

Tributaries of Our Distant Palpability

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ABSTRACT

This demonstration paper describes the concepts behind *Tributaries of Our Distant Palpability*, an interactive sonified sculpture. It takes form as a swelling sea anemone, while the sounds it produces recall the quagmire of a digital ocean. The sculpture responds to changing light conditions with a dynamic mix of audio tracks, mapping volume to light level. People passing by the sculpture, or directly engaging it by creating light and shadows with their smart phone flashlights, will trigger the audio. At the same time, it automatically adapts to gradual environment light changes, such as the rise and fall of the sun. The piece was inspired by the searching gestures people make, and emotions they have while, idly browsing content on their smart devices. It was created through an interdisciplinary collaboration between a musician, an interaction designer, and a ceramicist.

Author Keywords

Sculpture, ocean, interactive media, smart phone

CCS Concepts

• Applied computing → Sound and music computing; *Fine arts*; • Human-centered computing → Auditory feedback;

1. INTRODUCTION

In this demonstration we present *Tributaries of Our Distant Palpability*, an interactive sonified sculpture. The form of the sculpture was created using traditional ceramic techniques to resemble a growth of sea anemones. Each pod of the anemone has a light sensor and unique voice in a dynamic audio mix. Audience members can interact with the sculpture by shining light on it using the flashlights on their smartphones. Such activity causes the sculpture to come to life with a digital soundscape that recalls an underwater environment. This response questions our reliance on smart devices and what else they may be drowning out.

2. CONCEPT

The concept for this piece arose from how our acts of communication have transformed with digital technologies. Our ability to broadcast a message to many people has increased through social media, creating a limitless supply of information and entertainment through emails, news feeds, videos, and posts. We often have no goal in browsing this data other than to check ‘what’s new’ and pass the time; we are not looking for something specific. The physical scrolling, swiping, reaching, and investigating gestures used in navigating these media inspired the scanning interactions that activate the dynamically looping audio of the sculpture. One scans the sculpture with light to explore the content, not to find a particular item.

The audio it plays recalls that of a bubbling wet murky landscape pulled into the digital age. Likewise, the sculpture itself takes the form of a large sea anemone. These metaphors were chosen because of how well they meshed isolating the individual sensors with the how bogged down and detached idly scrolling news feeds can make us feel. The title references how social media can keep us remotely connected, though lacking intimacy, just as the sculpture engages with light rather than touch.

3. INTERFACE

In its default state the piece produces little to no audio until someone begins interacting with it. However, should people cast shadows on the sculpture while walking by, it will activate slightly enticing them to explore further. The piece functions in both dark and bright environments. In a bright environment participants can use their hands to cover the pods to trigger the audio, while in dark environments they can use smart phones. The top pods of the sculpture contain melodic tracks, while the middle ring of pods has harmonies. The pods on the bottom of the piece contain effect tracks. See Figure 1 for a picture of the interface. A video demonstration is available at:

https://www.youtube.com/watch?v=PfqaFg_VNFw



Figure 1. Top view of 14-inch diameter light sensitive ceramic sculpture

The soundscape is designed to evoke the experience of moving through an alien, underwater environment. A mixture of analog modular synthesizers, custom Max patches, and field recordings were used in the construction of these sounds. There are 17 distinct sound files grouped in 5 categories, ranging from



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organic to machine-like, dense to sparse. These categories suggest the micro-biomes of our underwater environment, and include conceptual themes of: big bubbles, tiny bubbles, electric eels, the bends, and ambient underwater. An additional 14 sound files are copies of the originals with rate changes applied.

Tributaries is made out of porcelain clay, chosen for its smooth texture and its ability to enhance the brightness of the glaze applied due to its white hue. It is half hand built and half thrown on the potter's wheel. The coral forms were created on the wheel and then collaged together onto the form. The outer glaze was chosen for its minimal color to further accent the sculpted form of the piece. The curved opened corals beckon the viewer to get closer and investigate the form, creating a level of intrigue. The texture of the sculpture is varied with a tactile crawl glaze used on the inside of the pods. This texture can peak the viewer's interest inspiring further investigation.

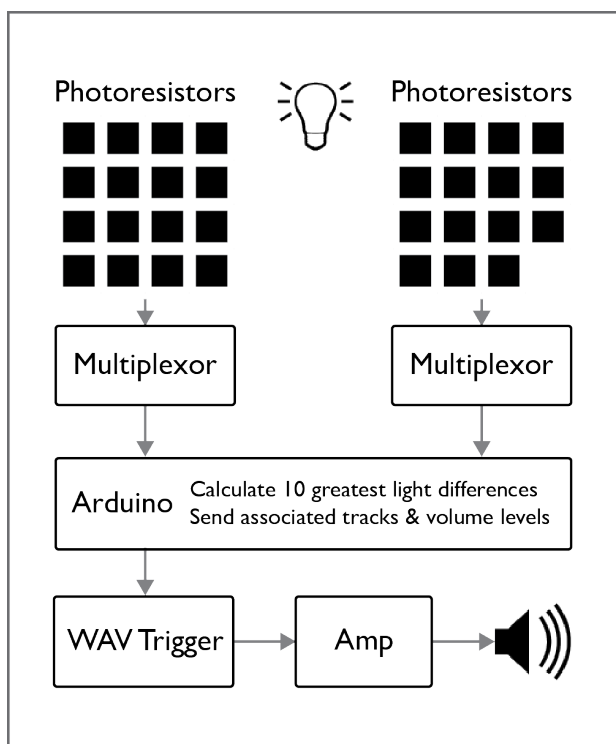


Figure 2. Data flow diagram showing light to sound process

4. TECHNICAL SPECIFICATIONS

The system works through a multiplexed array of photo resistors, an Arduino, a WAV Trigger circuit board, and amplifier, and a speaker. Figure 2 shows the data flow from light to sound. Each of the 31 pods of the anemone has its own photo resistor, and is symbolically linked to an individual audio track on the WAV Trigger. When the sculpture is first powered on, it senses and saves the ambient light environment. It proceeds to constantly compare the readings from each photo resistor to the environment readings. The sculpture's understanding of the environment is updated over time using a running average algorithm. While the light analysis will respond to decreases in light from passing shadows, it responds to increases in light from flashlights with more gusto. The light difference for each photo resistor is determined by calculating the absolute value of the difference between its current light level and its environment light level. Using polyphony on the WAV Trigger, the audio tracks associated with the ten photo resistors with the highest light difference get mixed together creating an audio atmosphere. The volume of those tracks is

determined by mapping it to the possible range of their associated light level. The tracks are each one to two minutes long, and loop when completed. Tracks not in the top ten are stopped. This is rarely noticeable as their volume is usually already quite low. While the system allows for multi-track mixing, it is mono channel to keep all of the components within the sculpture's form. The overall dimensions of the sculpture are 13 x 14 x 7 inches.

5. RELATED WORK

There is a rich history of incorporating sound into sculptural forms, beginning with the Futurist Luigi Russolo's noise orchestras in the early twentieth century. This mode of work was continued by exemplars in the fields of fine art and music with Robert Rauschenberg's *Oracle* [4] and Brian Eno's *Sound Flowers* [2]. More recent projects examine the role of user interaction in musical sculptures. *Variations* [6] presents a multichannel formalist sculpture that allows people to mix their own sound composition by adjusting the physical relationships between geometric solids. It uses an array of speakers external to the interface. *Hive* [1] uses multichannel audio and an integral multi speaker array to activate the surrounding architecture. In installation it uses piezoelectric inputs to determine listener location. Its form is designed to enhance particular wave shapes and timbres resulting in a honeycomb like structure. Other sound sculptures also find aesthetic inspiration in nature, like *Swayway* [3] and *Driftwood* [5]. Significantly, *Tributaries* does not require an external computer, and is self-contained.

Tributaries builds on a previous work by authors 1 and 3 that used a large array of paper cones installed on the walls of a gallery instead of freestanding ceramics. Rather than a sea anemone this early work took the form of a growth of barnacles. The new version was developed to streamline the technology and construct the sculpture in a more durable and portable form.

6. CONCLUSIONS

Tributaries does not intend to be a musical instrument, but to examine new ways to engage viewers with sound sculpture. The project combines interaction design and music composition with ceramics to create a refined artwork.

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