The Stranglophone: Enhancing Expressiveness In Live Electronic Music

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ABSTRACT

This paper describes the design and on-going development of an expressive gestural MIDI interface and how this could enhance live performance of electronic music.

Keywords

gestural control, mapping, Pure Data (pd), accelerometers, MIDI, microcontrollers, synthesis, musical instruments

1. INTRODUCTION

The Stranglophone was developed to investigate alternative strategies for gestural mapping and expressive control of electronic music. The goal was to develop a controller for electronic musicians that could allow them to "step away" from their laptop screens, but retain and possibly enhance the playability of their custom software instruments. The hardware was assembled using readily available electronic components, plastics and wood. The software was written in Miller Puckette's Pure Data (pd) graphical programming environment.

2. BACKGROUND

Live electronic music performance has at various times been criticized by the inability of it's performers to effectively convey emotion and expression using most of the commonly available interfaces such as a laptop, keyboard, mouse. This inability to effectively communicate emotionally with the audience can be directly related to a lack of direct gestural performance in a traditional laptop musician's repertoire [1].

A gesture can be defined as a body movement which conveys information [2]. An expressive instrument can be broadly defined as one that uses an effective mapping scheme and overall metaphor to convey the feeling of the musician to the audience [3]. In traditional acoustic sound generation, the sound is generated by a visible physical gesture of the performer which members of the audience can observe and then create a natural association or mapping of that gesture to the creation of that sound. In electronic music performance, the absence of a clearly identifiable gesture can create ambiguity in the audience's perception of the creation of the sound and can lead to an otherwise stellar performance being unfairly branded as "emotionless" or (even worse) "dull". Compounding this problem, gestures traditionally associated with the performing of electronic music such as the movement of a mouse or typing on a computer keyboard are small, subtle and general movements which do not suggest any specific expression or association with sound creation.

Although many genres of electronic music may not require a "lead" or "performative" aspect to their performance, there are many instances where an alternative interface could create a superior live performance by effectively bridging the gap between the physical gesture of the performer and the expectations of the audience. Although there has recently been renewed commercial interest in gestural controllers for electronic music performance, such as the IR sensors found in Roland's MC-505 Groovebox[4] or in Alesis' AirFX [5] controller, these products are typically used to how a sound is effected or parameters of those effects and are not intended to function as primary controllers or sound generators.

The Stranglophone was developed to function as a dual purpose device – both as primary interface for sound generation as well as a configurable effect modifier.

3. DESIGN

The initial design, prototyping and development of the Stranglophone took place during Gideon D'Arcangelo's NIME class [6] taught at the Interactive Telecommunications Program at NYU. The initial version was then presented at the NIME03 conference in Montreal. The second iteration of this design which will be presented is currently being developed at NYU.

The design criteria for the project included portability, ease of use, the potential for virtuosity and a clear relationship between the gestures required to play the instrument and the sound produced. The name was derived from the words "strings" and "angles" which were the primary effectors in the initial design.

3.1 HARDWARE

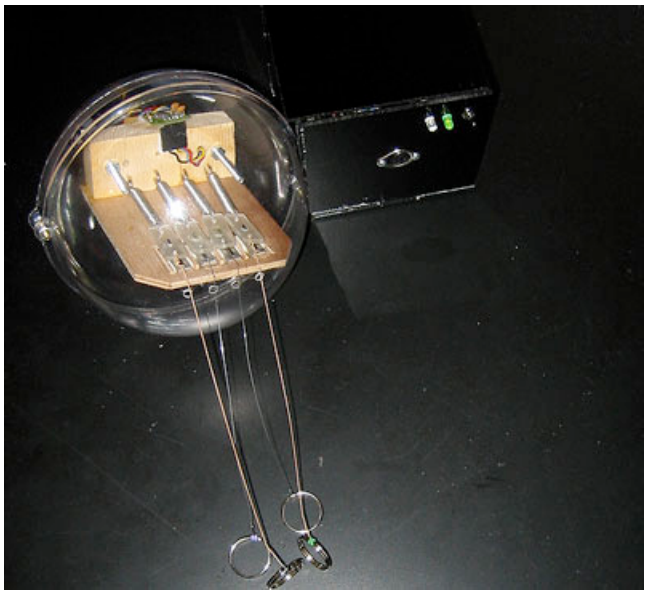

Figure 1. Stranglophone sphere controller and black box

The Stranglophone platform consists of two elements – a spherical handheld controller and a black box. The handheld controller consists of an L-shaped block of wood mounted inside a clear plastic sphere. The "back" of the instrument has a Cat-5 jack, as well as a single Analog Devices ADXL202 accelerometer mounted on top. Four small sliding potentiometers are mounted in the base of the wood and attached to springs on the back. These sliding pots have custom handles which are attached to guitar strings with key rings at the ends.

The sensor information from the Stranglophone sphere is sent via a Cat-5 cable to the black box controller which contains a BX-24 microcontroller, power connectors, two indicator LEDs (power and MIDI traffic) and a single MIDI jack. The BX-24 processes the sensory data and sends it out as MIDI note-on messages on five separate channels.

3.2 Software

The software is written in PD and it consists of synthesis, effects and amplification modules. The accelerometer in the sphere sends tilt data to PD which uses this to generate a base frequency. In the initial version, tilting the sphere right produced lower-pitched sounds while tilting it left produced higher pitched sounds. This basic sound is controlled and shaped by the four sliding potentiometers which affect a number of user assignable parameters.

4. PERFORMANCE

The Stranglophone was initially performed at the avant garde jazz club Tonic in NYC as part of Gideon D'Arcangelo's NIME03 [6]. I have since performed it as part of a demonstration at NYU as well at a freeform jam session at a club called the Frylab. At these performances, the audience reacted most positively to the instrument when I stood up and performed it expressively, like a saxophone or guitar player.

5. ONGOING DEVELOPMENT

The next steps in this project are to redevelop the handheld interface to make it more ergonomically sound, as I felt that holding the sphere for long periods of time could be uncomfortable. I would also like to make the sphere completely wireless so as to improve its potential range of possible gestures. I am also considering switching to Microchip's PIC series of microcontrollers as they are lower cost and more flexible than the Basic X controller.

6. ACKNOWLEDGMENTS

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7. REFERENCES

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