NIME 2023 – Song of Distances

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Abstract

"Song of Distances" is a participatory and algorithmic composition based on ubiquitous computing. It praises the concept of compressed time/space and connectivity. Each login session is represented as a node in the topographic coordinate by granting access to GPS data by the user. The system calculates the session period and relative distances between the center and each node to generate m. At the same time, the orientation affects the spatiality of the sound, transforming the positioning data into audible events. Each networked entity that contributes data to the system is the center point of its coordinate and a detective node on other devices. The user can close the webpage or keep it open while moving; all of the behavior and decisions reflect on the parameters of the generative music. Thus, this piece gradually evolves with crowd participation as a collective experience on the Internet.

Author Keywords

Generative music, GPS, networking, mobile device, data sonification

1. Project Description

"Song of Distances" is a generative music piece that uses real-time positioning data from connected sessions as its material. The project blends the complexity of mobile networks, data collection, personal privacy, and ubiquitous computing with the artistic traditions of generative music. It is a participatory and algorithmic composition that highlights the concept of time and space compression while also exploring the potential of comprehensive connectivity. The project employs a generative music system that plays off with other systems, utilizing algorithms, a database, and a responsive web-based interface to create a unique musical experience. Users are prompted to grant access to their GPS data and device information, which is then written to a cloud-based database. The webpage displays an animated radar that scans for surrounding nodes and generates corresponding musical sounds based on the relative distances and orientations of the nodes.

The webpage also features an embedded program that continuously calculates session data and relative distances between the center and each node, transforming the positioning data into audible events. Each networked entity is represented as a node on a topographic coordinate, with the node's color indicating whether it is online or offline. The system utilizes session cookies to update the real-time session information to a server before it expires. A musical scale is distributed on each annulus, beginning from the origin, and gradually expanding outward in a concentric manner. The farther the annulus is from the center, the higher the pitch triggered by nodes located in its area. In this project, every user is their own center but shares the same data set with all connected sessions, allowing for a collective and collaborative musical experience.

The project showcases how frugal innovation can be applied to new interfaces for musical expression by utilizing easily affordable resources available to many people while respecting users' privacy. The project webpage is also built with a responsive JavaScript framework, allowing for seamless integration with any device. Furthermore, the project's accessibility and interactivity encourage participation from a diverse range of users and create a sense of community, adding to the overall experience.

For a generative system based on user mobility, users do not necessarily need to be in the exhibition space to complete the experience. From the technical perspective, the digital image displayed on-site is only one of the nodes, precisely identical to users' devices in terms of content and mechanism. Although the video installation at the exhibition site is not a "personal mobile device" since it is a prepared machine with the project webpage opened, the session created through data authorization is equivalent to sessions from mobile users after digitized as a tone in the Song of Distances. Again, this format highlights the advent of total connectivity and turns our relationship with artifacts and virtual entities more like an assemblage, interacting on the same platform.

The idea behind this project was to eliminate central presence, as all representations on each device are nodes in a shared dataset, receiving commands from an identical server for the synchronized radar and universal timing. At the same time, different center points lead to various melodies. More importantly, the essence of this work is the pre-determined rules and the constant accumulation of nodal data. Even there is no device opening the project webpage, the system of the project is still running on the server-side. This work examines the "generative method" that requires adjustments to accommodate emerging technologies and embody the abstract connectivity in observing reactions of crowd participation.

2. Floor Plan & Logistical Requirements

For presenting "Song of Distances," a projection or screen display of the work would help provide a visual representation of the distribution of participants to help the audience to understand the concept of the work and the relationship between the connected sessions. The work can also be accessed from a mobile device website after leaving the exhibition site, allowing for continued participation and engagement.

Audience will need access to a device with internet connectivity and GPS capabilities to participate in the piece. QR codes will be provided for easy access to the project webpage, where users can authorize the positioning data of their mobile devices. The webpage displays a topographic coordinate with the relative distance and direction of historical sessions and the device in their hand. It is important to note that the audience must have their GPS and Location Services enabled on their device to participate in the piece. Instructions

for participation will be provided on-site, including the steps to scan the QR code and authorize positioning data and how to reconnect to the system to affect the music through mobility.
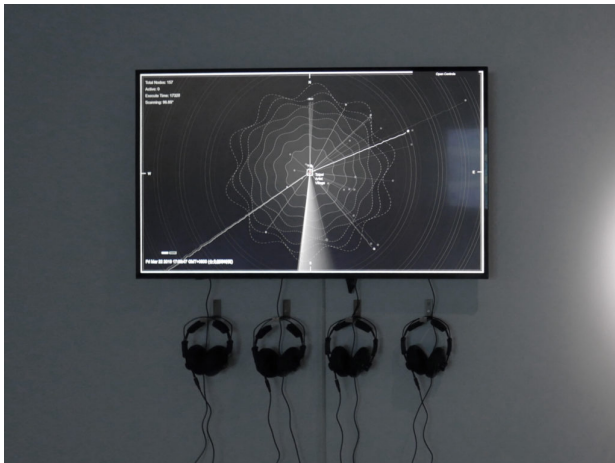

Figure1. Installation view with a monitor showing the webpage.

Figure2. Instructions as a printed card for the audience.

3. Space Requirements

The space requirements include a suitable area to display the projection or screen and an appropriate location to place the QR codes to access the webpage, with headphones or an amplifier for the sonification results. The display size will depend on the space and the number of participants. Regarding the venue, the project is well-suited for a university environment that can be easily accessible to the public. Still, an open indoor space where the GPS signal is not blocked by physical barriers can work better.

Regarding technical requirements, the project is a networked and web-based work that requires internet connectivity and a stable GPS signal. It is recommended to have a stable internet connection with at least a 2Mbps upload speed for the project to function smoothly. It is also essential to have a backup internet connection or a dedicated device in case of technical difficulties. This way, the audience can easily participate in the project and experience the real-time GPS data on the webpage.

The webpage also features an embedded program that continuously calculates session data and relative distances between the center and each node, transforming the positioning data into audible events. Each networked entity is represented as a node on a topographic coordinate, with the node's color indicating whether it is online or offline. The system utilizes session cookies to update the real-time

session information to a server before it expires. A musical scale is distributed on each annulus, beginning from the origin, and gradually expanding outward in a concentric manner. The farther the annulus is from the center, the higher the pitch triggered by nodes located in its area. In this project, every user is their own center but shares the same data set with all connected sessions, allowing for a collective and collaborative musical experience.

4. Feasibility

This project was exhibited in "attraper le JE, champs de JEU" at the National Taiwan Museum of Fine Arts in 2020. More than 2,400 connected sessions were created during the exhibition period. Most of the audience visited the museum and left before the session ended. Therefore, their traces had distributed to various locations in Taichung City. Apart from the musical result, another generative product was rearranging sessions as presenting digital profiles since users could name their sessions before participating in the piece.
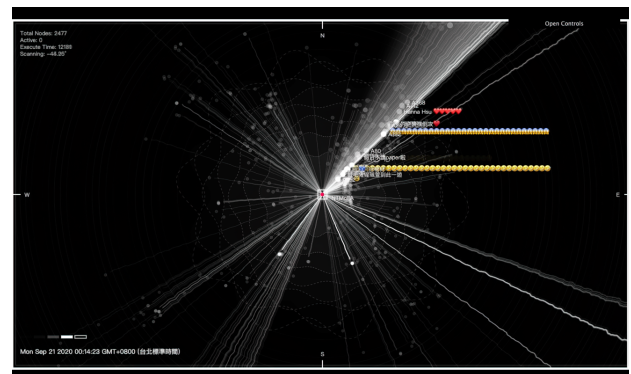

Figure3. A screenshot with 2477 offline nodes after being exhibited at the National Taiwan Museum of Fine Arts. (2020)

5. Equipment Requirements:

Besides of software, server and sonification program, I would like to require the conference organizer to provide hardware for the presentation.

- Computer: to run the project webpage.
- Projector or TV monitor: to display the real-time GPS data on the webpage.
- Internet connectivity: to access the project webpage.
- Printed QR code: to allow easy access to the project webpage.

6. Reference Links
- Project Demo Webpage https://zonesound.github.io/song-of-distance/
- A screen recording of audience engagement after the exhibition https://youtu.be/HqZXZQ9LVtw
- Github page https://github.com/ZONESOUND/song-of-distance