

Conclusion and Outlook

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1. What the Prototype Revealed

The project set out to build a directionalized version of Lucier's "I am sitting in a room" (Lucier 1969), a live feedback loop in which the wall acts as a filter and the gimbals steer that filter in real time. The prototype demonstrates that this is achievable with commodity hardware: two ESP32 boards, four small servos (two per gimbal), two horns, and a wall. The first closed loops confirmed the central claim. Moving the gimbals steered the system's resonances, turning the wall into a live, adjustable filter.

The comparative approach to horn geometry remains an open experimental variable. The current prototype uses a single tractrix horn, and the infrastructure is in place to swap in exponential, conical, or hyperbolic contours. That exchange is not yet easy, though, because the original bayonet mount was replaced by a mechanically better-balanced side bracket, so each new horn contour still needs its own manual modelling of the bracket and the mounting points. Making that exchange straightforward is a problem to fix in the future.

The tension between the scientific and artistic orientation, first noted in the opening post, proved productive rather than paralyzing. The signal processing stayed minimal, a gain stage and a noise gate, which keeps the system's responses somewhat reproducible. The spatial, performative movement of the gimbals supplied the artistic dimension, and neither orientation had to be sacrificed for the other. The project is fundamentally about listening, to the wall, to the room, and to the feedback between them, and the prototype enables that listening in a way a static setup could not.

At this step I still had no name for the project. A provisional one I came up with is "big brother is sitting in a room with you", which alludes to the Lucier piece that started this work, as well as the impression of surveilling someone the gimbals give when being positioned in a room. It can and will probably still change.

2. Future Directions

Several directions remain open, and most of them extend the prototype rather than replace it.

- An equalizer, or a parametric filter inside the feedback loop, would give more control over which frequencies are emphasized, enabling deliberate shaping of the feedback character. Per my advisor Professor Ritsch, such filtering would also help “to make it sound less like a plastic box”.
- Integrations of other protocols such as FUDI¹ would also expand the possibilities of sending control data, therefore also enabling OSC communication which would also open up the audio side of the processing to more advanced DSP solutions.
- The modular design can also scale to an arrangement of many devices facing a common wall, creating a multi-point feedback network.
- A MEMS microphone, being digital, would bypass the ESP32’s non-linear analogue-to-digital converter entirely.
- A custom printed circuit board would improve reliability and reproducibility compared with breadboards.
- A Bluetooth headphone output could broadcast the microphone signal, letting a visitor listen privately to the feedback loop as a personal, spatialized experience.
- The ultrasonic array from the first semester could return, as one element in a comparative setup rather than the sole technology (Westervelt 1963; Shi and Kajikawa 2015).

None of these are commitments; they are invitations for future work. What the prototype has already shown is enough to justify a deeper research and further tinkering with this project. It provides the physical and computational infrastructure for asking how walls, horns, and signal processing shape acoustic feedback over time.

¹<https://en.wikipedia.org/wiki/FUDI>

Bibliography

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