Project Title - net(work)

Project Goals and Realization

Instrumentation: violin, cello, piano (synthesizer), live electronics, video, surround sound

net(work) is an interdisciplinary collaboration that will investigate the ways in which artistic and scientific labor intersect by creating a work that blends the artistic and practical objects they produce. Dana Simmons is a Ph.D. Candidate in neurobiology researching the ways networks of neurons communicate with each other in autistic brains. Specifically, Dana examines networks of neurons in the cerebellum, which contains a precisely organized neural circuit. Dana draws artistic inspiration from the patterns and shapes of neural circuitry that are unique to the cerebellum. She creates Warhol-esque digital art images of neurons cerebellar neurons using a confocal microscope, fluorescent dye, and lasers. Dana was recently awarded a Passion in Science Award from the New England Biolabs in the category of Arts & Creativity for her neuron art. Composer Pierce Gradone's (Ph.D. Candidate, music composition) music is fascinated by the small, mechanical impulses that form the foundation of modern music-making. His recent work has explored the way in which machinery have informed the production of music in both the past and present, resulting in works that forefront the performative labor of his collaborators. He was recently awarded a major commission from the Fromm Music Foundation at Harvard University.

In net(work), the project will permeate both the product- and process-oriented layers of interdisciplinary collaboration. The piece will be scored for amplified violin, amplified cello, amplified piano (synthesizer), live electronics (surround sound), and live video. All prepared digital sound will be sourced from field recordings documenting Dana’s work in her lab, to which the acoustic sounds created by the instruments will directly and indirectly respond. Sample sounds recorded from the lab environment will include rhythmic spinning of a magnetic stirrer, whirring of the pipette puller, electronic microscope noises, a breezy fume hood, vacuum tube suction, laser scanning, and other sounds made by lab equipment that is critical for Dana’s neuroscience experiments. As a musical counterpoint to the sound world of Dana’s lab, the musical structure of the piece will be constructed in real time, achieved through the composing of smaller, modular movements whose shapes are directly representative of Dana’s neural pulses through various musical parameters like pitch, amplitude, instrumentation, and timbre. These modules will dynamically interact with virtual stimuli provided by external audio sources, be they from the musicians or the ambient space around them.
We will feed these stimuli into the group of musicians in an effort to mirror how a neuronal stimulus enters a neural network. The music will transform in response to these stimuli, representing the way a neural network must also respond. The result is a musical ecosystem in which a musical neural network is formed throughout the duration of the 15-minute performance. The video/multimedia element of the work will consist of animated representations of Dana’s research and science-based visual art that will accompany the music in real time. This video element will visually narrate the construction of the network throughout the performance.

In the performance space, the audience will be surrounded by speakers and the musicians themselves, with the projection screen placed in front of them. The visual element will directly correspond with the musical activity, as different musical gestures form the crystallizing network.

Challenges and Benefits for Collaborators
For Pierce, this will be an especially technological project, requiring coding and the creation of triggers and samplers for the musicians, as well as the coordination of a responsive software system to create the “musical ecosystem.” The importance of interactive technology in this project will allow him to further develop skills with various musical software, including Max/MSP and SuperCollider. For Dana, this collaboration will be extremely beneficial in that it will provide new ways to think about networks of neurons. Specifically, the improvisational and modular structure of the composition will mimic a stimulus that is fed into a network. Once the stimulus is present, the network - of musicians or neurons - must respond accordingly. For both collaborators, the biggest technological challenge will be editing the multimedia video that will incorporate animated neuron images. Both collaborators will work on video editing together with assistance from a professional video editor mentioned in our proposed budget.

Timeline
In the fall quarter, we will hire musicians and begin collecting data to shape the composition. Collection of data will take place from November through May, during which time we will meet bi-weekly to discuss how to incorporate the experiments into the a musical composition. Composition will begin as soon as there is a collection of neuronal responses and electrical signals large enough to inspire variety in the music. In the winter quarter, we will meet bi-weekly to evaluate our progress, and begin designing light stimuli that will be used to decide the direction of the music. Once the light and technological aspects are ready, we will begin rehearsals with the musicians. In the spring quarter, all details for each module of the composition will be finalized, and the piece will be performed in an available space at the Logan Center.