
The Biomuse Trio

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Abstract

The Biomuse Trio is computer chamber music for violin, computer and biomuse. The violinist performs conventionally; the only sensor used is a microphone to capture its sound. The computer produces all of its sound through processing of violin sounds captured during performance. The performance of the computer sound is controlled by the gestures of the biomusician, measured with on-body sensors. The musical composition consists of precisely sequenced events for violinist and biomusician, as well as performance environments that are explored through improvisation.

Keywords

Biomuse, Computer Chamber Music, HCI.

ACM Classification Keywords

H.5.5 Sound and Music Computing. J.5 Performing Arts.

General Terms

Performance.

Introduction

The Biomuse Trio is a natural extension of my recent work in the area of computer chamber music [1]. My computer chamber music represents an attempt to integrate the laptop computer into ensemble chamber music, with the laptop performer functioning as a full member of the ensemble. Three works explored this

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notion from different angles: "Introduction and Allegro" (2005-2006) for mixed ensemble and laptop, in which the laptop features as virtuosic soloist; "String Quartet no. 3 with Computer Enhancements" (2006) in which the laptop supports and enhances the quartet, and "Trio for Flute, Clarinet and Computer" (2006-2007). "Introduction and Allegro" in which the prominence of all three parts is roughly equal. The results of this compositional experiment have been mixed.

The musical integration resulted in many situations in which the laptop performer acted as a traditional classical musician, with split-second precision required to trigger various events in time with the ensemble. The computer part made use of the great flexibility that is the primary advantage of a computer – constantly changing DSP configurations – sampling, processing, and recombining old materials. The very difficulty of the computer parts presents a problem in terms of finding performers other than the composer to play these parts, whereas simpler parts that do not attempt such integration, but mainly have the computer performer push the space bar at the appropriate time have had better luck in this regard.

Visual Deficiencies of Laptop Performance

At the same time, the intensity of the computer part does not necessarily promote the laptop performer to being an equal member of the ensemble. The computer operator in mixed-media pieces has traditionally been situated offstage near the mixing-board, and the exigencies of performances sometimes conspire to separate the laptop performer from the rest of the ensemble. In the Trio for Flute, Clarinet and Computer, my wind performers actually did not want me onstage, as they perceived a great disparity between their own

performances, and my laptop performance. This is where we reached what might be called the "email" problem in laptop performance, where the audience is unsure if the laptop performer is actually creating sounds in real-time, or simply playing back a sound file and then reading email during the performance. This objection might be considered a bit unfair, since in many laptop performances, it is clear that the musician is actively engaged in producing the music, as it is being heard. But still, there is a strong visual disparity with performance on traditional acoustic instruments.

Motivation for Visible Performance Cues

Irrespective of perceived effort, the audience generally cannot see what the laptop performer is doing. There are acoustic performance situations where the audience cannot see much of what a performer is doing, either when the performer is off-stage, behind an organ console, or more commonly, a pianist, whose hands are not visible to audience members on the wrong side of the auditorium. However in all of those cases, the audience at least has a mental model of what the performer is doing, and what is difficult to do. Because there is no inherent correlation between even a fully visible laptop gesture, and the musical function accessed, the audience does not have any way to judge the effort involved. And in cases where the computer interface (Max patch, live code, etc.) is projected, the audience is watching a screen, rather than a performer, and the fundamental connection between performer and instrument is broken. Of course all of these issues have hardly prevented a vital practice of laptop music from emerging; the attraction of the portability of the laptop computer, something like the acoustic guitar for folk sets, is too great to resist. But in hybrid ensemble the abovementioned problems became significantly

amplified. This provided a strong motivation to explore more visible forms of computer control.

The Biomuse Interface

The Biomuse [2] is an instrument that captures human bio-signals that can then be transformed into musical controls. The bio-signals themselves have no inherent sonic interpretation, so composing for the Biomuse becomes fundamentally a mapping experience.

The Biomuse Trio

My first work for biomuse, The Biomuse Trio is scored for violin, laptop and Biomuse. This work was developed in close collaboration with biomuse inventor Ben Knapp and violinist Gascia Ouzounian, with frequent rehearsals during the course of composition. We initially explored performance interaction between the three instruments. However the division of labor that emerged soon favored interactions between violin and biomuse. It became clear that the musical gestures of violin and biomuse were simply much more interesting to watch than those on laptop. So the role of the laptop became primarily to capture and edit violin samples, and to manage the progression of the Max patch through each movement. As in my other computer chamber music, the computer sounds are all derived from acoustic sounds captured during performance. This may be seen in the score. The initial violin tetrachord is sampled by the laptop performer and quickly edited. Shortly thereafter, stacks of this chord are triggered using forearm EMG signals. This chord then serves as the source for most of the computer-generated sounds heard during the rest of the movement. An attraction of this approach is that the compositionally fixed harmonic and rhythmic patterns will vary sonically between performances, as

differences in the quality of the performed chord and other live-sampled materials propagate through the various DSP processing schemes. Of course this happens naturally in successful acoustic instrumental performances; it does not happen to nearly the same degree in performance with the playback of prepared sound files. While this is attractive, the use of live sampling can introduce new problems: insufficient production value, enhanced flaws of the sound environment, and a critical danger from incorrectly played or (much worse) missed sampled sounds. However this is more than compensated for by the sense of spontaneity achieved in a successful performance.

Compositional DSP Strategies Employed

The key contribution of the computer is a rich articulation of the sampled sounds during performance. One of the great strengths of the computer as a performance instrument is its ability to rapidly reconfigure its DSP chain. The Biomuse Trio takes advantage of this capability by presenting a variety of DSP strategies including granular synthesis, time-stretching, spectral tuning [3], and spectral freeze. The laptop performer manages the flow of the available processes, which are then deployed by the biomuse performer. Mixed DSP configurations present a multi-parametric interface to the biomuse performer, who is able to explore timbre space organically in ways that would be difficult or impossible to achieve in performance with the more standard knob and slider interfaces.

Conclusions

The Biomuse Trio presents a first step toward integrating gesture-based performance with computer processing, employing the human body as control surface. This performance control configuration is much more apparent and understandable to the audience than would be possible using the laptop computer as the primary performance interface. At this stage, the performance requirements for The Biomuse Trio are onerous, and the performance itself is extremely difficult. However, we are at the beginning of a process, and believe that this performance approach will become increasingly feasible in the context of computer chamber music.

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Citations

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