic Simulator:

a program that can emulate how hearing-impaired people hear sounds to people with normal hearing, by filtering out certain frequencies. It includes a basic “audiogram” to test the user’s hearing and emulates what people with cochlear implants would hear. It is useful for trying to understand what hearing-impaired people experience. It would also help parents make decisions about whether to use cochlear implants or not when they’re told their child has severe hearing loss/deafness.

Audio Transcription Assistant:

Automated music transcription has traditionally been a difficult task for

computers. Our project explores whether this process can be refined through

the introduction of a human element. We hope to demonstrate that automated

music transcription can be performed more effectively by breaking down the

process into smaller tasks that can be easily verified by human listeners. Once

all the pieces have been verified, they can be re-combined into a much more

accurate output file.

A Glove That Sings:

We created a device that lets anyone (with a hand) to play and create layered music without prior proficiency using sequencers. All one needs to do is tap their fingers as if tapping along to a song, and musical sequences are played. A user wearing the glove taps their finger, and a sensor reads the pressure and duration of the tap.

Virtual Drum Kit:

Drum kits, like many instruments, are too loud to play in most living environments. Drum sets are often large and cannot easily be transported. Our virtual drum kit mimics a real-life drumming experience as closely as possible, while minimizing

the cost and space constraints. To do this, we sought to use consumer human interface devices—the KinectTM 3D camera and the WiimoteTM Bluetooth gaming controller—that can capture a user's drumming motions and provide haptic feedback.