Music–Dance with Acoustic Feedback

[redacted] [redacted]

Author Keywords

Interactive installation, music, dance, EMG, feedback

1. PROJECT DESCRIPTION

Imagine entering a room with dimmed lights and moving around without knowing how to control the acoustic feedback loops. You may need to bend your body or contract yourself to tame the loops that can escalate very quickly. The system details are presented in a related paper submission for this year's NIME, entitled "Music–Dance with Acoustic Feedback: An Exploratory Study on Embodiment and Agency." Briefly, participants of this interactive installation step into a room alone, knowing they can create acoustic feedback loops by changing their proximity between the lavalier microphone mounted on their head and the loudspeakers asymmetrically placed in a reverberant room. They are given two Myo sensor bands that capture each forearm's muscle activity and orientation, with which they can control the sound parameters of the feedback loops. In addition, muscle contractions & relaxations of the participants are also mapped to color parameters projected in the room as the primary light source. The visuals essentially comprise solid colors aimed at providing the participant with a more immersive experience with respect to their covert bodily processes.

2. CONCEPTUAL DESIGN

All living systems are equipped with information-feedback paths to adapt to their environment [4]. That is due to a particular character of the living systems: the *autopoietic* organization [5]. Auto means "self," and poiesis, "creation" in Greek; hence, autopoietic systems are comprised of self-creating processes [7]. In living systems, that refers to the recursive interactions between organisms' components (e.g., proteins, nucleic acids, etc.).

In this interactive installation, we re-create the *no-input mixing board* (NIMB) using a room, speakers, and wearable sensors. NIMB is known for its emergent peculiarities [2], and its performers' action capabilities are concerned with sharing musical initiatives with the tool, hence waving the control and being dependent on it. The first author has several years of experience performing improvised music with

Figure 1: A representative installation site (Photo from [redacted])

this instrument. The working principle is based on plugging the output into one of the inputs and "taming" the self-oscillation by tweaking the knobs and faders of volume control and filter parameters. The starting idea of this installation is to create a simple NIMB-like setup using a microphone and speakers and use the body motion for control.

The embodied perspective asserts the living body is the cognitive system. It stresses that the web of "reasoning, memory, emotion, language and all other aspects of mental life" depends on and comes from a body with particular perceptual and motor capabilities [8]. Cognition is contingent on the body's various and unique sensorimotor capacities, which are embedded in biological, psychological, and cultural contexts. We ground our artistic exploration on each participant's unique sensorimotor capabilities. How differently do people conceive *feedbacking*? Musicians' embodied knowledge, for example, is usually limited to fine motor movements of fingers and limbs, focusing on sonic aesthetics. In comparison, dancers are trained to use their bodies intentionally from micro to macro motion scales. In dance, movement & choreography are the focal points.

Artist–scholars, such as David Borgo [1] and Marco Donnarumma [3] suggest a mutual *configuration* with the environment that actively co-constitutes music with the living bodies and their activities. The performance space, microphone setup, and monitoring system are all parts of the dynamicity of emergence, control, and agency. [6]. If your microphone faces the speaker too closely on a concert stage, creating audible acoustic feedback, you will most likely be triggered to change the microphone direction spontaneously. This could be seen as similar to reaching out the hands while falling. When deliberately creating the feedback, one can experience a tussle between the intentions and impulses.

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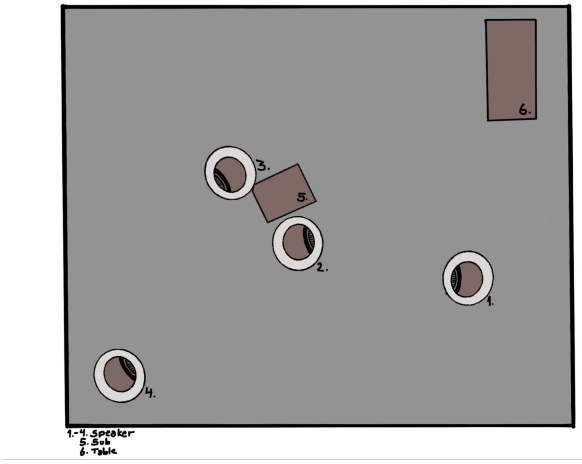

Figure 2: Floor plan is highly adaptable to various room sizes and shapes. 1 to 4: Speakers, 5: Sub-woofer (optional), 6: Desk for the equipment

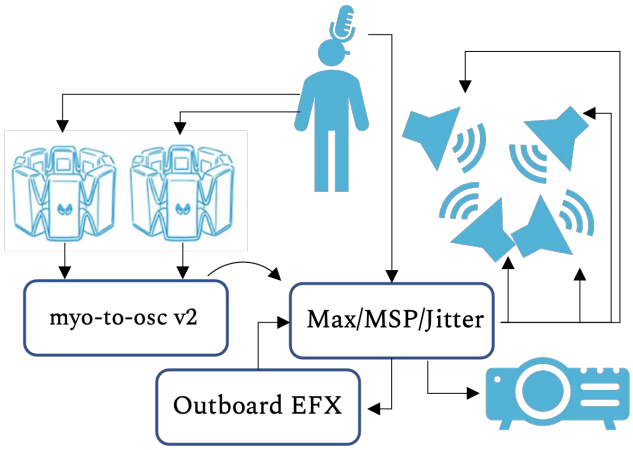

Figure 3: A simplified signal flow diagram for the hardware setup.

This installation is part of ongoing artistic research that derives from an extensive collaboration of the authors sharing a common interest in sound and movement and unconventional forms of control. Their first project was [redacted], a shared music–dance instrument. Following their first performances in 2018-19, including NIME in Brazil, the primary prompt of this presented project was a two-week art residency at the [redacted]. During that process, the room became an essential part of the instrumental setup, making it more suitable for an installation format. We also envision this installation as an opportunity to collect qualitative data from participants willing to give further feedback.

3. REQUIREMENTS

The hardware system of the study includes (Figure 3):

- A wireless condenser lavalier microphone on the head (provided by us)
- Two Myo armbands on each forearm (provided by us)
- Two laptop computers running the Python scripts and Max/MSP patches (provided by us)
- Outboard effect units (provided by us)
- Four *found* active speakers: These can be mixed types and brands (min. 4 inches) –do not have to be matching. (to be provided by the host)
- Four speaker stands with adjustable heights (to be provided by the host)
- A projector (to be provided by the host)
- A desk for two laptop computers, sound interface & tools
- An analog mixing console & sub-woofer (**optional** – to be provided by the host)

This work can be best presented in a closed indoor space, ideally not smaller than 30 square meters and not larger than 200. The room should be empty of physical obstacles that participants can collide with. As for the feasibility, this project was set up and used once for the duration of an arts residency at [redacted]. Please check the artwork portfolio submitted as supplementary material that can demonstrate the submitter's capacity to implement the proposal.

Audio-visual documentation is available at:
`https://vimeo.com/794637408/3e9415a3a0`

4. ETHICAL STANDARDS

The presented interactive installation and the related study were conducted with the fully consensual participation of the authors with the core values of accessibility and sustainability.

5. REFERENCES

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