

Invited Talk

Recent Interactive Music

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Abstract

Three recent works continue my long-time interests in interactive music, algorithmic programming, timbral organization and natural sound. *Syreo* is an in-progress collaborative installation project based on emergent behavior. Using related computational strategies, architect Christoph Klemmt is creating the physical structure while I create the sound using physical models. I am also creating a virtual reality version of *Syreo* in Unity3D based on his 3D models. A previous project was based on recordings of natural sounds I recorded in Australia's Great Barrier Reef and outback environments in 2016. In an effort to allow others to explore these sound environments interactively, I created a laptop ensemble piece, *from Australia*, with a MaxMSP patch for performance. The third project is an interactive collaborative work composed with Esther Lamneck (New York University), *Irresistible Flux*, for tarogato and electronics. All three projects rely on the RTcmix music programming language, and other appropriate technologies for interaction and synthesis.

1. Introduction

I became interested in live electronic music around the early 1990's although much of my electronic work has been in fixed media, using Cmix and RTcmix (RTcmix.org). At Columbia University I created an improvisation app *PieceNow* on the NeXT Computer, and then two pieces using a predecessor of MAXMSP software for live digital signal processing with the IRCAM Signal Processing Workstation. I have used MaxMSP (www.cycling74.com) often since around 2000 to create pieces for instruments and computer at the University of Cincinnati including *Irresistible Flux* and *from Australia*. The relatively recent invention of new versions of RTcmix by Brad Garton (Columbia University) can be used as a plugin for MaxMSP (rtcmix), as an iOS library (irtcmix), and as a Unity3D framework (urtcmix) which have allowed me to implement new compositional strategies for these platforms combined with previously programmed algorithms. Techniques of particular interest in my work include stochastic granular synthesis, filtering, and physical models. I also derive inspiration from natural sound and timbral relationships between materials.

2. Syreo I Installation

My most recent collaboration is with architect Christoph Klemmt, who has created a number of significant installations worldwide, and currently is teaching at the University of Cincinnati. Using related computational strategies based emergent behavior, he is designing a physical structure while I am generating the sound for an installation.

Syreo I is an in-progress project based on emergent behavior. Syreo is Greek for "swarm." Early images of prototypes for the structure are below.

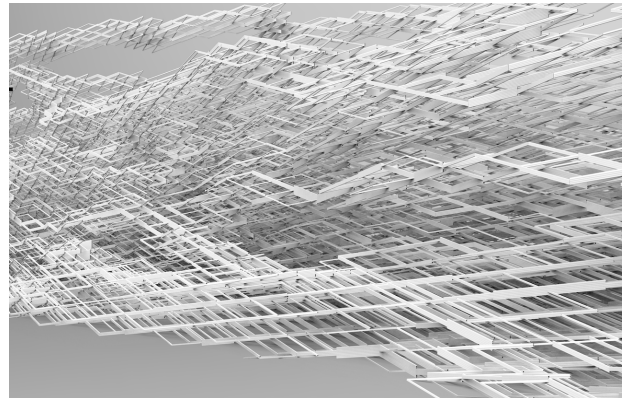


Figure 1. Syreo prototype image 1

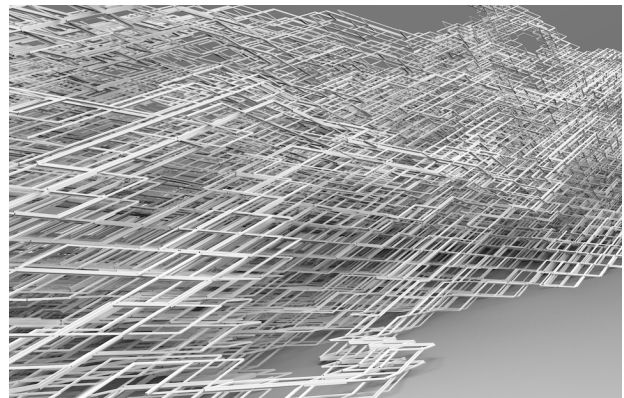


Figure 2. Syreo prototype image 2

While the physical structure is under construction, we have created a virtual reality version of *Syreo* in Unity3D.

The video shown contains a later version of the structure, with sound associated with certain locations in the structure and the viewer's position moving around within it.

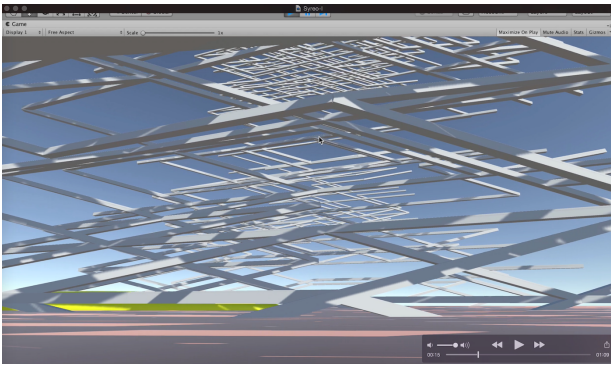


Figure 3. Image from video of Syreo virtual reality interaction in Unity3D

The sound is created with a MESH2D() physical modeling instrument in RTcmix, with various types of processing. Several algorithms are being explored including one based on the flocking algorithm used by the architect.

3. Evolving Sound, Playing Nature

I have created 2 laptop ensemble pieces of a series, based on recorded natural sound. The first, *from Uganda*, came from a travels in Uganda in 2011, where I recorded wildlife on safaris. In 2016 I visited Australia's Great Barrier Reef and outback environments, learning about the natural environments and aboriginal culture. *from Australia* is one of the pieces created from these samples. In an effort to allow others to explore these sound environments interactively, performers of the laptop pieces explore recorded sounds, processing them, and creating interactive environments based on deep listening.

Optionally, iPads running Mira which displays and allows control of the Max patch, lets the performers circulate around the stage while controlling the sound from their laptops. At Stony Brook University by Synth Beats, seven channels of audio, one from each performer, were sent to different angles of the hall, giving the sounds a calming depth. These pieces have also been performed at New Interfaces for Musical Expression 2016 in Brisbane, the International Computer Music Conference 2015 in Denton, TX, and the New York Electroacoustic Music Festival and other events.

The MaxMSP patch allows sound selections for two functions: soundfile playback, and granulation of buffers. Either or both of these layers may be processed by RTcmix scripts running FILTSWEEP(), a time-varying biquad filter, STGRANR() stochastic granular sampling and/or COMBIT(), comb filtering. The patch keeps track of time, and displays the sound categories of the current section. The iPad orientation (pitch, roll and yaw), displayed in the right-middle of the screen, controls reverberation.



Figure 4. *from Australia* interface as displayed in MaxMSP on laptop

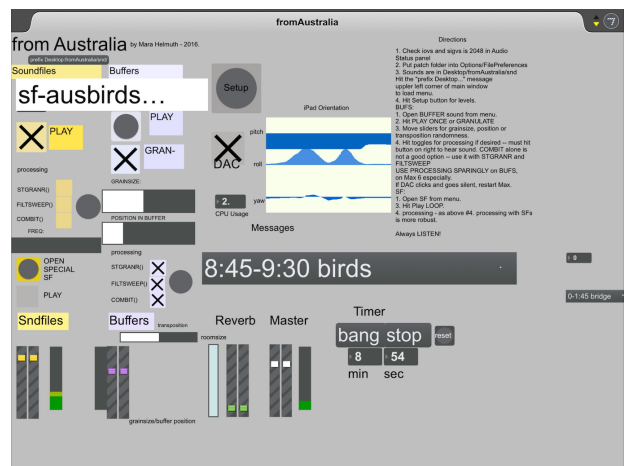


Figure 5. *from Australia* Mira display on iPad Pro

Some of the sounds from this piece were used in an Internet 2 improvisation, *Endangered Sound*, between my studio in Cincinnati and Stony Brook University's Network Music Festival in 2018. This piece is designed to cultivate awareness of a changing climate and wildlife. An OSX interface is used to select and play sounds using RTcmix and socket programming to send and received many layers of uncompressed sounds between remote hosts using the TCP/IP protocol.

4. Irresistible Flux, for Tároगतó and Live Electronics

Esther Lamneck (New York University), tároगतó player and clarinetist, and I collaborated over several years an interactive structured improvisation piece. Our work included two recording sessions, many rehearsals and culminated in performances at the New York Electroacoustic Music Festival, the International Computer Music 2014 in Athens, Greece, and elsewhere. The sound of the Hun-

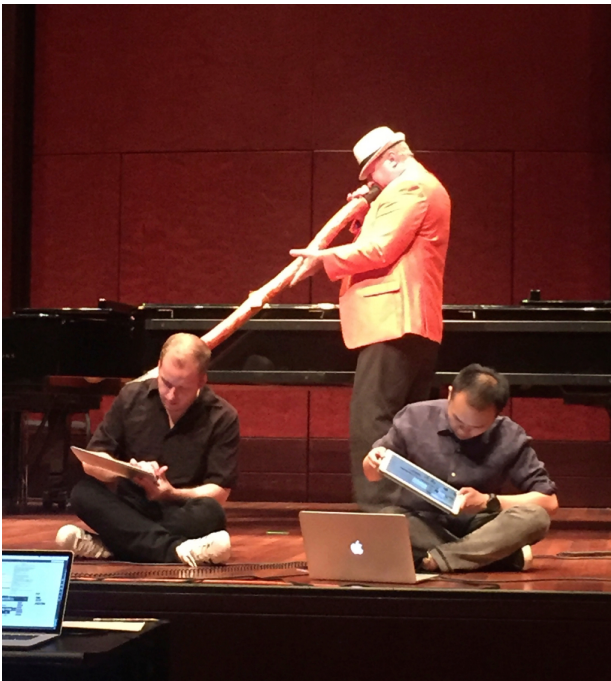


Figure 6. Performance of *from Australia* at CCM, Univ. of Cincinnati, by CiCLOP (Cincinnati Laptop Orchestra Project) with Timothy Northcut, digeridoo.

garian single reed instrument and Esther Lamneck’s virtuosic, exciting improvisations are high points of the piece. A Hungarian folk melody appears in the beginning, and is transformed digitally to create an expanded sonic environment.

I perform with a MaxMSP patch calling on RTcmix scripts to expand the already powerful and expansive tárogató’s sound into dynamic and timbrally defined environments in eight channels. While each performance is different, the overall structure remains the same, with similar events happening in each section.

I used my stochastic granular synthesis RTcmix score generating C program *stscoreap* to create sound families:

1. Select source file
2. Choose number of files to create
3. Choose mid points and preferences for grain rate, grain duration, grain transposition and grain amplitude.
4. Choose an amount of change throughout the sound – the function activity. (This will translate into the number of breakpoints in the shape of change functions.)
5. Run *stscoreap* on the command line, generating the desired number of score files.
6. Run a shell scripts to create sounds with RTcmix from the scorefiles.

7. Listen and choose the 1 to 5% of sounds that might be usable and appropriate.

The MaxMSP patch allows great flexibility in timing and event selection. The left half of the patch contains controls:

- Aqua - Upper left: delays
- Yellow - Agrans (windowing buffer with probabilities)
- Brown – Left: PLACE() Rtcmix Room Simulation, Right: PLACE() for end of piece
- Multigran – Rtcmix heavy delay layering
- Timer
- Bottom – Levels for inputs, delays, Agrans, munger, and 8 channels of output

The right half of the patch contains controls:

- Upper: Soundfile play triggers for 13 granular sounds to various chans
- Blue – Right: Score of events over time
- Preset: Controls initial levels (set for each performance space)
- Munger controls: Live granulation (Bukvic, Truman object)
- Output Number of Channels Selector
- Record control
- DSP Toggle

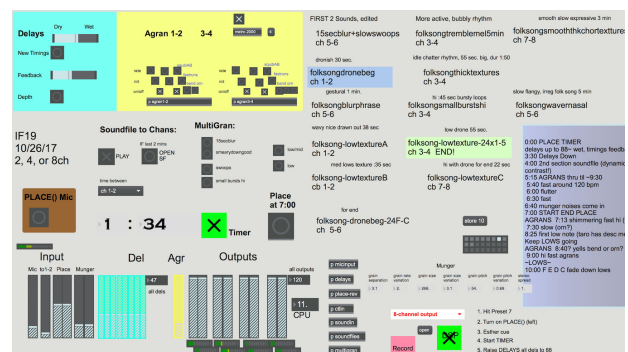


Figure 7. *Irresistible Flux* Max Patch

Irresistible Flux appears on Esther Lamneck’s *Tarogato Contractions* (2018) compact disk.

5. Future Directions

The plan is for the installation Syreo to be realized as a physical structure with a more extensive sound component. We are currently discussing a museum location in Cincinnati for this work. We would also like to have a virtual reality installation available for presentation in other locations.



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