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A Method for Gestural Control of Augmented Harp Performance

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Abstract

Here we present an interdisciplinary collaboration and performance, featuring a gestural control system designed to augment harp performance. From a performers perspective, the developed interface system and prototype presented opportunities for real-time control and manipulation of the traditional instrument. Collaborators exchanged ideas and commentary, as well as problem-solved, in real-time. This was advantageous for direct and efficient regulation and implementation of the hardware and software into the artistic phase of this project and resulting composition. For the performer, the device needed to be lightweight, ergonomic, and user-friendly. In this performance, the device uses amplified harp, as well as voice of the player and electric tape, as sound-sources for computer-based audio effects and processing.

Keywords

Harp
Gesture controller
Performance
Electro-acoustic harp
Audio effects
Processing

Introduction

Performers play an essential role in the attractive and ergonomic design of digital musical interfaces (DMI). The genesis of this collaboration aimed to understand harpist's movements, using a motion-capture system provided by the Centre of Interdisciplinary Research in Music, Media and Technology (CIRMMT), as preliminary research for the design of an interface for gestural control. In this collaboration, the first author is the harpist and research assistant, the second and third authors are the main researcher and interface designers, and the fourth author is the composer. For the performer, it was necessary to design a wearable device that would not inhibit natural playing mobility and technique for performance. Another aim was to develop an interface system that could be accessible to musicians and composers with various backgrounds in an electro-acoustic setup.

The result was a lightweight and wireless controller with an interface system built in Max/MSP. Our system is adaptable for use with any instrument or movement based art form, affording opportunities for this system to be explored and implemented in systems beyond that presented here. The following presents a description of the composition and summarizes the artistic process, from an artist's perspective.

1.Description

Composition

...prends-moi, chaos, dans tes bras... is titled after a translated collection of Arabic poems written by Syrian poet, Adonis. At its core, the piece serves as a reflection on war-torn Syria and mounting tension affecting the Middle East and Europe, felt in recent years by the increasing numbers of refugee and asylum seekers. Two thematic elements are rooted in this composition: a narration of a Sumerian creation poem and a transcription *of Hurrian Hymn no.6* [Figure. 1] and a Mesopotamian song known as the first written piece of music (ca. 1400 B.C.E.), discovered in the 1950's in the Ugarit, Syria.

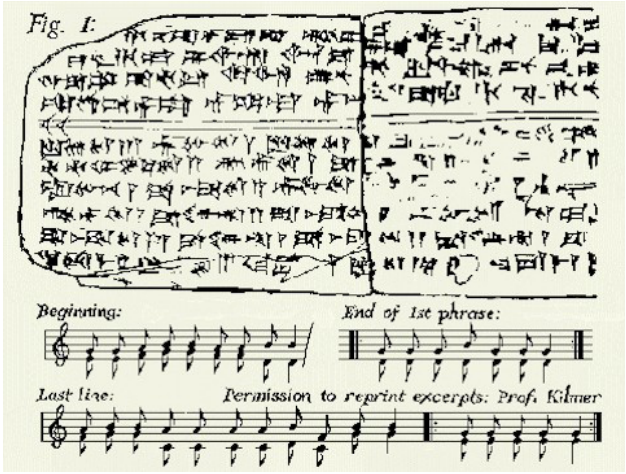

Figure 1. Transcription of Hurrian Hymn no.6.

Figure 2. Performance with harp and motion-controlled electronics.

The authors worked closely together to develop a piece that would artistically demonstrate the potential of augmenting harp performance. With over a decades experience in harp studies, it was of personal interest to the first author that the piece would focus on the marriage between musical gestures and the processing components of the device.

2.Setup

The work calls for amplified harp, gesture controller, voice microphone, foot-switch, and four speakers [Figure. 2]. Audio from the harp and voice are processed through several modules from GRM Tools. Processing parameters are mapped to the X, Y, and Z axes of the controller, allowing real-time manipulation of instrumental and ancillary gestures (Cadoz and Wanderley 2000). Parameters and effects are interchangeable based on a bank of presets configured in a Max patch, navigated by a MIDI pedal foot switch. MARG sensors (Bachman, et al. 2003) were integrated in the main hardware design for the device.

For the preliminary version of this prototype, collaborators took a simplified approach to mapping audio-processing parameters. Effects are applied to a desired axis (e.g. *pitch* controlling volume and *roll* controlling delay). With this approach, the performer could practice and master her technique of blending multiple effects during tight rehearsal sessions.

Rehearsals revealed efficient methods for utilizing the controller, with the left wrist and arm having the advantage of a large dynamic range of movement in comparison to the right. With this observation, parameters for the controller were focused on left arm mobility.

Future work would benefit in exploring gesture recognition and implementing machine learning into interface design. With this addition, a personalized gesture vocabulary could be developed and overtime incorporated in future use of this gesture controller.

Media link: Debut performance of "...prends-moi, chaos, dans tes bras..." April 2017, Montréal, Canada. https://vimeo.com/291366942

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