

# **Exploring the Landscape of SuperCollider through Multi-modal Art**

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## ABSTRACT

*The abstract should be placed at the start of the top left column and should contain about 150–200 words. The abstract should be formatted in italic type (this has already been set in the abstract style).*

## 1. INTRODUCTION

Within the theme of considerations around the future of Supercollider (SC), its ability to collect, organize, manipulate data and interactions through a variety of means presents fertile ground for exploring SC's capabilities for integrating multiple audio-visual platforms and developer environments. The purpose of this paper is to introduce a variety of projects that provide creative outlets within larger, interdisciplinary explorations, leveraging the well-established capabilities of SC as a platform for audio synthesis and algorithmic composition while enabling fluidity within software and hardware platforms through Open Sound Control (OSC) protocols and libraries that micro-controllers (such as the Arduino) and connect distributed servers. Responding to the question of the future of SC, these humble experiments propose to highlight the way SC can be instrumental as a central control system for multi-programmatic outputs. The author is more immediately a part of the user-group that has sustained experience with SC and moderate dexterity with its programming environment, so accessibility and longevity of these tools are one reason SC has remained a pivotal tool for these works, and for many others. The objectives of SC and for artists such as myself, would be to learn and adopt new approaches and in continue to envision them within ongoing and new integrative environments that include emerging digital tools and to help shape its role in the future of creative systems and collaborative work.

## 2. A NOTE ON ARTISTIC CREATION

The artworks described in this paper involve assiduous processes of designing, building, evaluating and accepting range of composed and generative works. As a methodology that oscillates between theoretical reading and creative work research-creation processes such as these might offer traditional quantitative research strategies validity as creative practices, especially where it concerns socio-cultural phenomena. Building on Loveless (2019) and Chapman and Sawchuck (2012), some of such projects allow the expression and exploration of research findings through artistic and imaginative story-telling mediums.

### 2.1. Bird Song Mimic

The Bird Song Mimic was the primary interactive component of the work Birdsong Diamond led by artist Victoria Vesna, evolutionary biologist Charles Taylor, engineer Hiroo Iwata, physicist Takashi Ikegami, their labs and the UCLA ArtSci Collective between 2011-2017. A collaborative project looking at avian communication through the localization, recording, annotating, classification and algorithmic analysis of birdsongs, the Birdsong Diamond

sought to understand the language of birds through such modern advances in computing and analysis. The Birdsong Mimic was developed in response to early models of avian communication that had as their fundamental structure a call-response, including elements of repetition and improvisation (Tan, Kossan et al, 2013). Essentially, the program is a gamified version of singing like a bird that presents the user with a birdsong from a database, and then prompting them to repeat what they have heard. The program then provides the user with a score as a percentage. The project has been presented in various different venues, such as at Governor's Island (2015), Ars Electronica Festival, Linz (2017), the Centro de Cultural Digital in Mexico (2018), the National Museum of China (2019), providing an opportunity for site-specific adaptations in the form of different birdsong database created for each location sourced from endemic and endangered species of birds. In some cases, the installation involved 2 stations which allowed the piping of recorded human birdsongs from one station to the next, simulating the act of communicating between two users.

In Supercollider an interface facilitated the initiating of audio interfaces, the database, and number of stations. When the loop was triggered, a randomized birdsong was played and data relating to its pitch, amplitude and standard deviation and baseline pitch was recorded. A standard text-to-speech model then invited the user to mimic the birdsong. Using similar pitch, amplitude and standard deviation tracking, the two samples are data-matched and a percentage is provided to the user as a measure of how successful their attempt was.

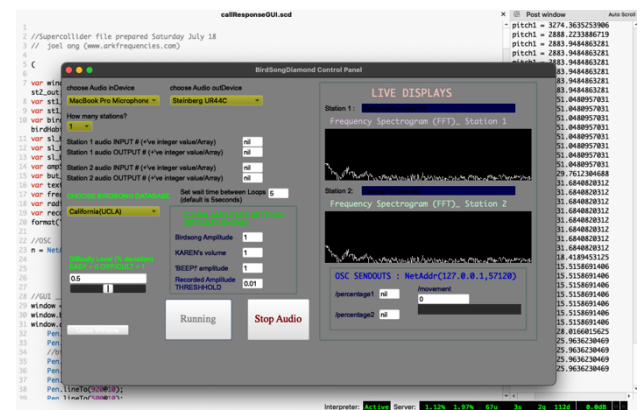


Figure 1. Birdsong Mimic interface creating in Supercollider.

### 2.2. Aeolian Traces

“Aeolian Traces” is an immersive installation that utilizes a hybridization of data harvesting, physical installation, algorithmic composition and spatial sound. Presented through a combination of a multi-channel sound diffusion system and an 8-channel ventilator (DC motor fan) setup, the piece creates wind currents in a gallery space triggered by human migration data derived from UN statistics from

2015, at the height of the Syrian refugee crisis and other significant geopolitical events. To establish an ephemeral sense of movement around and about the visitor, the ventilators are synced with sounds of wind, where visitors to the space are able to simultaneously feel and listen to them. The project read through the year's data set over a span of approximately 35 minutes, at each time stamp, nodes were created corresponding to the polar coordinates of the countries of origin that then migrated over the screen to the country of destination. Spoken narratives in native languages are also introduced in the piece as whispers that reveal themselves as they passage from one location to another. A nearby screen displays the project's informational content, visualizing migration data as suspensions of nodes in three dimensional space, and displayed connections between each node as they come into close proximity with each other. Additionally, the time each node spent 'suspended' was related to the year's Visa Restriction Index, a measure of how freely a country's citizens can move across international borders. In 2015, Syria was at the bottom of the list, along with other countries from the Middle East.



**Figure 2.** Project mock up of Aeolian Traces during the design phase.

In this piece, sound, image and wind are profoundly connected- the directionality of migration mapped to the movement of all three elements within the Ambisonic sphere using the Ambisonic Toolkit (ATK) library, as well as via OSC connections to the Java-based Processing IDE and Arduino for control of the ventilators. (Ong, 2019).

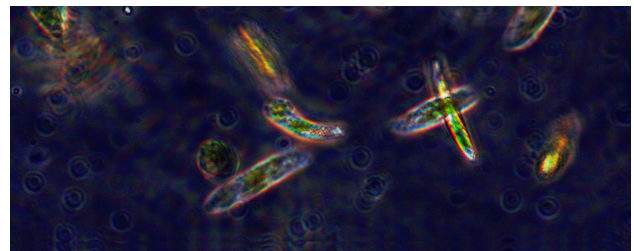
“Aeolian Traces” was first presented as part of the Windward||Windword exhibition at the Jacob Lawrence Gallery after a period of artistic and technical research at DXARTS at the University of Washington. It was further developed at the Alice Lab for Computational Worldmaking at York

University in Toronto, and has been presented at the Seattle Art Museum in conjunction with the REMIX festival, at the Gladstone Hotel Gallery as part of Nuit Blanche 2017 in Toronto, at the Currents New Media Festival in Santa Fe (2018), and at the Penny Stamps Gallery in Michigan as part of the New Media Caucus “Border Control: Traversing Horizons in Media Practice” in 2019.



**Figure 3.** Aeolian Traces installation at the Currents New Festival (2018).

### 2.3. Untitled Interspecies Umwelten



**Figure 4.** *E. gracilis* imaged at 400x as part of Untitled Interspecies Umwelten at the Onsite Gallery in 023

The project “untitled interspecies umwelten” is an artistic research project exploring expanded and computer-mediated experiences of conversation with other species. Through strategies in data visualization, motion capture and computer vision, the project proposes the speculative intermingling of the natural and cultural worlds of bio-semiotics and extra-verbal language. Its goal is to develop an interspecies futurity through which the collaborative practices with multiple species of plants, animals, fungi and microbes may inhabit the field, scientific/engineering laboratories and studios of computational practices. In this iteration, I focused on the *Euglena gracilis*, a fascinating single celled algae that exhibits a wide range of mobility. It is fascinating in this project because of its invisibility at the human scale, yet is bursting with activity under the microscope, exhibiting rapid responses to stimulus that were almost predictable, and at a time scale that is available to us as a human.

Its variegated responses to its environment are also well documented, in addition to moving towards light, it also

exhibits extensive contortions of its body (metaboly) that while are methods for self-preservation, could also be framed as performative and expressive gestures. In the exhibition, motion, speed and parameters derived through an custom build Open CV based program written in Python and focused on the activity of the *E.gracilis* was collected and connected a sonification sketch in Supercollider, to a visualization through Python. In addition, these parameters were used to generate prompts for a artificial story teller (initially custom built, later based on a fine-tuned LLM) and to produce narratives that would relate to the inferred sentiment in and of the algal population.



**Figure 5.** Untitled Interspecies Umwelten at the Onsite Gallery in 2023

#### 2.4. Other notable pieces

Amongst an additional list of pieces that were briefly described at the symposium included Spatial Experiments #1-3 (2013-6), which used SC as a control hub for moving suspended speakers through a space as a speculative form of auditory scene analysis and to play into the room's resonant frequencies; the Cybernetic Monochord (2015-6), which used SC to control the oscillations of an electromagnet driven single string instrument, as well as provide an interface for users to play the instrument; Spatial Measure (2015) that used an early voice to text recognition library (through CMU Sphinx) that converted text from a radio in the gallery space to search terms for Youtube videos and Freesound samples that were played in an Ambisonic 8 channel set up. In this work, the project also utilized the WSGui library developed by Marcin Pączkowski to invite users to interact with the piece by adding their own keywords over a local server. The last piece mentioned was Those who Observe the wind (2015), a piece that used SC to collect data from a weather station and organize the triggering of 16 stringed instruments in a space.



**Figure 6.** The late Pauline Oliveros testing out the cybernetic Monochord at the Deep Listening Conference at EMPAC, RPI (2015)

### 3. CONCLUSION

Responding to the question of the future of SC, these humble experiments propose to highlight the way SC can be instrumental as a central control system for multi-programmatic outputs. I am more immediately a part of the user-group that has a limited but sustained experience with SC and moderate dexterity within its programming environment, so accessibility and longevity of these tools are one reason SC has remained a pivotal tool for my work. My aim at this conference would be to learn and adopt new approaches and in envisioning them within ongoing and new projects, help shape its role in the future of creative systems and collaborative work.

### 4. REFERENCES

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