Distracted - A piece for Violin and an Audio-Visual Interface

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ABSTRACT

This is an extended abstract for a demo of an audio-visual interface for a violin bow demonstrated through a composition called *Distracted*.

1. INTRODUCTION

The author's primary PhD research at the University of Technology, Sydney focuses on the design of a wireless audio-visual interface, fitted to the frog of a violin bow.

The interface is designed to be a discrete tool that allows an expert practitioner to expand their creative tool bank beyond the limitations of a traditional acoustic instrument by combining their existing skill set with the ever expanding possibilities of technology. Embedded in practiced-based research, the interface is developing through composition, improvisation and live performances. Hence, the first of many compositions was written to explore the possibilities of the prototype.

This paper will focus on the first of three movements of *Distracted - Rain*. A six minute structure, starting from solo violin, then building layers through live sampling and audio processing and pre-recorded playback. The visual component, made up of video samples, is also processed and manipulated in real-time, as one, cohesive improvisation with some pre-determined flag posts. There is a predetermined structure, enabled by timed triggers, initiated by the first toggle that turns on the sound within the max patch. Some instances are enabled directly by the interface, others rely on pitch detection, or slightly more random data from the sensors. It is a fine balance between predetermined, carefully planed out, reliable moments, and surprising, unpredictable instances, allowing for improvisation and spontaneous variations.

2. BRIEF OVERVIEW OF THE AUGMENTED VIOLIN

Although the modern violin has remained essentially the same since it was standardized in the 18c (Steinberg, 2002 [1])the pursuit of implementing extended techniques and augmenting the instrument have led to an abundance of studies and innovations.

2.1 The Electric and the Augmented Acoustic Violin

In their book, *The Contemporary Violin: Extended Performence Technique*, Strange et al. [2] outline the history of the electric violin and amplification of the instrument, dating back to as early as 1930, with the first commercially available electric violin being made by Rickenbaker, the manufacturer of electric guitars, in 1935. The development of electric violins expanded to the addition of extra strings, creating a hybrid viola/cello violin, such as the six string The Viper, created by rock violinist Mark Wood (Lieberman, 1997) [3]

The use of commercially available pickups, microphones and amplifiers was game changing for string players, allowing them to manipulate their sound whilst retaining the feel and technique of the original acoustic instrument. The ability to amplify an acoustic instrument also allowed violinists and other quieter instruments to stand their ground and be heard within a non-traditional setting, such as a jazz or rock band, which would otherwise be impossible.

In more recent years, research has been published into gathering data from the acoustic violin for analysis and creative purposes. In 2006, Bevilacqua et al. published their research on the augmented violin developed at IRCAM which was an acoustic violin with "added sensing capabilities to measure the bow acceleration in realtime." [4] In 2013, Gidion et al., published their research on using polymer sensor technology to study the dynamic patterns of the violin bridge by mounting the sensors under the feet of the bridge. The motion of the two bridge feet was captured separately, so that their mutual phase and amplitude relation could be followed while the violin was played in the accustomed way. They were able to gain a deeper understanding of how the instrument produces sound as well as the complexities of the fluctuating intensities of harmonics depending on their location on the fingerboard. [4]

Dan Trueman and Perry R Cook's BoSSA (Bowed-Sensor-Speaker-Array), [5] is a completely novel instrument that was put together after years of previous research which broke the violin down into separate components and created a completely new looking instrument. Challenging the audience's preconceived associations with the violin.

Unlike the developments mentioned above, the author's interface is specifically designed to fill the void for an elegant, wireless solution aimed at a virtuoso string player that may also identify as improviser and composer. As demonstrated in *Distracted*, the possibility of sound manipulation in real-time is very fluid. Fitted with four pushbuttons, two slider potentiometers and an accelerometer sensor, the interface communicates wirelessly with

Max/MSP and Jitter through the Xbee/ZigBee module, using an arduino Fio. The 3D printed casing allows for a light yet sturdy design.

The Arduino code along with the Max patch came together organically as the physicality of the interface began to take shape. The initial stages consisted of simple tests of data inputs and outputs, making sure all the software and hardware was communicating properly. In it's early stages of development, the interface functioned as a very basic loop pedal, initiating and ending sample recording and playback. Then, as the work began to take shape, so did the ideas and possibilities of the prototype.

3. PHYSICALITY OF THE INTERFACE

The audio-visual interface is made up of an Arduino Fio, with an XBee radio receiver mounted on top.

There is a small rechargeable lithium battery that is tucked away between the XBee module and the Fio. The other components are a push button module with four buttons, two, small slider potentiometers and an accelleromter sensor. All the hardware lives inside a 3D printed casing that sits around the frog of the bow. The Fio radio sends data to an XBee receiver which is mounted to an XBee expolerer USB and connected to a computer. *Distracted* is written using basic Arduino code and a Max/MSP and Jitter patch. Arduino communicates when the buttons are on or off, relevant data from the sliders and the acceleromter. But all the interesting and creative aspects of the piece happen in Max.

As with any new instrument, there is a learning curve. Designing, experimenting and practicing with the interface requires time and patience, often resulting in frustration. However, the result, is a truly unique, fully customized extension of an instrument, already capable of deep expression and technical prowess. Limited only by the engineering and programming capabilities of the engineer.

In *Distracted - Rain*, there is one pre-recorded sample, spliced together in Logic and read through a buffer . All other samples are recorded in real-time and processed using the interface, as well as some mapped instances within the patch.

For now, the audio signal is sent using a pickup, mounted around the violin. This pickup has a 1/4 inch jack input and the cable is inserted into an audio interface that is connected to a computer. A future goal, would be a completely wireless set up, with no cables attached to the acoustic instrument. The justification for this goal, is a visual aesthetic of elegance, freedom and wonder. An aesthetic which a visible cable connected to a black belt like pick-up around the instrument, completely destroys.

4. MUSIC STRUCTURE OF THE WORK

The arc of this movement is simple. It starts thin, with a solo violin, and builds as more samples are layered on top and around the acoustic melody. There is a pre-composed melody, but it is lose and free. The same goes for the harmonic structure. There are worked out chord land posts, but they are reached freely and no performance is alike. The piece grows and develops organically. Apart from the rain and wind sample, everything else is fluid.

Partly influenced by the rainfall and storms in NSW during the summer of 2022, this movement explores personal challenges imposed by extreme weather conditions and uncontrollable external circumstances.

5. VISUAL TECHNICALITIES

Made up of home videos and stock footage, the visual component juxtaposes together the cognitive difficulties induced by prolonged periods of rainfall against the playfulness of children in such circumstance.

Similarly to the audio manipulation, the visuals are processed and triggered using the interface. The data from the Arduino is sent to Max, and the video component is executed in Jitter.

The visuals are displayed on a large scrim, with the performer standing and moving around behind it. Lighting is used to accentuate either the artist or the visuals, depending on their importance in the current instance within the piece, creating one cohesive audio-visual experience.

6. CONCLUSIONS

This extended abstract discussed the author's ongoing PhD research into augmenting the violin through the design and engineering of a wireless audio-visual interface, fitted onto the frog of the bow. The workings of the interface are demonstrated through a three part composition named *Distracted*, focusing on the first movement *Rain*.

Acknowledgments

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7. REFERENCES

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