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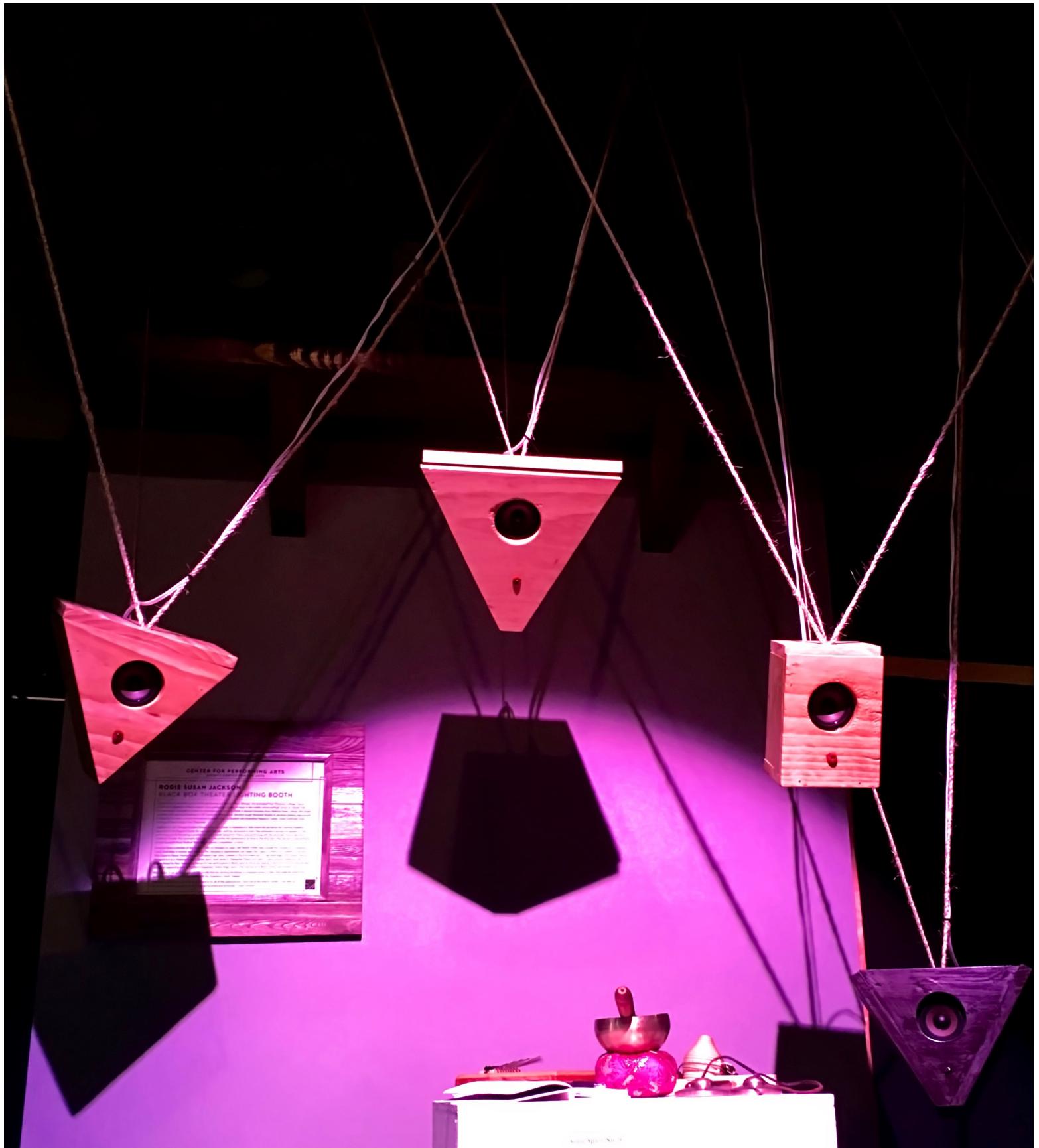
# Sonic Space No.9

for deliberate sonic sculpture agents

A Sonic Ecosystem Composition

to be presented as an installation  
for a chamber ensemble  
of 4 or more physically distinct  
single-board computer based digital agents

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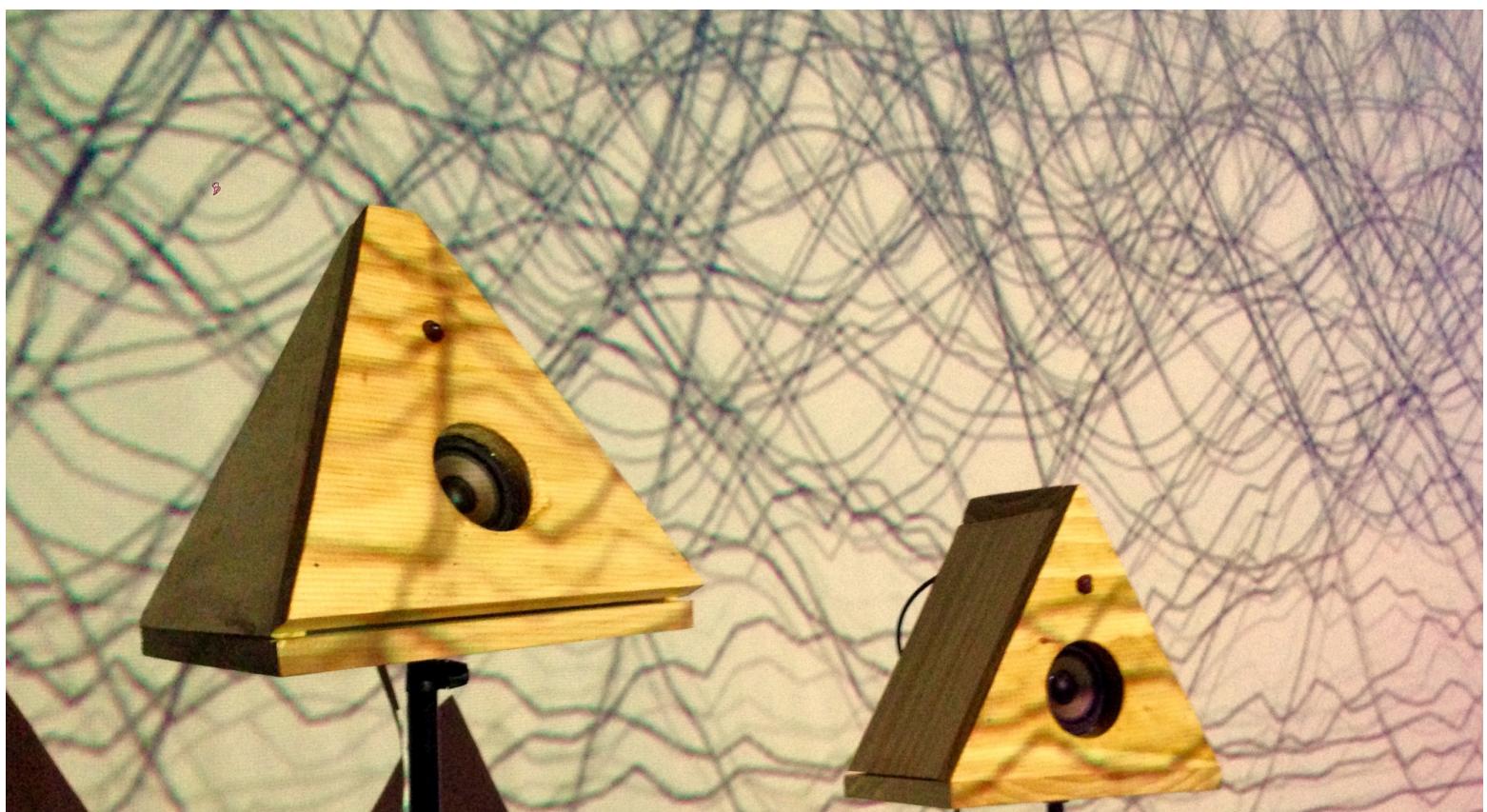
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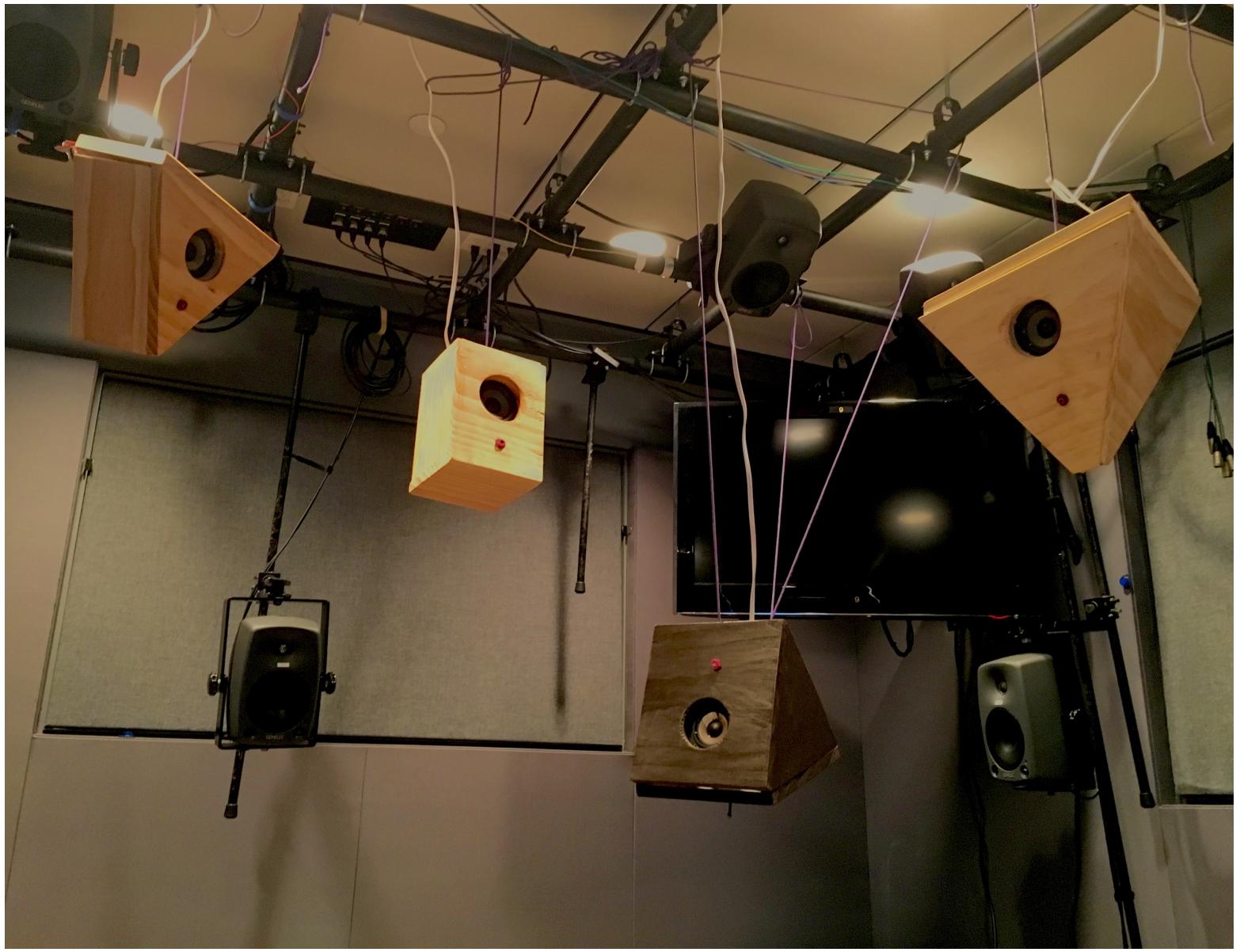
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*Sonic Space No. 9; for deliberate sonic sculpture agents* (2016) is a sonic ecosystem, whose composed interactions create a complex emergent composition that unfolds in consort between the ensemble of sculptural agents, visiting human participants, and the physical space of the chamber that it is installed within.

This composition moves away from a central single-computer-based system with large speaker array and multiple microphones towards a system comprised of physically-distinct, single-board computer based, digital sculptural agents. Each agent is housed in a wooden structure, runs from a single-board computer, in this case a Raspberry-Pi, and has its own dedicated microphone and speaker. This change in structure and technology, has created exciting new opportunities for the exploration of group interactions between individual agents, each with their own understanding and awareness of the physical world.





## The System

For this composition, at least 4 agents are to be used and as many as possible are encouraged, depending on the size of the installation space, resonance, and installation time. The system is comprised of two separate species, evenly split between the physical agents, running unique sets of programs dictating the sonic interactions. Each agent's composed set of rules is structured with regard to the time cycle of a day and a year. The representation of this day's actual length can be adjusted for each of the agents. For installation presentations where participants are free to come and go as they please, a day cycle length of 15 minutes is suggested. This should allow participants to the system the opportunity to experience an entire cycle at least once.

Each agent is given specific sets of rules for how to interact with sonic energy present in the space. As the day progresses, these rules change, mimicking the behavior of energy use in real ecosystems.

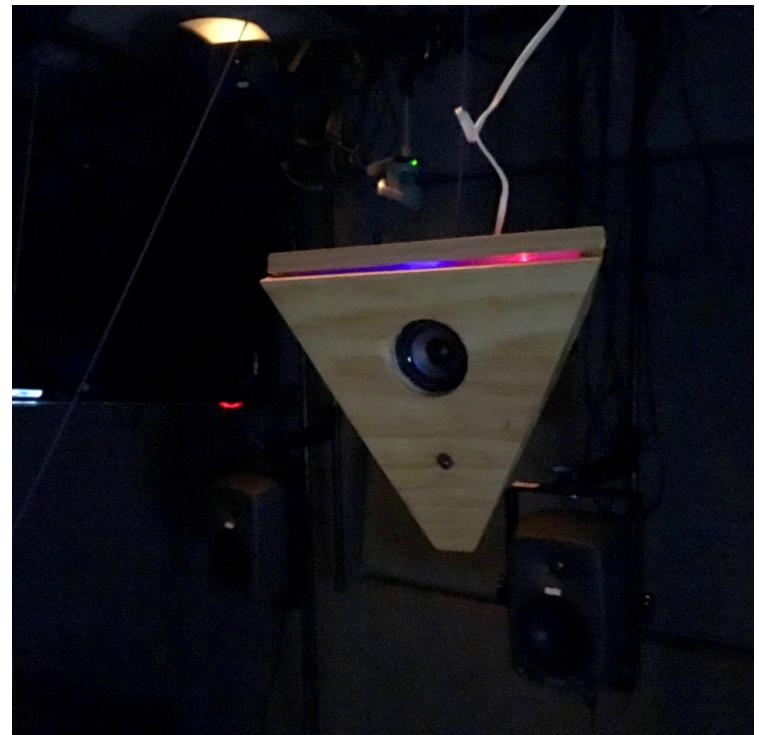
Each agent is equipped with a microphone and speaker, and as such, their reach or knowledge of the world is limited to the sonic domain. However, with this microphone, they are able to hear the room, energy present in the room, and each other. This results in an emergent musical composition.

## Participants and Installation Space Requirements

Participants are free to sonically interact or play with the system in any way they feel comfortable. However, to place an emphasis on active listening, comfortable chairs should be placed within the installation space for participants to sit in.

This piece is appropriate for a number of installation spaces. Ranging from individual rooms, free from excessive noise, to larger open spaces where sound can interact freely and may come from many sources. The agents can either be mounted on microphone stands, or suspended from the ceiling. In order to function, the simply need to have their power chords plugged in.

The agents may also be set up in one of two ways. 1) clustered all together facing one general direction or, 2) spread throughout the space creating an immersive experience. This decision should be made at the time of install based on the size of the space, number of sculptures to be deployed, ability to place



chairs in the space, and consideration of participant traffic flow.

Although not dangerously loud, this piece will create an amount of noise that is likely not appropriate or welcome in office/work environments. Therefore, care should be taken to separate the installation location away from any offices.

## Information about The Sonic Spaces Project

The **Sonic Spaces Project**, is an artistic and research project that has been ongoing since 2012. This project was originally inspired by the perceived relationships and energy transfer principles within nature and the soundscapes of the woods. The research and compositional output of this has resulted in a number of 'sonic ecosystems', which reflect these principles. The resulting compositions have created engaging interactive opportunities that touch on notions of computer agency, experience-based art, and site-specific couplings.

**Sonic Space Ecosystems**, are a sub-discipline of interactive music systems, which attempt to represent, adapt, and explore principles of other systems through an open sonic interface. These systems create a complex network of interconnected agents, based on artistically inspired relationships and principles from real-world ecosystems. The characteristics of these compositions create open-form, spatio-temporal, interactive music systems. This model creates flexibility in the presentational and participatory aspects of the systems, as well as creating engaging interactive opportunities that touch on computer agency, experience-based art, and site-specific couplings.



*Sonic Space Ecosystems* (clarified here to refer to feedback-based sonic ecosystems) are classified as both *cyber-physical systems* and *interactive music systems*, comprised of hierarchically related *elements* that together perform a *system function* that is greater than is possible by the individual elements. The primary function of this system is to create a controlled *music environment* which exhibits *emergent qualities* of *self-organization* created through *inter-reliant relationships* between internal elements in the digital system, and relationships between the digital system itself to the physical *sonic space* that it is installed within. These elements are made *aware* of their physical world through microphones that act as input transducers, allowing them to use *sonic energy* that they then transform according to their *individual function* (algorithms) as a way of surviving themselves. This transformed *sonic energy* is then returned to the *sonic space* through loudspeakers that act as output transducers as a way of *potentially affecting* the system as a whole. A *healthy system* is one that exhibits self-regulating *states of growth, decay, or steady states* and is capable of recovering from unexpected or extreme environmental changes. These systems are *open* and require external contributions of *sonic energy* by *human-agents/participants* or *non-living external elements* in the *environment*. This *sonic space ecosystem* then fulfills Jørgensen's requirement that "an ecosystem is a dynamic complex of *elements, agents, communities*, and the nonliving environment, interacting as a functional unit," while at the same time fulfilling the ideas of interactive music systems.

As this is intended as an interactive art form it is important for participants to experience these systems. Participation should provide opportunities to reconsider one's relationship to other systems through experience-based play. Software agents need to be capable of collaborating and engaging with human participants in the system.



## **Code**

Composed for SuperCollider 3.7.beta1 on Raspberry-Pi, running default Raspbian Jessie-Lite.

The code repository for all of *Sonic Space No. 9* is available from:

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