# "near and far" - An interactive sound and light installation





Figure 1: The artist interacting with near and far

## ABSTRACT

*near and far* is an interactive sound and light installation that explores how proximity influences our perception of sound in space and our relationships with people, places, and things. The installation aims to provide co-creative agency to the audience, whose presence and actions uniquely define the experience of the work. Movement is sonified in the space via a distance sensor and audience members may turn on and off a collection of three lights to toggle between eight unique soundscapes and musical compositions. The soundscapes and compositions range from ab-



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stract electronic sounds, to fully-fledged song / composition arrangements, to everyday sounds like wind, waves, and urban transit. The multiplicity of sonic spaces was inspired by the author's belief that embodying plurality is a core facet of being human and, when enacted in art, provides many varied opportunities for observers to resonate emotionally or otherwise engage with a work.

Documentation: https://youtu.be/fmZ9P51U7Kk

#### **Author Keywords**

Sound installation, light installation, interactive art, audience interaction, multichannel audio, Teensy, sensors

## **CCS** Concepts

•Applied computing  $\rightarrow$  Sound and music computing; *Performing arts*;

## 1. DESCRIPTION

near and far invites observers in to a comfortable and cozy space (decorated with armchairs and antique lamps) to engage with a speaker wall while their movement and actions control the sounds around them, ranging from fundamental electronic sounds like sine tones and clicks, to found sounds recorded in rural and urban spaces, to tunes and melodies that recall vernacular genres like jazz, songwriting, and hip-hop. When close to the speaker wall, audience members hear sounds spatialized horizontally and vertically (i.e. sounds of birds at the top of the array, and rushing water at the bottom). The observer can directly effect what is playing by turning on and off three lights (totaling 8 musical combinations) and approaching or receding from the speaker wall.

The installation consists of a 14.2 speaker array with speakers arranged in a vertical wall. The speaker wall is suspended from the ceiling. The speaker system is lightweight and affordable, comprised of a collection of three Logitech Z606 "surround sound" 5.1 speaker systems (with a combined sub and amplifier unit), three 7.1 surround audio interfaces (Vantec), and cabling. The speakers are mounted to lightweight 1 x 2-inch ( $2.5 \times 5 \text{ cm}$ ) planks of wood with custom 3d-printed adapters affixed to properly mount each speaker through mounting holes on their rear. Rope secures the wooden frame and attaches to two carabiners that enable the structure to be mounted to ceiling hooks or other rigging apparatuses. A distance sensor embedded in the center of the speaker wall communicates with a Teensy  $4.0^1$ 

<sup>1</sup>https://www.pjrc.com/store/teensy40.html

programmed to act as a MIDI controller, which sends controller data corresponding to the distance of audience members from the speaker wall.



Figure 2: An audience member interacting with the lights and speaker wall.

An array of three pull-string lights also hangs from above. Photoresistors affixed to each bulb communicate with another Teensy 4.0 configured as a MIDI controller, which sends MIDI note on and off messages corresponding to the state of each light: on or off.

The MIDI data from the distance sensor and photoresistors are used by a Max/MSP patch to dynamically control eight compositions. Distance is routed to various parameters, such as filter cutoffs, gains, the mix between two samples or signal processes, and more. The state of the lights simply toggles between the eight compositions.

Furniture familiar to households is spread throughout the space: notably, a side table beneath the speaker wall is home to an antique lamp and analog clock. An armchair faces the speaker wall from the back of the installation space. Nearby is another side table with an active AM/FM radio (able to be tuned by the audience) and a collection of a few books. A carpet leads the audience beneath the pull-string lights and encourages movement towards the speaker wall.

# 2. MOTIVATION AND RELATED WORK

With *near and far*, the artist aimed to create a musical experience that balanced passive and active interaction on the part of the observer. Observers may sit in the armchair at the back of the installation space, listen, and observe the structure (or actions of other audience members) somewhat passively. Others may choose to be more involved, interacting hands-on with the lights and sonified space. Some may aim to "figure out" the technical aspects of the system,

explore to deduce meaning, or just have fun. Regardless of the mode of interaction, users have agency to define and co-create their own experience of the work. This notion of diffusing agency beyond the sphere of the artist to encompass the audience is an important part of the artist's practice and interest in engagement and accessibility.

Another key motivation for providing audience the ability to navigate the musical landscape as they wished was to provide more possibilities for emotional resonance and engagement. By presenting choices to navigate a wide variety of soundscapes and musical textures (and genres), the chances that an audience member might resonate with a sound increases. On top of this, they may feel a sense of empowerment in knowing that their unique actions led to the current sound and moment.

Many related predecessors to this work exist, including several works that inspired the artist at one time or another, such as:

- 1. Telepathic Improvisation and The Greeting from Pauline Oliveros' collection of works, Sonic Meditations, which ask audience members to interface with musicians or interact with each other to make music out of their shared experience[3]
- 2. Jim Campbell's Memory/Recollection (1990) and Memory/Void (1990), which capture video footage of observers and play it back in real-time or delayed on 5 different television monitors, creating an interactive co-creative memory piece[2]
- Palle and Ami Skånberg Dahlstedt's OtoKin, a sonified space for dance improvation in which any small movement is mapped to real-time signal processing[1]
- 4. Vaim Sarv's "ritual" performances, highly inclusive and audience-interactive live musical moments led by the artist in vernacular spaces like abandoned tunnels and forests<sup>2</sup>

# 3. LOGISTICS

### 3.1 Space and Floor Plan

Much of the motivation behind using affordable and lightweight equipment is to preserve portability, flexibility, and ease of installation and presentation. Ideally, the installation needs about  $9 \ge 16$  feet (approximately  $3 \ge 5$  meters) worth of floor space, with ceilings between 10 and 15 feet (3 to 4.5 meters). See Figure 3. Even so, many spaces would work for this: the end of a hallway, a small room, the corner of a larger room, or any space where the speaker wall (about 25 pounds or  $9 \ge 2$ ) can be mounted from above. The vernacular and DIY elements of this installation may make it an interesting candidate for an installation to occur simultaneously with a social event at the conference (such as in the lobby of a banquet or at a party).

#### 3.2 Equipment

As described in detail in Section 1, the installation consists of:

• 14 suspended speakers and 3 combined sub/amplifier units (sourced from a "surround sound" speaker setup), and 3 small 7.1 audio adaptors, a distance sensor, Teensy 4.0

<sup>2</sup>https://www.vaim.net/



Figure 3: A drawing/diagram of a viable performance layout, 3 x 5m.

- 3 suspended pull-string lights with photo resistors, Teensy 4.0
- A custom wooden frame with adapters to mount each speaker
- Various furniture, lamps, carpet
- Cabling

If the project is accepted, the artist plans to bring all but the larger furniture, lamps, and carpet. These larger pieces can be sourced from local thrift shops or friends of the artist in the area of the conference.

## 3.3 Feasibility

This project is lightweight and portable and its parts are affordable. This makes it quite easy to insall the crux of the system, provided there is a way to suspend the speaker wall from above. Again, the speaker wall only weighs about 25 pounds (9 kg). The artist has been able to install the same system in a matter of 4 to 5 hours for previous events with limited help from colleagues, such as the **Constant** Open House on October 21, 2022<sup>3</sup> and a party at the artist's house

on May  $30, 2022^4$ .

### 4. ACKNOWLEDGMENTS

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# 5. **REFERENCES**

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<sup>&</sup>lt;sup>3</sup>https://youtu.be/fmZ9P51U7Kk

<sup>&</sup>lt;sup>4</sup>https://youtu.be/uF5RVmPYJ\_k

<sup>&</sup>lt;sup>5</sup>https://ccrma.stanford.edu/people/

dirk-s-roosenburg

<sup>&</sup>lt;sup>6</sup>http://rezahb.com/