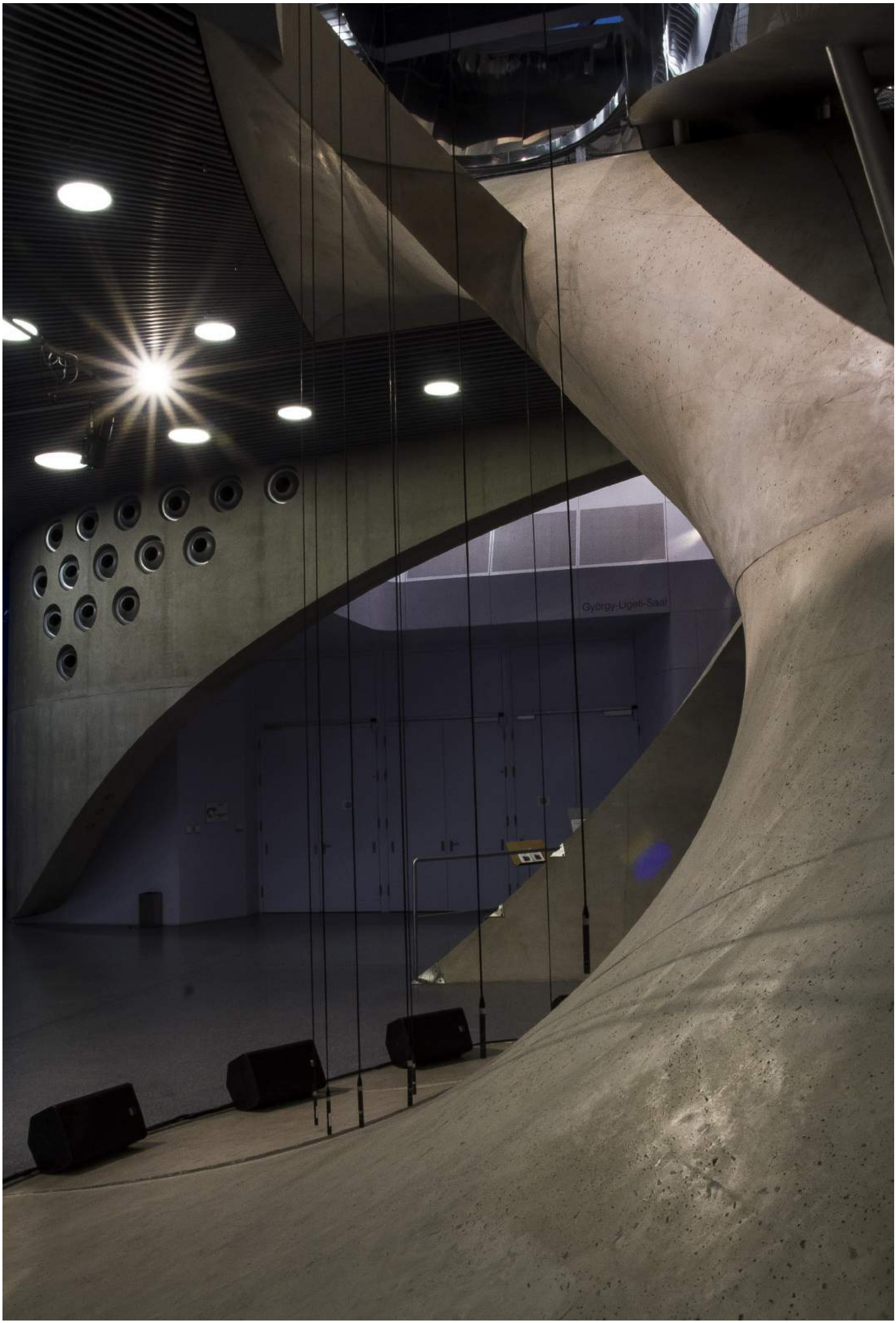
Kosmas Giannoutakis

Sonic Current

Sound Installation (2016)


György-Ligeti-Saal

Description

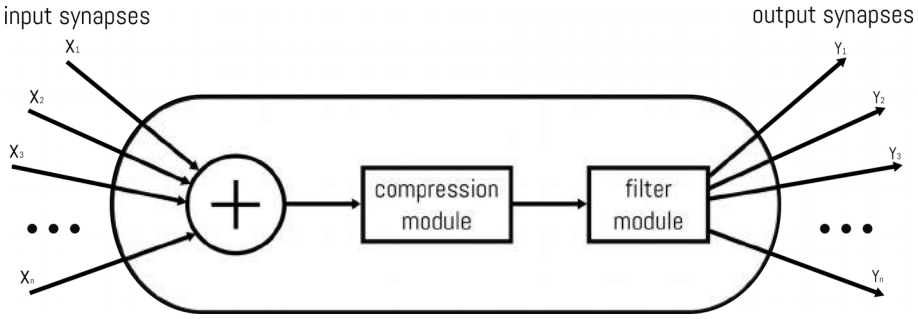
Documentation: Photos Audio Video1 Video2

Sonic current is a site-specific sound installation that transforms architectural locations into "sonic conscious" organisms. The transformation of the site into a body, with its sense organs (microphones) and actuators (loudspeakers), enable the site to articulate and manifest itself in an open dialogue with its visitors. Sounds from visitors, environment or other exhibited installations, captured as external stimuli by the microphonic "ears", are distributed over a digital audio network which is inspired by neuronal processing. Inside the high-dimensionally dynamic, self-regulating network, sound circulates recursively in multiple recurrent layers, resulting to diversely fragile resonant frequencies. The network output is assigned to the loudspeakers, which radiate the neuronaly processed resonances back to the site. Sound, as information, electric current or organic fluids, is the precious vital substance that sustains "artificial sonic life" on the site.

Digital Audio Network

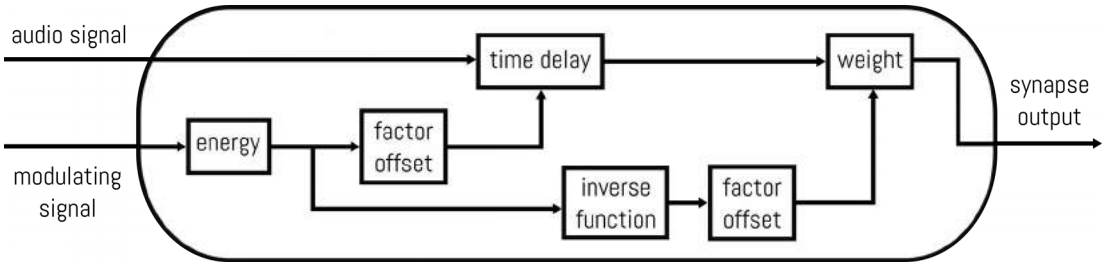
The digital audio network is inspired by biological neural networks and is a creative adaptation of various audio network structures, like IIR filters, Digital Waveguide Networks, Feedback Delay Networks and Recurrent Neural Networks. While preserving some of the typical behaviors (filters, reverberators, oscillators), the custom network focuses on non-linear qualities that emerge from a self-organizing and decentralized manipulation of its plasticity. Depending on the current inputs (microphones) and past states, the network is able to update some of its local parameters in real time. It can be described as a complex dynamical system which exhibits dynamic memory and renders chaotic oscillatory trajectories audible.

The implementation is realized in the Pure Data programming environment with the RNMN (Recurrent Neural Music Network) abstractions library. The library provides the basic building blocks, with which various network topologies can be designed. The basic object "neuron" can have an arbitrary number of audio inputs and outputs (unlimited fan-in and fan-out). Inside the neuron, the incoming signals are mixed and passed through a compressor module and a filter module. The compressor module operates in time domain and ensures that the mixed signal amplitude remains bounded. The filter module applies a constant high-pass filter, which eliminates any inaudible fixed-point attractors. Additionally, the spectrum of potential oscillatory attractors can be arbitrarily shaped with band-pass and low-pass filters.



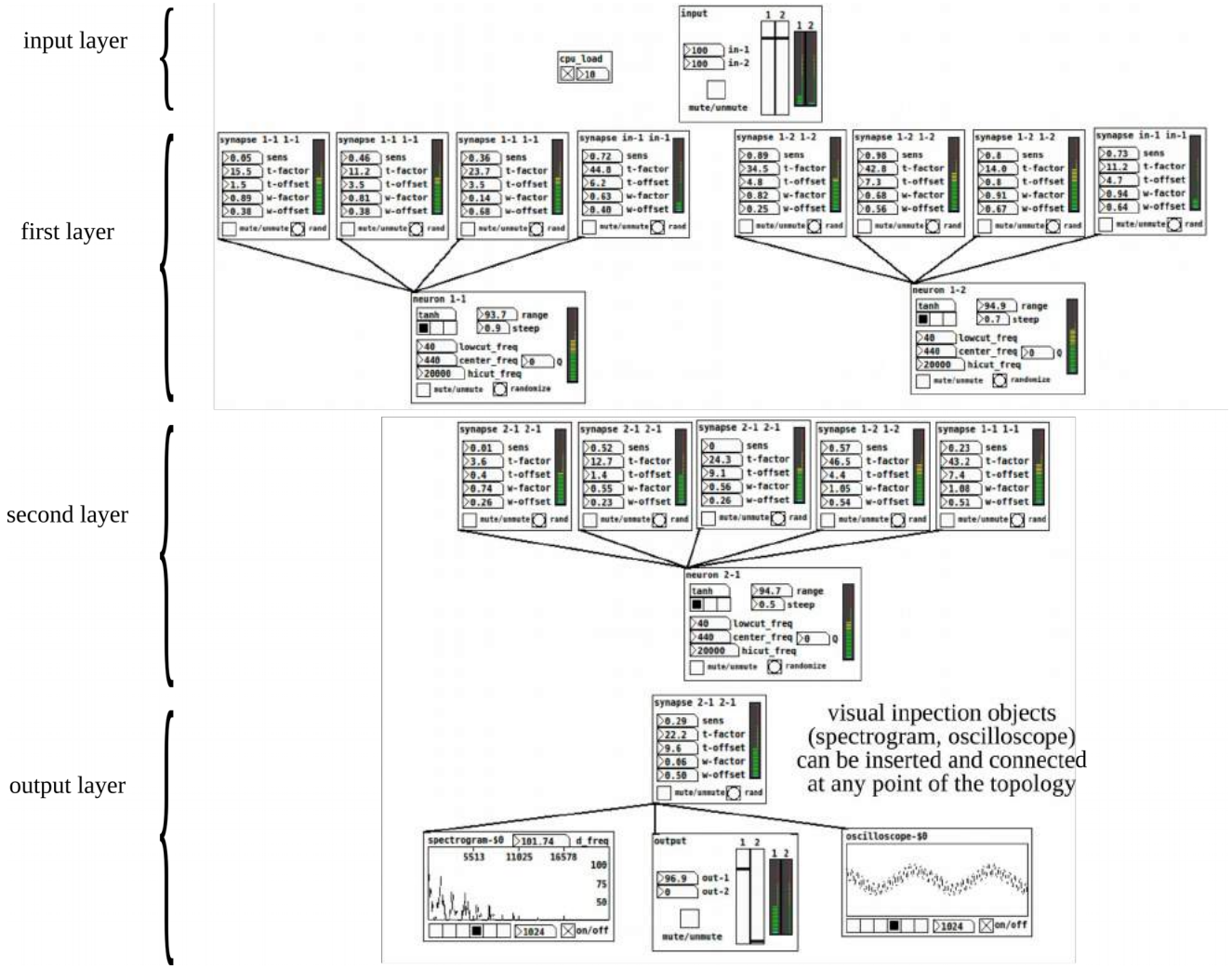
Anatomy of a digital neuron.

A synapse is the interface between two neurons. The implementation is inspired by biological neuromodulation which is the physiological process by which neurons use chemicals to regulate diverse populations of other neurons. Biological neuromodulatory communication is generally slower-acting and longer-lasting than classical neurotransmission. The object "synapse", has a second audio signal coming from the same neuron (self-modulation) or other neurons (neuromodulation) which modulates the delay time and weight of the transmitted audio signal. The signal energy is used in order to capture variations in longer time-scales. This implementation can be interpreted as the neurons expand and weaken or contract and strengthen their synapses in relation to the incoming sound energy.



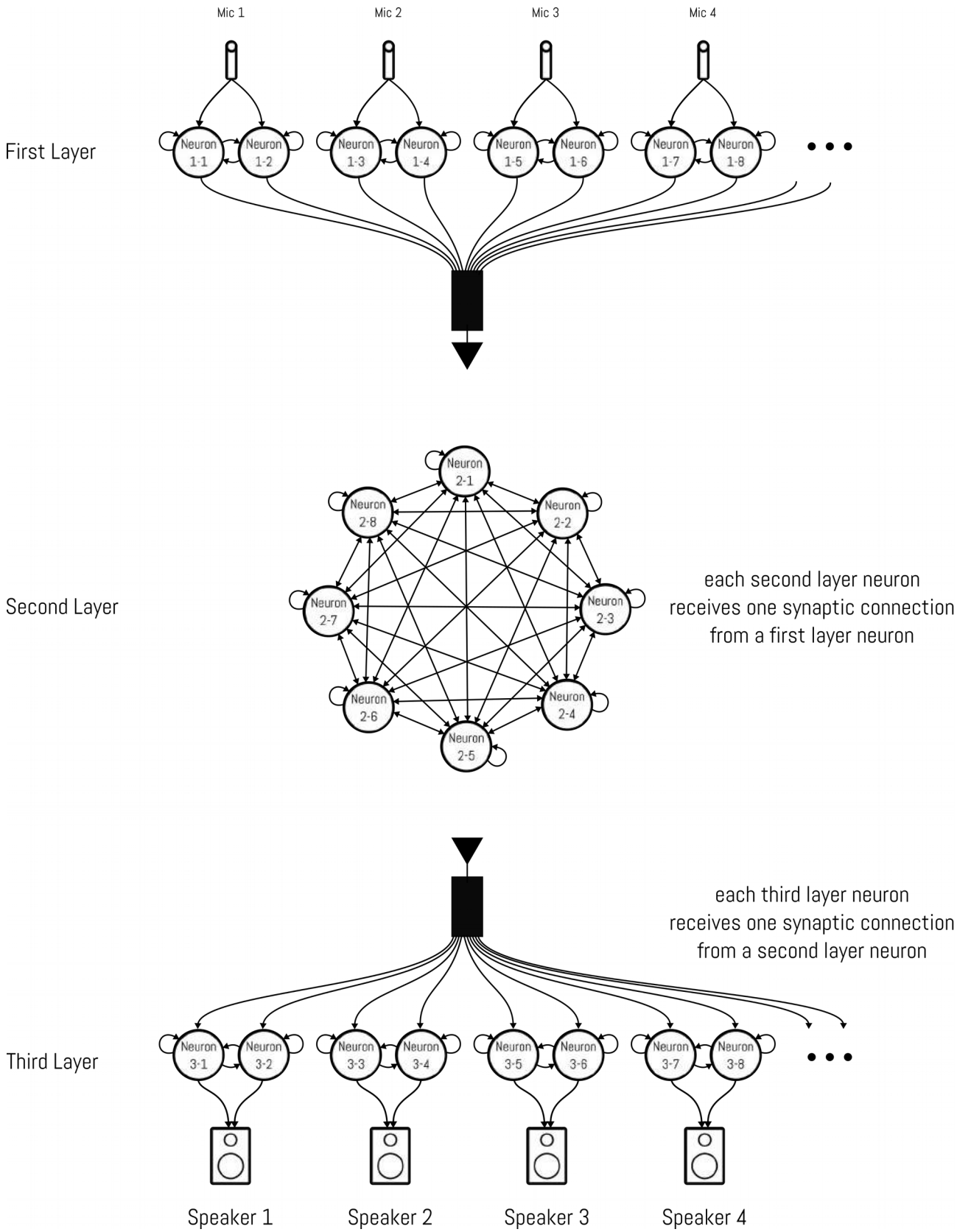
Anatomy of a digital synapse.

The framework facilitates the composition of various feed-forward and feedback topologies. The sonic behavior of each individual neuron can be visually inspected and listened, allowing a convenient and quick development of musical intuition. The topology structure and the actual parametrization is subject to the compositional creativity of the composer.



A three-neuron topology implemented with the RNMN library. Some design principles are indicated.

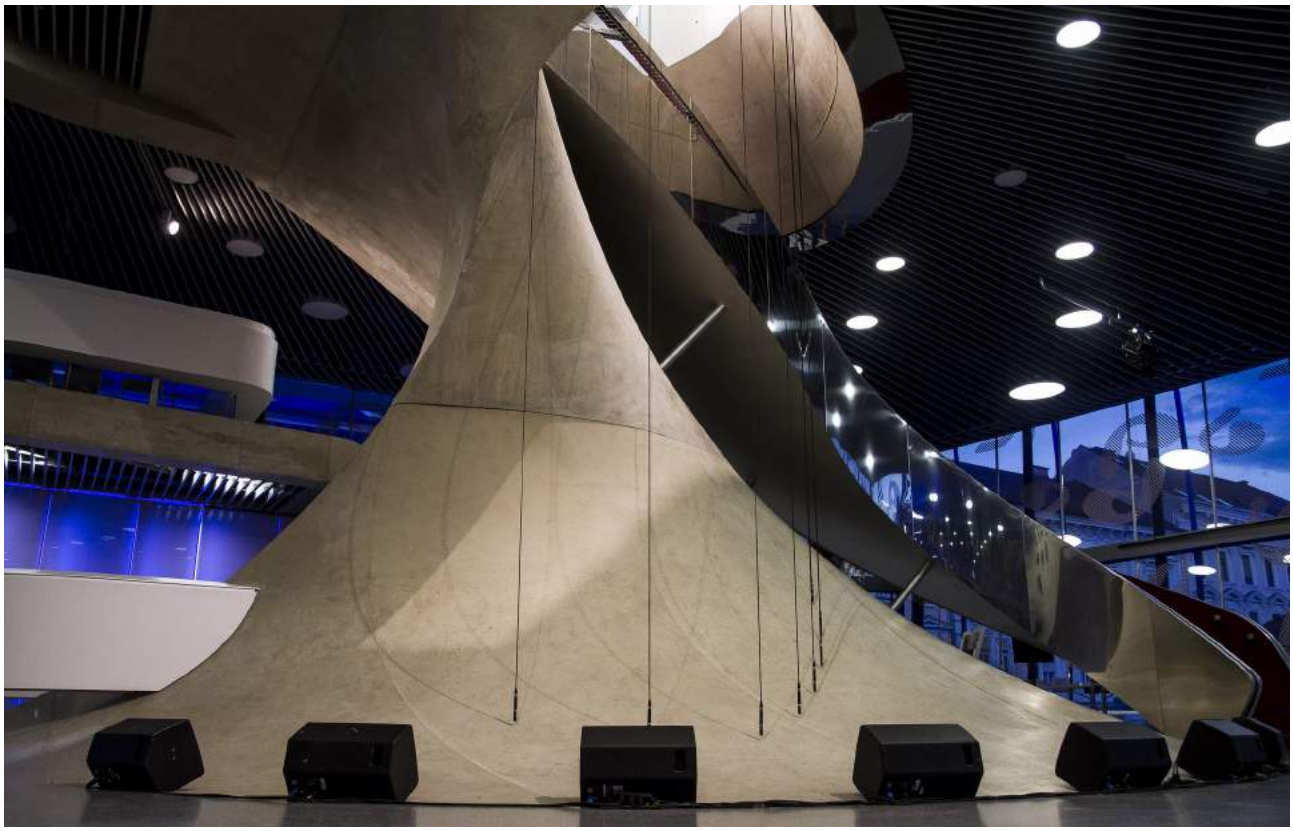
The site-specificity of the sound installation "Sonic Current" suggest creative thinking and experimentation with its internal digital audio network topology in compliance with its external physical "body". The microphones and loudspeakers are usually positioned in way that permit the smooth flow of the sound over architectural-sculptural surfaces. The asymmetrical positioning of the microphones establish different distances between each microphone and loudspeaker. The internal network topology is composed and parametrized according to any physical peculiarities on the site.



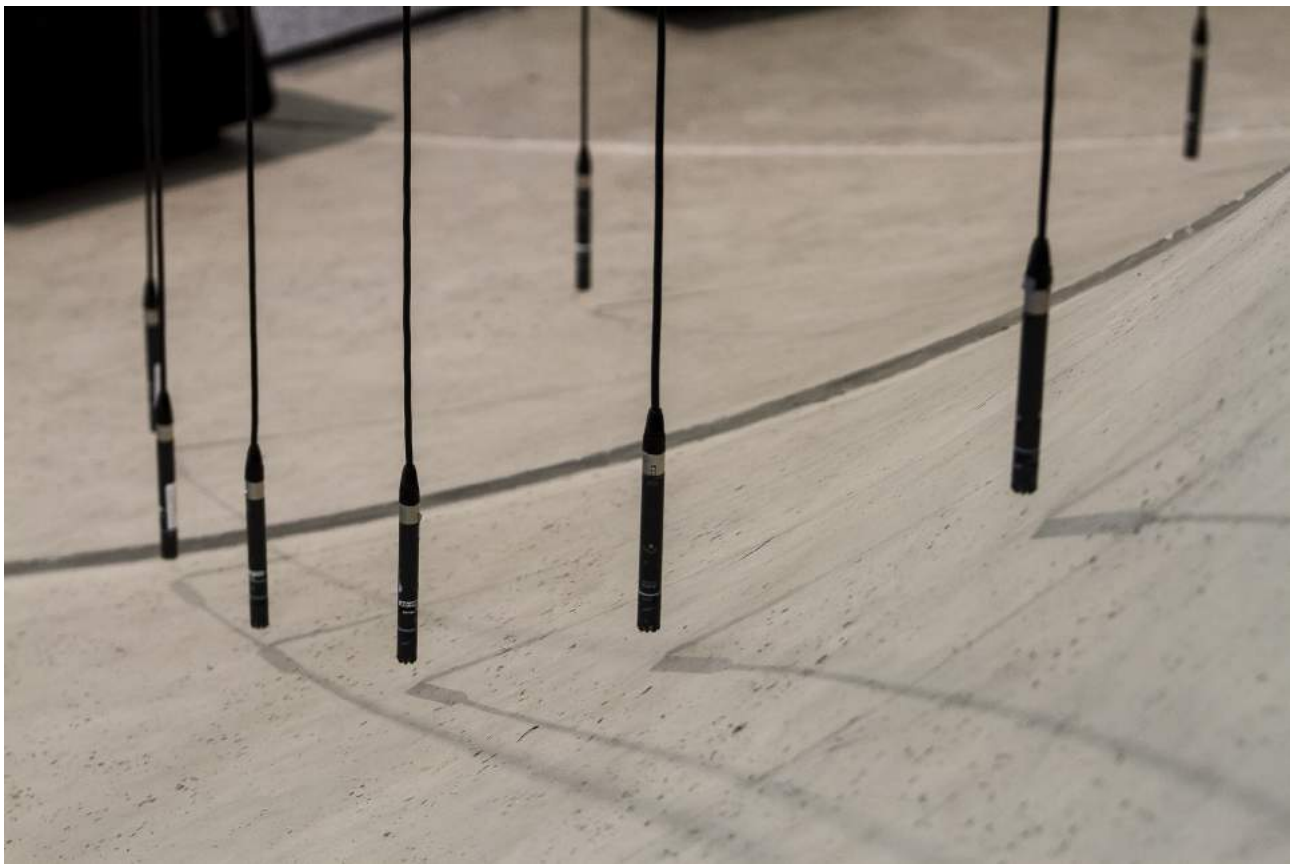
Exemplary network topology used in various exhibitions of the installation “Sonic Current”.

TECHNICAL RIDER

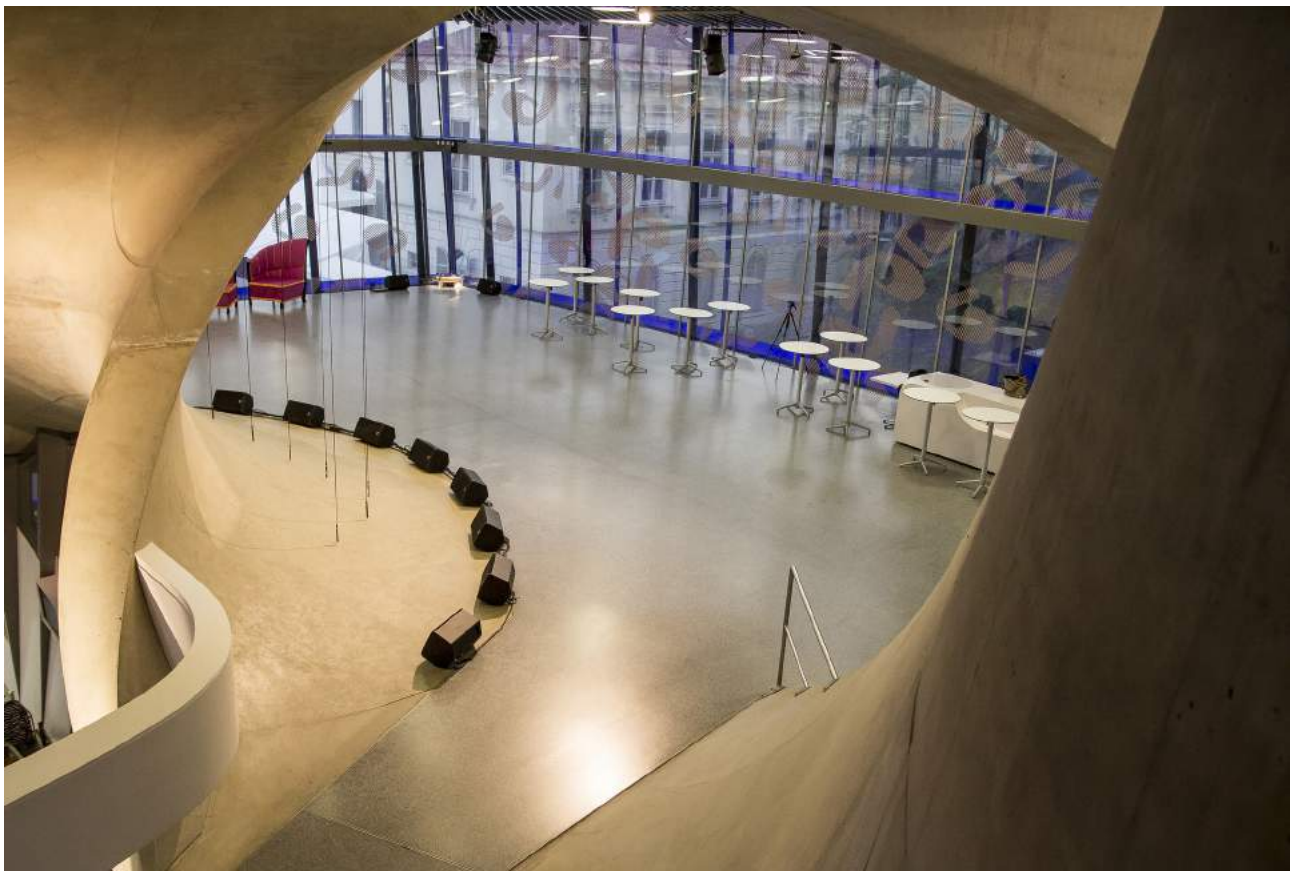
- Sculptural, architectural or gallery site at least 5x5 meter.
- 4-8 full-range loudspeakers (preferably passive).
- 4-8 omni-directional or cardioid condenser microphones (according to availability).
- Microphones hanged appropriately in ceiling or scaffolds.
- Audio interface with 4-8 analog outputs and 4-8 analog inputs.
- 4-8 microphone preamps (embedded in the audio interface or as external device).
- Computer with Pure Data (preferably Linux).
- Setup time and system calibration: 1 day.
- The number of microphones and loudspeakers can vary.

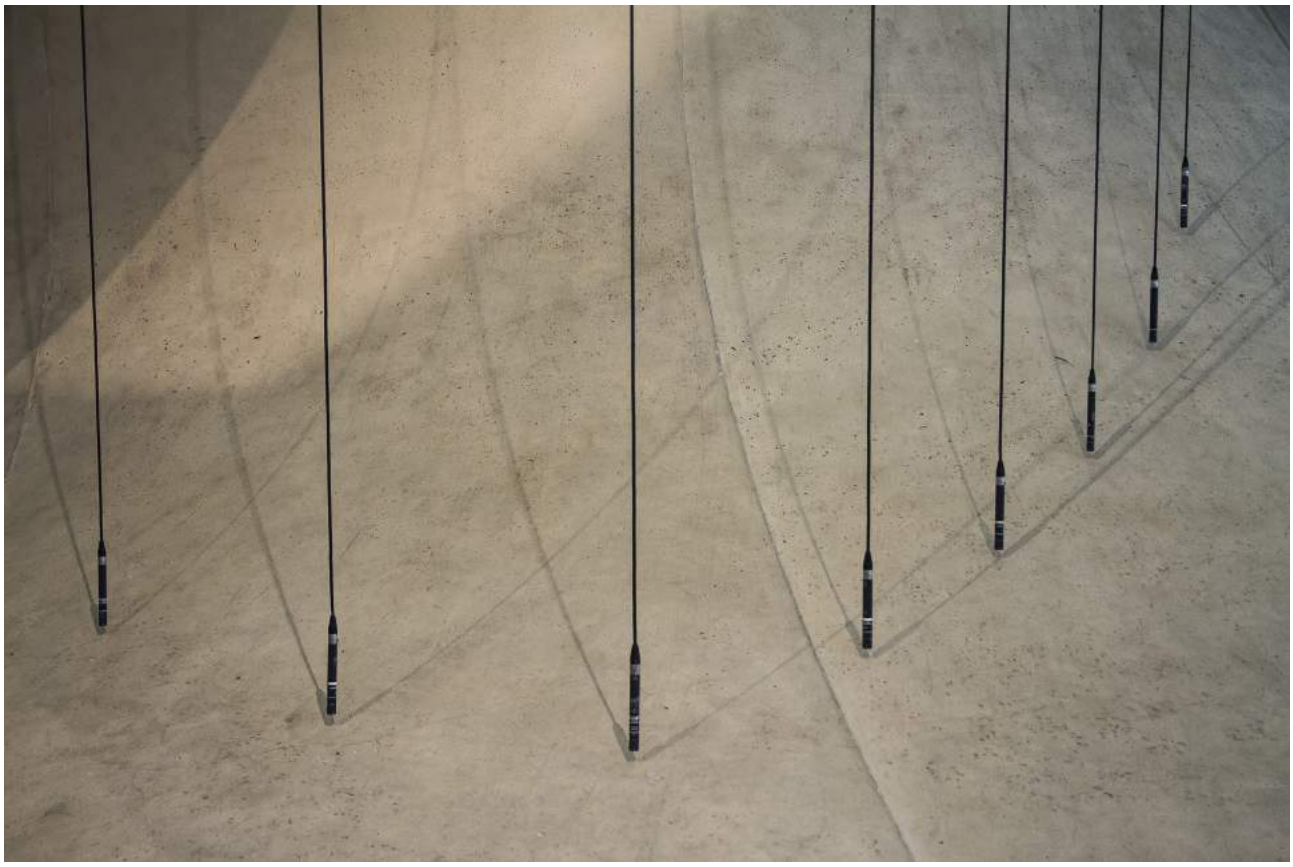


Photos by Lucija Novak



Photos by Lucija Novak





Photos by Lucija Novak

EXHIBITIONS

- Workshop-in-Exposition – Thresholds of the Algorithmic, Lydgalleriet, Bergen, Norway.
- inSonic 2017 Immersive Future, ZKM, Karlsruhe Germany.
- New York City Electroacoustic Music Festival, Abrons Arts Center, New York City U.S.
- Linux Audio Conference 2017, Université Jean MONNET, Saint-Etienne, France.
- 13th Athens Digital Arts Festival, Greece.
- Special Olympics World Winter Games Austria 2017, Messe Congress Graz.
- "The Digital Body" International Exhibition, Bucharest International Dance Film Festival, Romania.
- As "Klangströme Börstingen", Vorort_2_draußen Symposium & Kunstfestival, Starzach-Börstingen, Germany.
- Begehungen Chemnitz 2016 – TA LÄRM, Germany.
- As "Sonic Current on a twisted surface", Junge SIGNALE 2016, MUMUTH, Graz, Austria.

Honorable mention at the ALife Art Award 2018, ALIFE 2018 | The 2018 Conference on Artificial Life, Tokyo Japan.