Portfolio

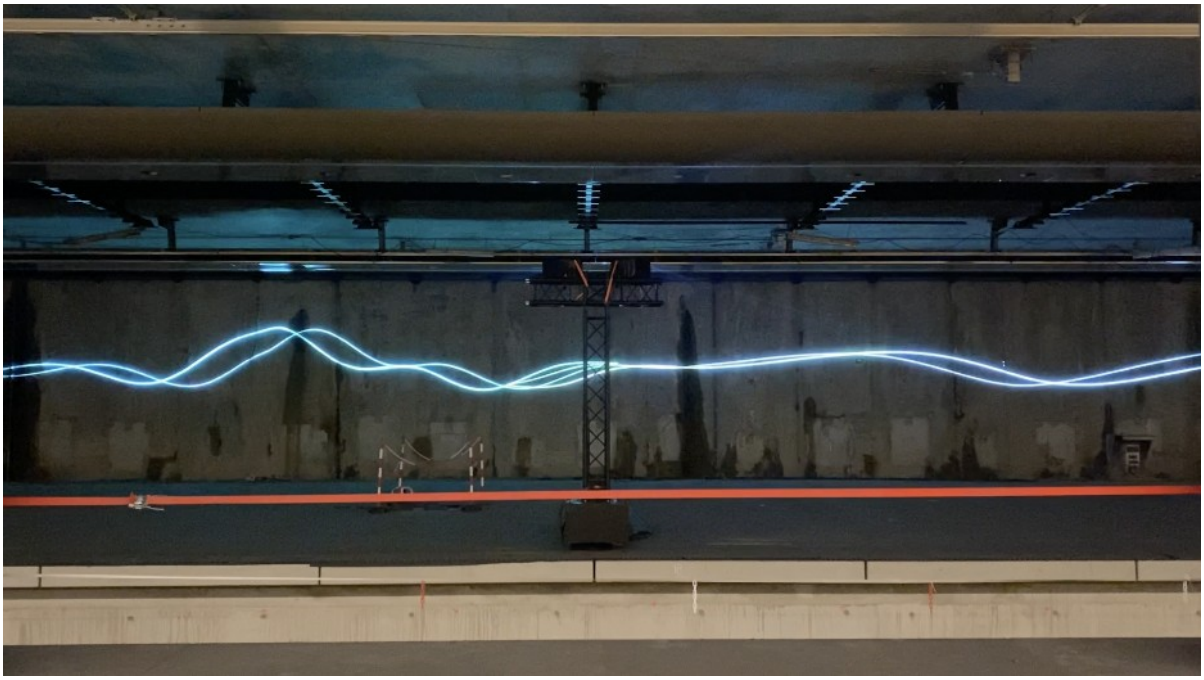
Edwin van der Heide

Lijn - Delft 2023

Edwin van der Heide

Lijn - Delft is an audiovisual installation commissioned by Highlight Delft for the new train station of Delft, The Netherlands. The new train station is entirely underground. It has a length of about 400 meters resulting in two walls of 400 meters next to the outer track(s). The work Line - Delft is a projection of a horizontal line on one of these walls by means of two lasers. The line slowly moves and vibrates in ways that are inspired by the vibrations in a string. Audible sounds become vibrations that enter and move the line vertically at specific positions. These movements propagate horizontally up and down the line.

https://youtu.be/K63kclHih00



Lijn – Delft, Highlight Delft, 2023

Lijn - Delft, Highlight Delft, 2023

Lijn - Delft, Highlight Delft, 2023

Kopje-onder 2021

Edwin van der Heide

In the middle of the IJsselkade (IJssel quay) in Zutphen is a recess with a symmetrical staircase leading down to the river. Directly in front of the recess a pole with a push button has been placed. By pressing it, the work Kopje-onder gets activated and a live-generated 4-minute composition is being played using four speakers that are installed in the 160 meter wide fence on the opposite side of the river.

For Kopje onder, two hydrophones (underwater microphones) have been placed in the water on the opposite side of the IJssel River near the two-hundred-metre-long wooden fence-like construction. The hydrophones record the underwater sound space. The signal consists of the sound of the propellers of passing boats and other sounds, such as the sloshing of the water against the poles or swimmers splashing into the water. In addition, the installation uses sensors to record the water level in the IJssel River.

What sounds underwater and how the water level develops determine the sound and development of the spatial sound composition. The four speakers in the fence beam the sounds over the water towards the IJsselkade. This results in a spatial experience that blends with the environment and temporarily transforms it. The composition consists not only of the signals of that moment, but also of the recorded history of earlier signals resulting in a layered sound experience. It this generative approach that makes each 4-minute composition unique.

Kopje-onder, IJsselbienale, Zutphen, 2021

Kopje-onder, IJsselbienale, Zutphen, 2021

Kopje-onder, IJsselbienale, Zutphen, 2021

Chiasm 2018

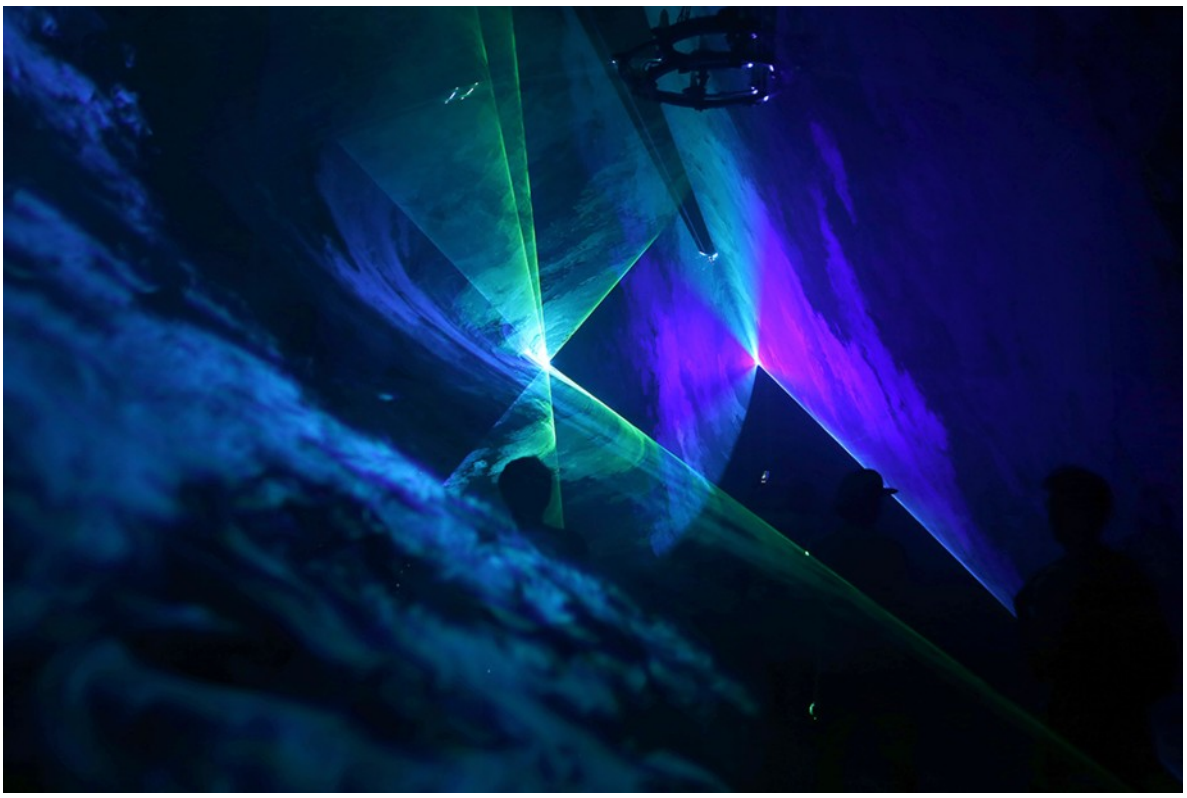
Edwin van der Heide

The title Chiasm refers to the intimate interrelations and interactions between a body, other bodies and the space they co-inhabit.

Chiasm creates a 3-dimensional interplay of light and sound. By using a thin layer of smoke, the light of multiple lasers becomes visible and tangible. This way 3-dimensional surfaces and shapes are projected inside the space. The shapes play with the existing architecture while creating and proposing new structures and transformed perceptions.

By moving around the space, the visitors will build their own experience of the work while simultaneously influencing each other's experience. The visitors form an integral part of the work and act as agents in a collective and "chiasmatic" experience.

Chiasm was commissioned by Sonar festival and the City Council of Barcelona in 2018 for the 25th anniversary of Sonar. The work was conceived for the inner courtyard of Barcelona City Hall and has been adapted afterwards for other presentations.



Chiasm at the city hall of Barcelona, SONAR 2018, Spain

Chiasm at the city hall of Barcelona, SONAR 2018, Spain

Chiasm at the city hall of Barcelona, SONAR 2018, Spain

T - Rijsterbos 2018

Edwin van der Heide

T - Rijsterbos is a listening experience in which a continuum is being created between the sounding reality and synthetic sounds. The audience gets transported from the here & now to parallel sound worlds that are intersecting the existing world. Sometimes, what you hear is pure fiction and sometimes you will not be able to distinguish it from reality.

The source material of the composition consists of both recordings made in the Rijsterbos and synthesized electronic sounds. The recordings are slowly transformed, pulled apart, while sounds are added. The audience is lifted from the ground, carried along, put back and again taken in another direction. It is an abstract play that connects the subtle and the fantastic.

T - Rijsterbos was part of the LÛD sound art exhibition in the Rijsterbos, Friesland. It was part of the Leeuwarden Cultural Capital of Europe 2018 program.

T - Rijsterbos, 2018

T - Rijsterbos, 2018

Fluisterende wind 2017

Edwin van der Heide

Fluisterende wind (Whispering Wind) is a permanent installation situated in the new passage that cuts right under the recently renovated P.J. Veth Building of Leiden University. With this passage a new pathway between the Leiden Observatory and the Hortus Botanicus has been created.

The artwork consists of a wall relief of 12.5 by 2.5 meters and an 8-channel generative sound composition. The composition creates a continuum between noise and human voice which results in moments when wind seems to be whispering.

Fluisterende wind was established at the initiative of Marcel Cobussen, professor of Auditory Culture at the Academy of Creative and Performing Arts. Cobussen is also the founder of Phonotonie, a center that wants to draw particular attention to the auditory environment in urban areas.

Fluisterende wind, Leiden, The Netherlands, 2017

Fluisterende wind, Leiden, The Netherlands, 2017

Fluisterende wind, Leiden, The Netherlands, 2017

Fluisterende wind, Leiden, The Netherlands, 2017

Fluisterende wind, Leiden, The Netherlands, 2017

– / |

2016

Edwin van der Heide

The work - / | creates a 3 dimensional interplay of light and sound on the square of la Catedral Nueva (Plaza de Anaya) in Salamanca. By using a thin layer of smoke the light of six lasers that surround the square becomes visible and tangible in the air. The light plays with the existing architecture of the square while creating and proposing new structures and experiences. The trees on the square will play an important double role in the work because the light will be partially caught by them and stop parts of the visual shape from continuing in space. The work takes place on the square itself while also projecting on the facades of the cathedral and the other buildings surrounding the square. The audience is challenged to explore the square and engage themselves with the different perspectives.

The installation was a part of Festival de Luz y Vanguardias, June 16th 2016 till June 19th 2016.

– / |, Festival de Luz y Vanguardias, Salamanca, Spain, 2016

– / |, Festival de Luz y Vanguardias, Salamanca, Spain, 2016

– / |, Festival de Luz y Vanguardias, Salamanca, Spain, 2016

Schwingungen - Schwebungen 2015

Edwin van der Heide

Schwingungen - Schwebungen is a work especially conceived for the University Library in Bonn. The library building, designed by Fritz Bornemann, has a very structured and minimal design with a clearly defined field in front of it. Situated in the middle of this field is the sculpture Die Wolkenschale by Hans Arp. The marble sculpture creates a contrast between the rational architecture and the floating and ephemeral qualities represented by the cloud. Schwingungen - Schwebungen brings a time-based, spatial and possibly more ephemeral component into the play between the building and the sculpture. Schwingungen - Schwebungen uses compressed air in combination with pneumatic valves to produce sound waves (Schwingungen). Acoustic horns are used to couple and direct the pneumatic energy to the acoustic environment. Large monumental wooden horns are placed on the sites of the field and smaller circular metal horns are distributed throughout the field. The horns produce round sounding tones in the middle and low frequency registers of our auditory range. Schwingungen - Schwebungen is a permanent but slow changing composition resulting in spatial interferences (Schwebungen) between the sounds from the individual horns. Since these interferences don't originate from the individual sources they are perceived as if they are spatially floating in and traveling through the field. Where we normally associate a sound with its sound source Schwingungen - Schwebungen brings in a less visual but almost tangible spatial perception of sound into play.

Schwingungen – Schwebungen, bonn hoeren project, Beethovenstiftung Bonn, 2015

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Schwingungen – Schwebungen, bonn hoeren project, Beethovenstiftung Bonn, 2015

Schwingungen – Schwebungen, bonn hoeren project, Beethovenstiftung Bonn, 2015

Schwingungen – Schwebungen, bonn hoeren project, Beethovenstiftung Bonn, 2015

Radioforest 2014, 2016

Edwin van der Heide, Jan-Peter Sonntag

When we think about radio waves we normally think about signals transmitted by humans. However, in the low frequency range of the radio spectrum we can find 'natural' radio emissions that originate from lightning and interaction of the earth's magnetosphere with the Sun. Natural radio signals can be received with specially build antennas and receivers.

Fascinated by the natural radio signals themselves and earlier works by other artists using natural radio, Edwin van der Heide and Jan Peter Sonntag became interested in staging a live 'natural radio reception' performance that focuses on the spatial nature of these radio waves that intersect the performance space. This led to the work Rund-Funk-Emfangs-Saal that premiered in 2013.

In October 2013 the Skanu Mezs Festival in Riga invited both Jan Peter Sonntag and Edwin van der Heide for a location visit to the Botanical Garden in Riga. On one of the sides of the Botanical Garden one can find the remains of a former soviet observatory. Besides this beautiful outdoor environment the botanical garden contains a huge green house full of tropical trees and plants. The combination of these two elements formed the bases for Radioforest.

Radioforest can be seen as a live natural radio observatory. Where the aim of Rund-Funk-Empfangs-Saal is the realization of a live performance, Radioforest's aim is a live natural radio reception installation. Electromagnetic signals received by custom built antennas and receivers form the source material for a generative compositional score that tunes, selects, combines and spatializes these signals over time.

Radioforest, Skanu Mezs Festival, Riga, 2014

Radioforest, Riga, 2014

Radioforest, Skanu Mezs Festival, Riga, 2014

Radioforest, Riga, 2014

Radioforest, Riga, 2014

Radioforest - Nahal Ein Kerem, Jerusalem, 2016

Radioforest - Nahal Ein Kerem, Jerusalem, 2016

Radioforest - Nahal Ein Kerem, Jerusalem, 2016

Spectral Diffractions 2014

Edwin van der Heide

We are hardly aware of the fact that almost all single sounds consist of a multitude of elementary vibrations (also known as overtones, harmonics or partials). Together these vibrations determine the timbre of the sound. When we, for example, analyze the sound of our voice we'll notice that each consonant sound consists of many many overtones. We perceive them together as one specific sound with a specific timbral color and texture. Just like molecules are formed by specific combinations of atoms, sounds are formed by specific combinations of elementary vibrations (overtones / partials).

The point of departure for Spectral Diffractions is the question what happens if you take a sound apart in its individual elementary vibrations and distribute these individual tones in space (by means of many loudspeakers). Since the recombination of the overtones happens now in the physical space the perception of the sounds becomes a spatial phenomenon (the overtones are structured in space).

Once we have separated a sound in its individual overtones we can go a step further. We can approach the overtones as independent sounds, not anymore related to its original sound. Each overtone becomes autonomous and has its own behavior in frequency, amplitude and spatial position. A metaphor for this is blowing against the seeds of a dandelion flower and releasing them individually in space. The only difference is that in Spectral Diffractions the process can go in both directions: sounds can be separated in individual (autonomous) overtones and the overtones can (later on) form relations that correspond to specific sounds. Back to the chemical metaphor: molecules can be separated in individual atoms and atoms can be grouped to form molecules.

When we summarize this approach we can distinguish three different distinct states (and the transformations in between):

- a sound that is not separated in its individual overtones
- a sound separated in its individual overtones. This leads to the possibility to distribute the overtones in space and give them a specific spatial behavior
- autonomous overtones with their individual behavior in frequency, amplitude and spatial position

Spatial Diffractions makes use of voice sounds as compositional source material. The composition is neither about words nor about singing but simply about the different timbral and textural possibilities of the human voice. The individual sounds will be zoomed into, stretched, compressed and 'exploded' in space. The described system creates the possibility for different abstractions of the human voice. It provides possible continua between acoustic sounds and sonic abstractions both in a timbral and spatial way.

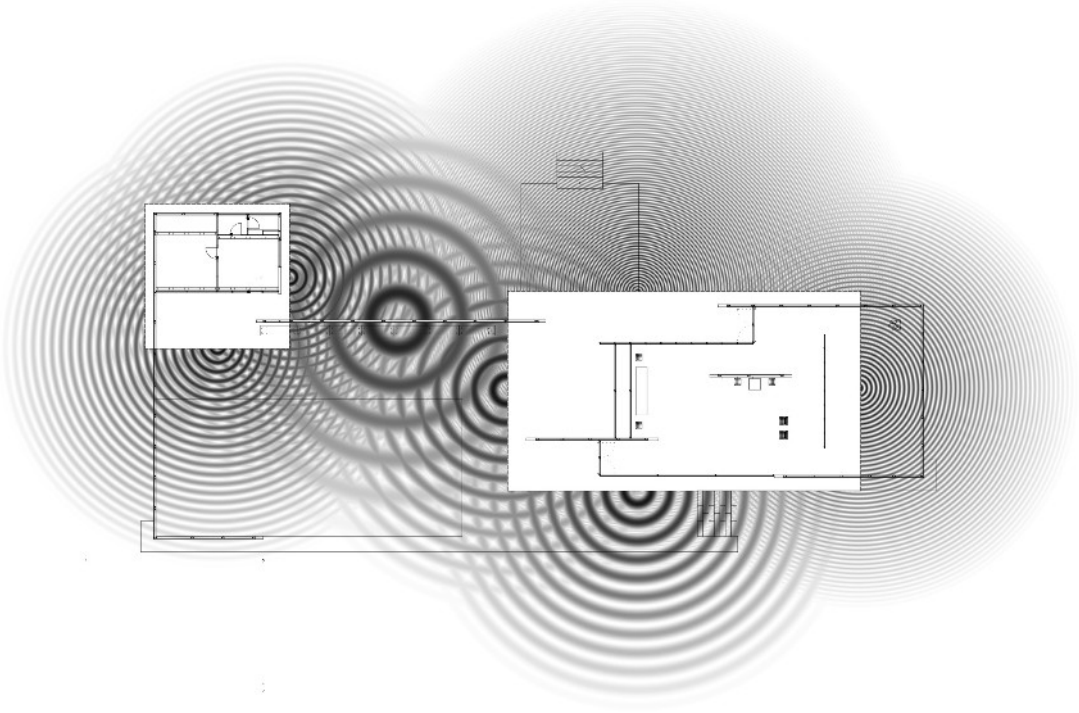
The Mies van der Rohe Pavilion in Barcelona is on the one hand very minimalistic in its architecture and on the other hand full of detail because of the use of natural stone. The pavilion reveals itself to the visitor by choosing and changing position and perspective. The clear shape of the pavilion form the point of departure for a multi speaker setup. The speakers follow the architectural structures while being hardly visible. The sound fields of the speakers overlap in space and get partially reflected by walls and floor. While the pavilion itself is static the sounds will

be dynamically following the architectural grammar of the pavilion, resulting in perceptual relations between the pavilion and the composition. Just like the pavilion needs to be explored the sound composition also requires the visitors to change position and perspective. While the sound is from a perceptual point of view equally present as the pavilion it nevertheless has an ephemeral quality that opposes the solid nature of the pavilion.

The Music Technology Group from the Universitat Pompeu Fabra in Barcelona is internationally renown for its highly specialized research into sound analysis and sound synthesis. It is therefore a fantastic opportunity to collaborate on Spectral Diffractions. For the university it's an opportunity to work in a more fundamental, less academic and/or less applied context.

We're used to speak about the spectrum of a light source. The spectrum describes the combination of the individual colors (frequency components) present in the light. The same term is used in sound. The sound spectrum is an analysis of a sound in its individual overtones. In Spectral Diffractions sound spectra get diffracted is space.

Spectral Diffractions, Mies van der Rohe pavilion, SONAR Festival, Barcelona. 2014



Spectral Diffractions, Mies van der Rohe pavilion, SONAR Festival, Barcelona, 2014

Spectral Diffractions, Mies van der Rohe pavilion, SONAR Festival, Barcelona, 2014

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Spectral Diffractions, Mies van der Rohe pavilion, SONAR Festival, Barcelona, 2014

Fog Sound Environment 2013

Edwin van der Heide

Fog Sound Environment is a site specific installation developed for the foreland of DordtYart (a former shipyard) nearby the junction of the three rivers that traverse Dordrecht. In this experiential artwork real fog is being created by pushing water under very high pressure through hundreds of nozzles. The fog system consists of independent sections that surround the foreland. The timing and distribution of the fog is part of a composition system that incorporates the on-site wind direction in real-time. The fog is dispersed across the, by high trees and water enclosed, grassy terrain. The behavior of the fog is under direct influence of the local weather; sun, rain and wind all have their influence on the behavior of the fog and experience of the work.

A soundscape of electronically generated spatial interferences surrounds the audience while it integrates with, and builds upon, the existing sound environment of the surrounding trees and boats. The fog and the sound both merge with the environment and create an altogether new experience.

Fog Sound Environment, DordtYart, Dordrecht, The Netherlands, 2013

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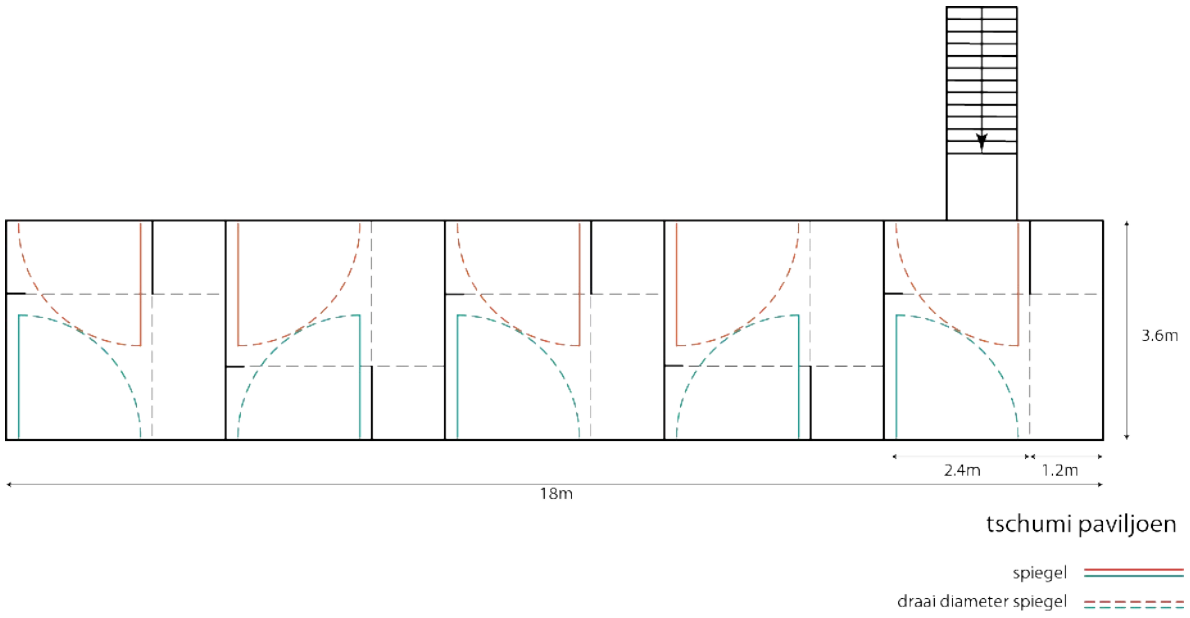
Pavilion noilivaP 2013

Edwin van der Heide

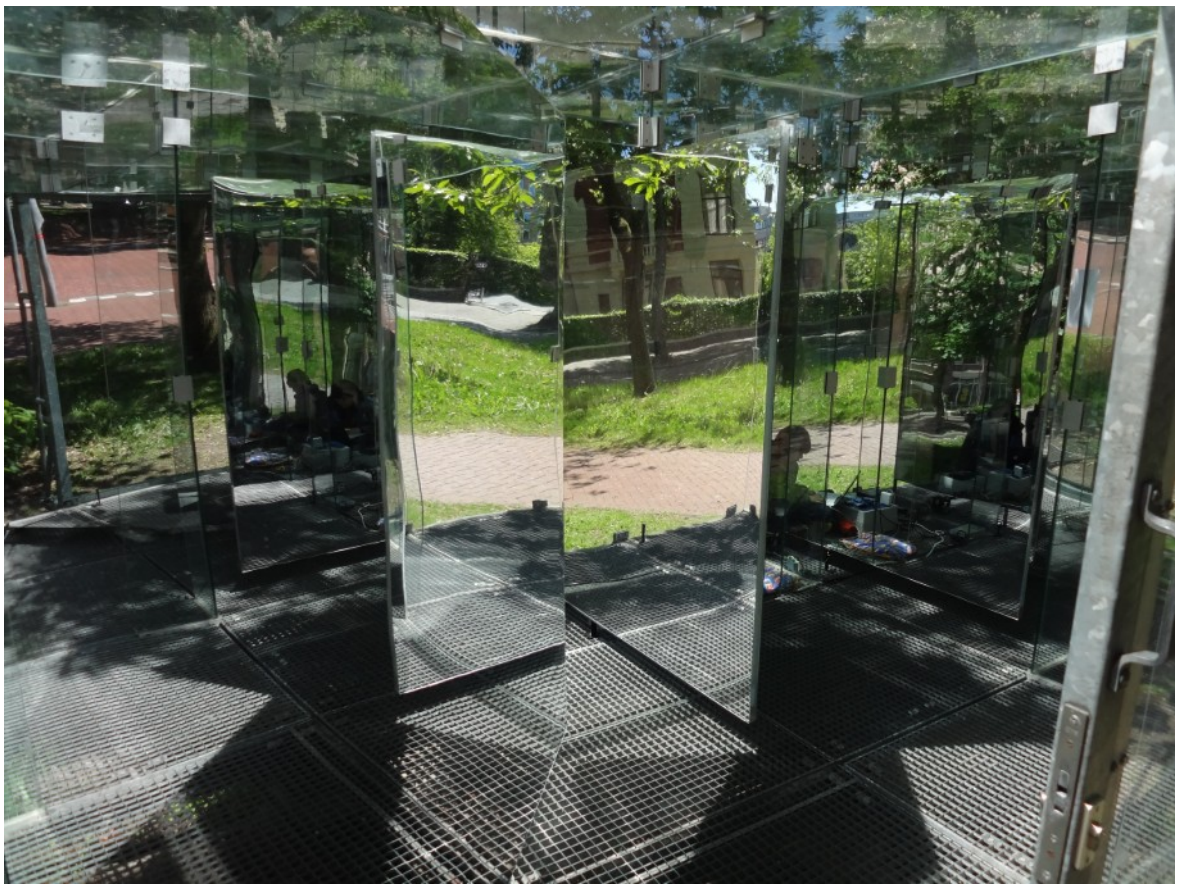
Pavilion noilivaP is an artwork specifically made for the Tschumi Pavilion in Groningen, The Netherlands. The work consists of large reflecting surfaces that seamlessly follow the dimensions and architectural rhythm of the Pavilion. They are double sided mirrors that are able to rotate independently from each other. As a result the glass based pavilion seems to close and open itself and dissolves in a complex of its own reflections and its environment.

The computer controlled mirrors rotate that slow that you have to take time to perceive the transformations. The altering constellations create a continuous shift between the interior and the exterior. Bernard Tschumi's Leitmotiv 'Looking and being watched' is being extended and turned inside out with the installation Pavilion noilivaP.



Pavilion noilivaP, site specific installation for the Tschumi Pavilion, Groningen, The Netherlands, 2013

Pavilion noilivaP, site specific installation for the Tschumi Pavilion, Groningen, The Netherlands, 2013



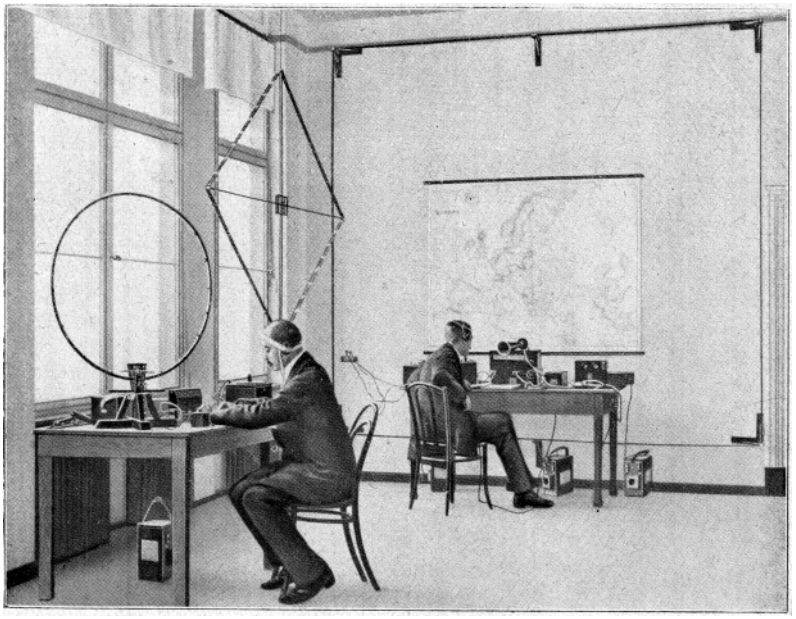
Pavilion noilivaP, site specific installation for the Tschumi Pavilion, Groningen, The Netherlands, 2013

Rund-Funk-Empfangs-Saal 2013

Edwin van der Heide, Jan-Peter Sonntag

For Rund-Funk-Empfangs-Saal the idea of the live radio concert hall has been inverted. Edwin van der Heide and Jan-Peter Sonntag take the signals in the electromagnetic space that intersect the concert hall as source material for their performance. Natural radio signals and transmitted long wave signals up to about 150 kHz traversing the performance space are received and translated into a tangible space of acoustically audible signals. When John Cage introduced the radio first in Imaginary Landscapes, and later in Radio Music, his main interest laid in the live-moment, the unexpected and unpredictable combination of concurrently transmitted (and received) sounds. While the unexpected is an important part of their performance, van der Heide and Sonntag navigate, steer and combine the different signals and, in contrary with Cage's approach, shape the unpredictable.

Extremely low frequency radio waves contain the fields of lightning and natural disturbances in the Earth's magnetic field. These signals are intersected by the electromagnetic smog of the city resulting from electricity cables, motors, etc. and transmitted signals from long wave transmitters from, for example, submarines. Kilometer long waves that traverse the performance space of Rund-Funk-Empfangs-Saal. The reason for the German title is the origin of radio transmission that is captured in the poetic term: "Rund-Funk".



An inspiration for Rund-Funk-Empfangs-Saal

Rund-Funk-Emphangs-Saal, Sonic Acts Festival, Vondelkerk, Amsterdam, 2013

Rund-Funk-Emphangs-Saal, Sonic Acts Festival, Vondelkerk, Amsterdam, 2013

Rund-Funk-Emphangs-Saal, custom build antennas

LSP -Festung Ehrenbreitstein- 2012

Edwin van der Heide

LSP is a research trajectory exploring the relationship between sound and three dimensional image by means of laser projection. In 1815 Nathaniel Bowditch described a way to produce visual patterns by using a sine wave for the horizontal movement of a point and another sine wave for the vertical movement of that point. The shape of the patterns depends on the frequency and phase relationship of the sine waves. The patterns are known as Lissajous figures, or Bowditch curves.

LSP interprets Bowditch's work as a possible starting point to develop relationships between sound and image. Since sine waves can also be used to produce pure (audible) tones, it is possible to construct a direct relationship between sound and image. Frequency ratios in sound, de-tuning and phase shifts can have a direct visual counterpart.

Although theoretically all sounds can be seen as sums of multiple sine waves, music in general is often too complex to result in interesting visual patterns. The research of LSP focuses on the subject of composing signals that have both a structural musical quality and a time-based structural visual quality. Different relationships between sound and image are used throughout both the performance and the installation form.

By combining audio with visuals the spatial perception of sound is often being reduced because of the two-dimensional nature of the image versus the three-dimensional nature of sound. With laser(s), it is possible to create three-dimensional changing environments that surround the audience. Here, the image is generated by projecting a laser on a thin layer of smoke or fog. Image and sound originate from the same real-time generated source in the computer. This results in a performance where image and sound play equally important roles. The environment challenges the audience to change their perspective continuously.

LSP -Festung Ehrenbreitstein-, illustration of the real fog environment

LSP -Festung Ehrenbreitstein-, illustration of the real fog environment

LSP -Festung Ehrenbreitstein-, Lichtströme, Koblenz, Germany, 2012

LSP -Festung Ehrenbreitstein-, Lichtströme, Koblenz, Germany, 2012

LSP -Festung Ehrenbreitstein-, Lichtströme, Koblenz, Germany, 2012

Extended Atmosphères 2011

György Ligeti, Edwin van der Heide, Jan-Peter Sonntag

Extended Atmosphères is a recomposition of György Ligeti's ATMOSPHÈRES. György Ligeti wrote the piece in 1961 and in the same year it was premiered by the SWF Orchestra in Donaueschingen. ATMOSPHÈRES is a radical response to serialism. In 1968, Stanley Kubrick used a recording of the piece as a sample ‘atmosphere’ in shooting his film 2001: A Space Odyssey, commissioned it for the score, and over night ATMOSPHÈRES became famous as film music. In 2011, ten years after the virtual odyssey and fifty years after the film’s premiere, van der Heide and Sonntag entered a sonic discourse with Ligeti’s futuristic audio icon and made a recomposition that questions how Atmosphères would sound if it would have been composed today.

Extended Atmosphères, Transmediale, Berlin, Germany, 2011

Extended Atmosphères, Kontraste Festival, Krems, Austria, 2011

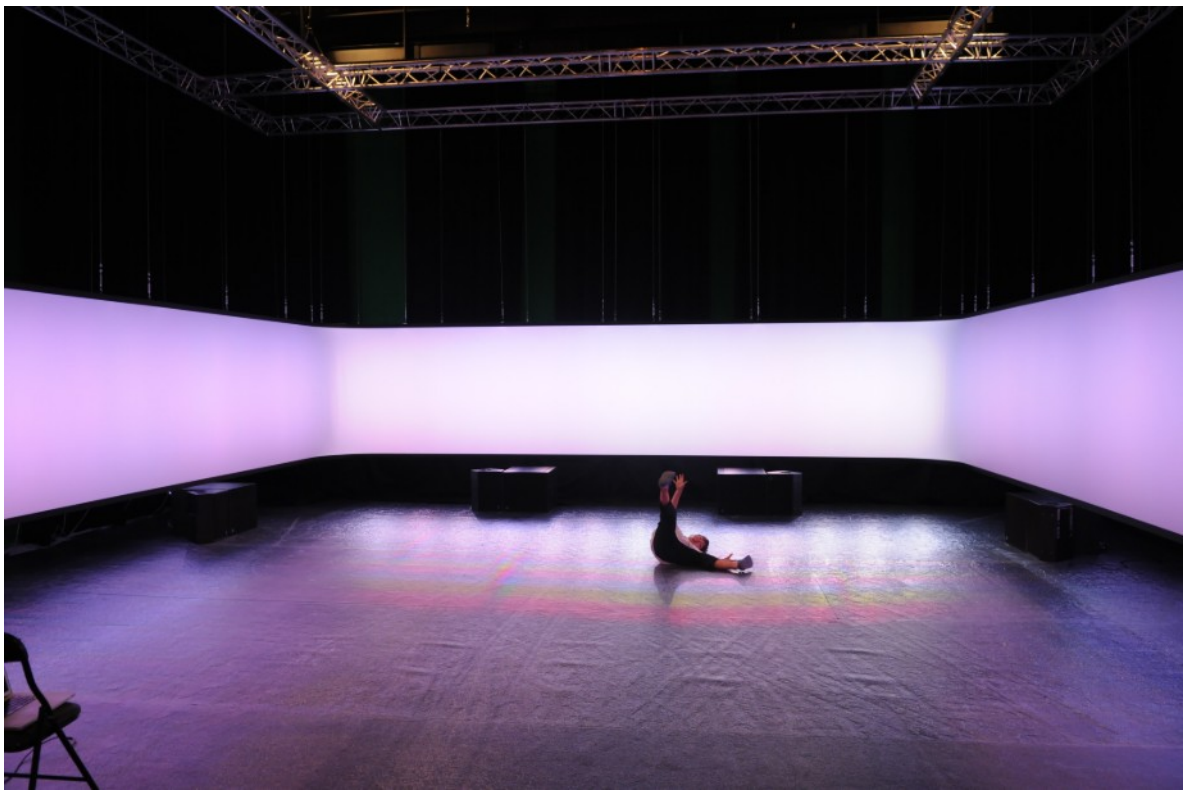
Extended Atmosphères, Kontraste Festival, Krems, Austria, 2011

DSLE -3- 2012

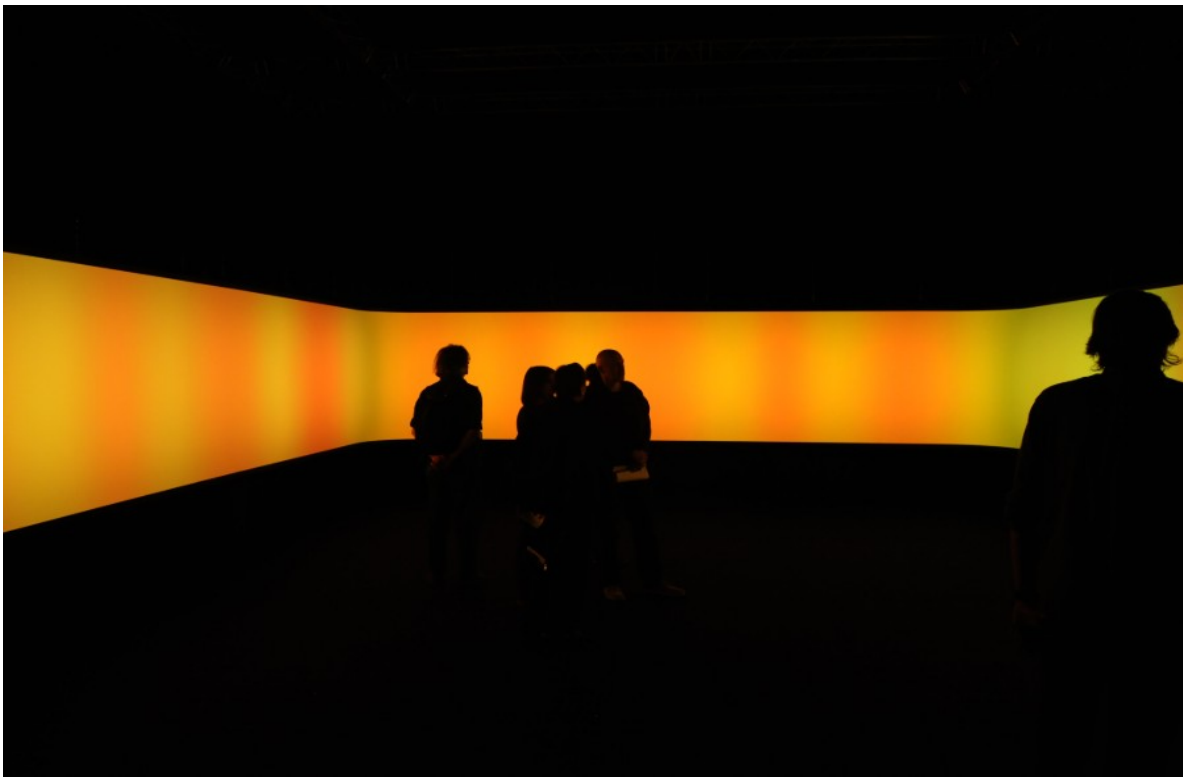
Edwin van der Heide

DSLE -3- is an immersive audiovisual environment that takes us to and beyond transitions in, and limits of, our visual and auditory perception. It explores carefully created interrelations between sound and light. Different models are being used to give light a spatial and time-based component comparable to the spatial behavior of sound.

DSLE -3- is using an octaphonic loudspeaker setup and forty four independently controlled led lights. The lights are shining towards and therefor lighting up the screen that surrounds the audience. The spatial nature of the setup and the detailed level of control creates the possibility to control and manipulate our perception of space. The behavior and artifacts of our senses form the starting point for the composition of a transforming space. Moments where sound and light appear to interrelate with each other are complemented with moments where the spatial perception of sound and light contradict with each other and lead to distinct ambivalences in our perception of space. Sections with very subtle, near invisible, changes are alternated powerful moments that play directly with the retina itself.



DSLE -3-, during setup



DSLE -3-, Panorama 14 at Le Fresnoy, Tourcoing, France, 2012

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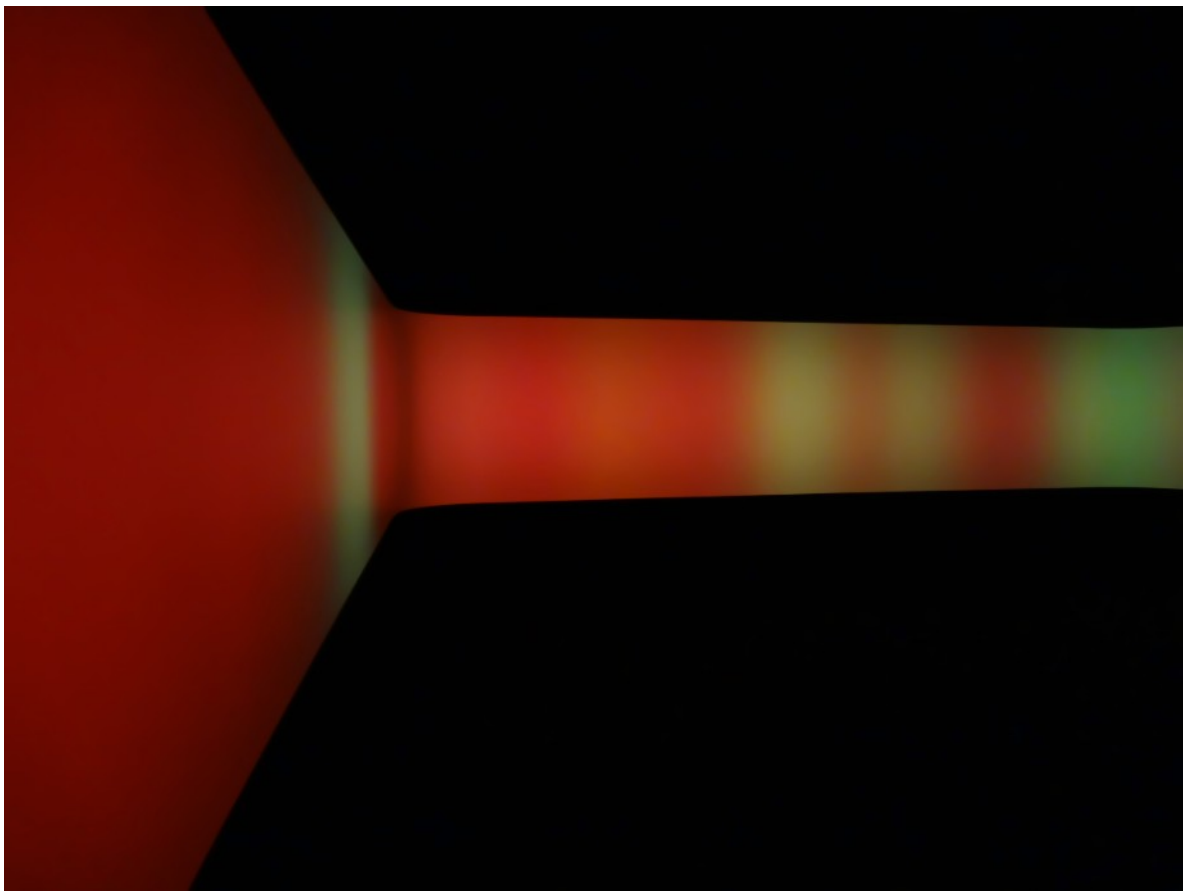
DSLE -3-, Panorama 14 at Le Fresnoy, Tourcoing, France, 2012



DSLE -3-, Panorama 14 at Le Fresnoy, Tourcoing, France, 2012

DSLE -3-, Detail of the setup

Evolving Spark Network 2010-2011

Edwin van der Heide

The installation Evolving Spark Network consists of a grid of electric spark bridges that traverses the whole exhibition space. Together the bridges form a plane with a height of about 3 meters above the floor. The sparks are a metaphor for the electrical impulses by which our nerves communicate information. Just like neurons that form networks in our body, the spark bridges also form an interconnected network. There is no hierarchical process that determines the patterns of the cells but they are the result from relationships between the individual cells of the network.

The movements of the visitors in the installation are being detected by means of radio frequent movement detection sensors and used as input for the network. The visitors activate the network and are being invited for a spatial dialog with the network. The behavior of the spark bridges is a form of artificial life with the physical world as input. The installation therefore represents a form of interaction with artificial life.

Evolving Spark Network is a sound and light installation. The sparks produce both sound and light. The generated patterns have a distinct visual and a distinct sounding quality. The use of sound makes it possible to perceive the space as a whole. With our eyes we're always focusing on something (while not focusing on the rest) but with our ears we always listen around us. With sound we can hear movements that for example come from behind us, travel over us and move in front of us.

In this installation the electric spark represents beauty, purity and simplicity. A spark is one of the most elementary forms of light generation. The arc lamp is an example of this. The impulse that is being produced is the shortest imaginable sound. Composing with these impulses can be seen as one of the most fundamental forms of composition in time and space.

Evolving Spark Network, STRP Festival, Eindhoven, The Netherlands, 2011 (photo taken with long exposure time)

Evolving Spark Network, V2_, Rotterdam, The Netherlands, 2011 (photo taken with long exposure time)

Pneumatic Sound Field 2006, 2007

Edwin van der Heide

In the installation Pneumatic Sound Field a continuum is being created between rhythmical perception of sound, spatial perception of sound and the perception of pitch. A horizontal plane of pneumatic valves is used to produce wind, pressure and sound. The result is a breathing sound environment above the audience.

Acoustical sound consists of temporary pressure changes traveling through the atmosphere of the air around us. While loudspeakers most often use moving membranens in order to produce these pressure changes in Pneumatic Sound Field compressed air is being used to produce acoustical sound. The compressed air is connected to very fast controllable pneumatic valves that release the pressurized air in the 'open' air. This results in a controllable pressure change in the atmosphere around the valve. Because the compressed air has always a higher pressure than the atmosphere not only sound is being produced but also a bit of wind. The result can be seen as wind that contains sound.

Pneumatic Sound Field consists of a grid of 7 x 6 (= 42) independently controllable discrete valves and four proportionally controllable valves with a total width of about 10 meters and a total depth of about 20 meters. Sound and wind traverse this field with differing speeds, directions, and intensities. The patterns are created in a generative way and are interpretations of spatial movements of actual wind. These patterns are following each other up or happening simultaneously and resulting in different developments, densities and spatial interferences. The audience is challenged to determine their own position within this environment.

A bit of theory:

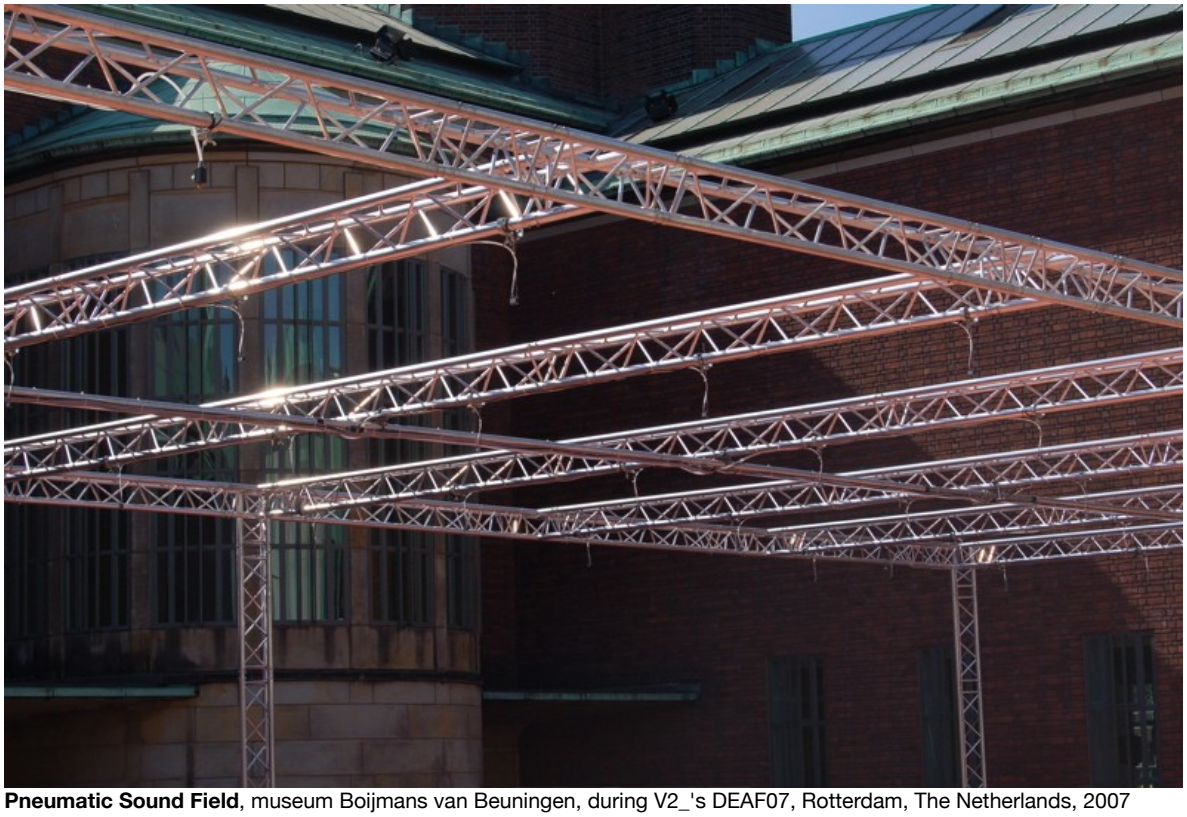
Our hearing has just as our seeing a change in perception around the frequency range of 16 to 20 Hertz. A sequence of film frames is being perceived by us as something happening in time in stead of individual frames with jumps in between when the frame rate is higher than about 16 frames per second. The same counts for our hearing. Repeating vibrations with a repetition frequency higher than 16 Hz are being perceived as tones while at a lower repetition frequency they are being perceived as individual pulses.

The spatial perception of the location of a sound source is partly determined by the difference in arrival time of the source at the left ear and the source at the right ear. This technique is often reversely applied in stereo reproduction where a mono sound is played little earlier out of the left speaker then the right speaker (or reversely) in order to spatialize the sound at any location between the two loudspeakers.

Pneumatic Sound Field uses spatial time delays of impulses over the 42 valves. By using different speeds, delays and repetitions a continuum is being created between the spatial rhythmical patterns, spatial localization of sound, movement of sound and the perception of tones and pitches.

Pneumatic Sound Field was developed by Edwin van der Heide during a project residency at tesla-berlin e.v. and premiered at sonambiente 2006.

Pneumatic Sound Field, museum Boijmans van Beuningen, during V2_'s DEAF07, Rotterdam, The Netherlands, 2007



Pneumatic Sound Field, museum Boijmans van Beuningen, during V2_'s DEAF07, Rotterdam, The Netherlands, 2007

Pneumatic Sound Field, museum Boijmans van Beuningen, during V2_'s DEAF07, Rotterdam, The Netherlands, 2007

Pneumatic Sound Field, Tesla, during Sonambiente, Berlin, 2006

Pneumatic Sound Field, 2006

Pneumatic Sound Field, Tesla, during Sonambiente, Berlin, 2006

Pneumatic Sound Field, with a dedicated pavilion designed by NOX, Synthetic Times, NAMOC, Beijing, China, 2008

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Son-O-House 2004

Architecture: Lars Spuybroek (NOX)
Interactive sound environment: Edwin van der Heide

Son-O-house is "a house where sounds live", not being a 'real' house, but a structure that refers to living and the bodily movements that accompany habit and habitation. Son-O-House is an architectural environment and an interactive sound installation in one. The work is continuously generating new sound patterns activated by sensors picking up actual movements of visitors.

The structure derives from a carefully choreographed set of movements of bodies, limbs and hands (on three scales) that are inscribed on paper bands as cuts (an uncut area corresponds with bodily movement, a first cut through the middle corresponds with limbs, finer cuts correspond with hands and feet). These pre-informed paper bands are then stapled together and the curves directly follow from that. What we then have is an arabesque of complex intertwining lines (white paper model); we only have to sweep these lines sideways to make it into a three-dimensional porous structure (purple paper model). The analog computing model is then digitized and remodeled on the basis of combing and curling rules which results in the very complex model of interlacing vaults which sometimes lean on each other or sometimes cut into each other.

Twenty three sensors are positioned at strategic spots to indirectly influence the music. The sound generation system is based on spatial interferences and dynamic standing wave patterns resulting from the combination of speakers. As a visitor (slowly becoming an inhabitant because this structure will stay in its place forever) one does not influence the sound directly, which is so often

the case with interactive art. One influences the landscape itself that generates the sounds. The score is an evolutionary memoryscape that develops with the traced behavior of the actual bodies in the space.

General

The Son-O-House's has a generative and reactive sound environment. The aim of this environment is to create a permanent interaction between the sound, the architecture and the visitors. The sound intents to influence and interfere with the perception and the movements of the visitors. The presence, activity and the approximate location of the visitors is being detected by sensors placed in the building. This information is continuously analyzed and quantified. The output of the analysis is used to control the nature of the sound and therefore challenges the visitors to re-interpret their relationship with the environment. The result is a complex feedback system in which the visitor becomes a participant.

The Sound Environment

The Son-O-House is equipped with 20 speakers. They can be be used with two different approaches. First of all they can all be used individually. The sounds will be clearly perceived from the direction of the corresponding speaker. With the second approach the 20 speakers are divided in five overlapping 'sound fields'. Each field consists of 4 individual speakers. The sounds produced by the speakers are designed in such a way that they interfere with each other in the space. Therefore the sounds are not perceived from the location of the individual speakers but surround the visitors in the space. The interferences of the sounds produced by the speakers in one field can either be static or dynamic resulting in movement in the space. All of the sound is synthesized in real-time.

Composition

The sound environment of the Son-O-House is not a musical composition in the traditional sense. The goal is to have a continuous developing environment that challenges the visitors to come back, perceive the new musical state and then relate and interact themselves with it again.

For the opening of the building the sound environment doesn't contain any prepared sounds. The system consists of rules and conditions that produce parameters of the sounds. The system is therefore generating it's own sounds in real-time. The sound fields transform within themselves depending on the activity of the visitors inside of the field. On a higher level of composition the sounds fields can be swapped with each other in space and time. The effect of a current sound can be measured by using the sensor input and analyze the relation of one location to another location. The results are stored in a growing data base. Previously generated sounds can be re-used in the future in new combinations.

Sensors

Twenty three sensors are spread over the building. They are meant to detect the movements of the visitors from one location to another location. The sensors are not doing a very precise position sensing but are meant to generate statistical information about the visitors. The result in a measurement that creates distribution maps of the activity of the visitors over the building. This information is used to influence the sound. The more activity on one location the faster the sounds transform in that region. On the other hand the system will try to attract the visitors to visit the opposite locations or 'push' them away from the current location.

The visitors leave their traces in the building because of there interaction with the architecture and the sound. The nature of the sound is based on interference. The sound environment as a whole attempts to interfere with the architecture.

Son-O-House, Ekkersrijt, Son en Breugel, The Netherlands, 2004

Radioscape 2000, 2004-2007

Edwin van der Heide

Radioscape, the receiver

Radioscape is an immersive environment that redefines the radio medium, establishing a new bodily relationship to the medium and adding a new layer to a region of a city.

Fifteen custom developed radio transmitters are distributed over a part of a city. Each transmitter is transmitting one layer of a 'meta-composition'. The audience uses a custom developed receiver that is able to mix the (received) signals from the individual transmitters and receive multiple signals simultaneously.

The participants explore and interact with the composition by navigating through the urban environment. By navigating the city the audience generates their own sonic order, combinations and timing of the composition. By interacting with the environment the visitors become 'inhabitants' of the organized transmitted signals. The visitors reorganize the area and assign new meanings to places.

Mixing the signals of multiple transmitters

Radio as we know it from the AM and FM band doesn't allow a receiver to receive two transmitters, each with its own frequency, simultaneously because the receiver is tuned to one frequency at a time. Inversely, when two FM or AM transmitters are transmitting on the same frequency the result is a distorted signal coming from the receiver instead of an addition of both (signals).

Radioscape is using a different modulation principle in the transmitters and a corresponding different demodulation principle in the receiver. This opens up the possibility to receive the signals from multiple transmitters that are transmitting on the same frequency simultaneously. The audible range of a transmitter differs from 50 to 200 meters. The transmitters are placed in such a way that you receive about 2 to 5 different signals simultaneously.

Loudness

We are used to the fact that the received loudness of a radio station doesn't change with a variation of the distance between the transmitter and the receiver. We do know however that the received electromagnetic energy increases when we get closer to the antenna of the transmitter. FM modulation is a principle where the loudness of the received signal is independent from the received electromagnetic energy. AM modulation is different and therefore AM receivers normally contain an automatic gain control unit in the demodulator that compensates for the loudness decrease (/ increase) caused by a decrease (/ increase) in electromagnetic energy.

The demodulation principle used for Radioscape results in an independent loudness for each received signal that is directly related to the strength of the picked up electromagnetic field of its corresponding transmitter. The closer you get to a certain transmitter the louder that signal becomes, the further away you move from a transmitter the softer the signal becomes until it is too soft to be heard or masked by other signals that are being received. Since the receivers are simultaneously receiving the signals from multiple transmitters moving the receiver will lead to a new loudness balance between all the signals. Certain signals are becoming louder while other signals are fading out.

Stereo receiver

The receiver is a hand held device with two antenna mounted on it. It's meant to be held with two hands, actively moved and reoriented continuously. The output of the receiver is connected to a stereo headphone.

Radioscape, a sketch for Yamaguchi. Japan

Each of the transmitters is transmitting a mono signal. The receiver is not only special because of its demodulation principle that is able to receive multiple transmitters simultaneously, but is also special because it is, what I call, a 'stereo panoramic receiver'. The receiver has two different antennas on it (a loop antenna and a vertical antenna). Each antenna has its own direction sensitivity pattern. By combining the signals from the antennas in two different ways it is possible to create an antenna principle that is similar to how a stereo microphone works, but for radio waves. Transmitters that are to the left of the antenna will be heard more on the left side of the headphone and transmitters to the right side of the antenna will be heard more on the ride side. Rotating and moving the receiver changes the stereo image directly.

Three levels of change

Each transmitter is transmitting its own layer of the meta-composition. Every layer is slowly changing over time and eventually repeating after 4-10 minutes. The changes of a layer are the slowest changes that you can experience in this environment. It's a result of not walking and not moving the receiver and just listening to the change of the received layers themselves.

The next level of change is the interaction that occurs when you don't walk but just move the receiver. By doing so, you reorient yourself in the field of received signals and find new perspectives to the environment.

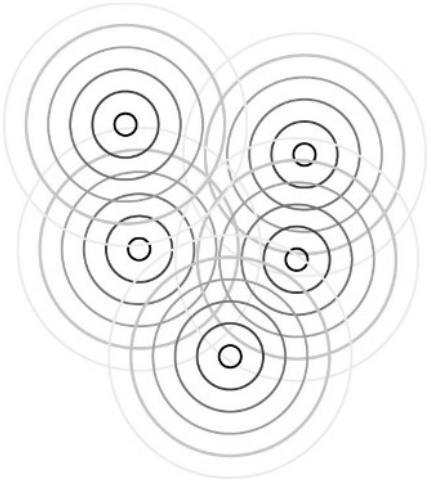
The last level of change is simply happening by walking and therefor getting closer to certain transmitters while moving away from others. Certain transmitted signals will decrease or disappear while other signals will fade-in or become louder. While listening, you alternate your focus and the way of interacting.

Distortions

There are quite a few sources in a city environment that radiate noisy electromagnetic signals. These signals can come from neon lights, computer controlled street lights, security systems, etc. Since they don't have an antenna they don't reach far but unexpectedly 'popup' on certain places. Often these signals mix well with the electronic nature of the meta-composition.

Wavelength

Just as sound (and light), radiowaves can be reflected by objects and surfaces. The original transmitted signal and its reflection can add up together or cancel each other out. This could lead to loudness interferences that influence the smooth loudness increases and decreases resulting from a change of distance between the transmitter and receiver. Wether radiowaves get refelected by a building or not depends on the size of the building and on the wavelength of the radiowaves. Wavelengths longer then a building generally don't get reflected. Frequencies in the FM band have wavelengths around 3 meters. These signals are reflecting over and over.



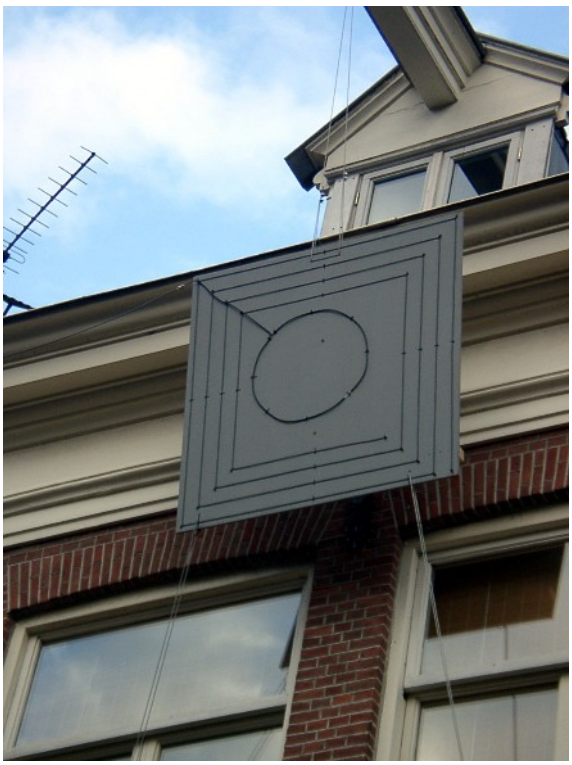
Radioscape, five overlapping transmitters

For Radioscape it turned out that it is best to use a frequency just above the AM band with a wavelength of about 175 meters. At this wavelength buildings do not reflect the radiowaves but now and then start to behave as additional conductors for the radiowaves. Getting close to a building results in an additional perceivable aspect of the interaction. Although the used frequency is a low frequency the quality of the signal is comparable to the quality of the FM band instead of the AM band.

The Composition

Radioscape is a redefinition of the radio medium. The properties of the medium become the starting point for the structural qualities of the composition. The result is not a composed piece with a certain length but a composed system that needs the visitors in order to be explored and experienced.

Radioscape, the receiver



Radioscape, the transmitter antenna

Radioscape, Holon, Israel, 2007

Radioscape, Urban Explorers Festival, Dordrecht, The Netherlands, 2010

Radioscape, Urban Explorers Festival, Dordrecht, The Netherlands, 2010

Wavescape 2001

Edwin van der Heide

Wavescape is translating the underwater sound space into an audible acoustic environment. Twenty four hydrophones (underwater microphones) are placed over a horizontal line in the water. Each hydrophone is connected to its own speaker. There are twenty four speakers on the water side. This creates a live reproduction of the underwater sound space. The result is very transparent and almost touchable. From the water side you listen into the underwater space. You hear an incredible depth and width. The speed of sound underwater is almost five times faster then the speed of sound through the air. This creates a possibility for interesting interferences between both of them. The installation is based on the principle of recording and reproducing wave fields. The principle of wave field synthesis is more extensively used in a World Beyond the Loudspeaker and Impulse #6.

Wavescape, Rotterdam, The Netherlands, 2001

Wavescape, Rotterdam, The Netherlands, 2001

Wavescape, Rotterdam, The Netherlands, 2001

Spatial Sounds (100dB at 100km/h) 2001

Marnix de Nijs, Edwin van der Heide

Spatial Sounds (100dB at 100km/h) is an interactive audio installation. In this engine-powered installation, a speaker is mounted onto a rotating arm that is several meters long. Like a watchdog, the machine scans the surrounding space for visitors. Closer investigation would be tempting fate, with the rotating arm swinging so powerfully around. You can feel the displacement of air as the speaker whizzes past you, and you better step back, out of reach. Now the machine slows down and, when the shock wears off, you start exploring the space, with your movements interacting with the movement of the installation and manipulating the sound it produces. Just don't get too close! Spatial Sounds (100dB at 100km/h) builds up a physically tangible relationship with the visitor. It is the game of attracting and repelling between machine and visitor that determines its sound and movement.

The installation:

Spatial Sounds (100dB at 100km/h) consists of a speaker on a long arm with a counterweight at the other end. The arm can spin, and can be regulated between slow and very high speeds, with a maximum of 100 km/h (the actual used maximum speed is below 50 km/h because that has already enough impact). Two high-speed distance-measurement sensors are mounted close to the speaker and measure the surrounding space. It scans any objects and visitors in this space. Because it is spinning, it creates a spatial depiction of the space, resulting in a continuously changing, dynamic map, rather similar to traditional radar.

Spatial Sounds (100dB at 100km/h) is an interactive installation that is capable of seemingly intelligent behavior. Not only can the arm spin quickly or slowly, it can also make very well-defined movements in both directions. On the one hand, Spatial Sounds (100dB at 100km/h) lives a life of its own; on the other, it reacts very directly to the people in its space. The sensors can detect how close the visitors are and where they are in relation to the arm. When the installation scans the space, it makes inspecting movements and generates sounds that symbolize this scanning. It produces remarkably short, loud pulses and 'listens' to the reverberations from the empty space. The pulses combine different frequency ranges and rhythmical patterns. When visitors enter the room, they are detected immediately. The installation reacts in both a musical and a gestural way. The sounds relate directly to both the position of the arm and the dynamic 'map' of the space and the visitors. The sounds have physical impact. For example, when the speaker is pointing at someone, it will generate a specific sound. This is also the case at high speeds and with several people in the room. However, the sounds and movements of the arm also direct visitors to move around. Different locations in the space represent different sounds, as does the distance of the visitors to the rotating arm.

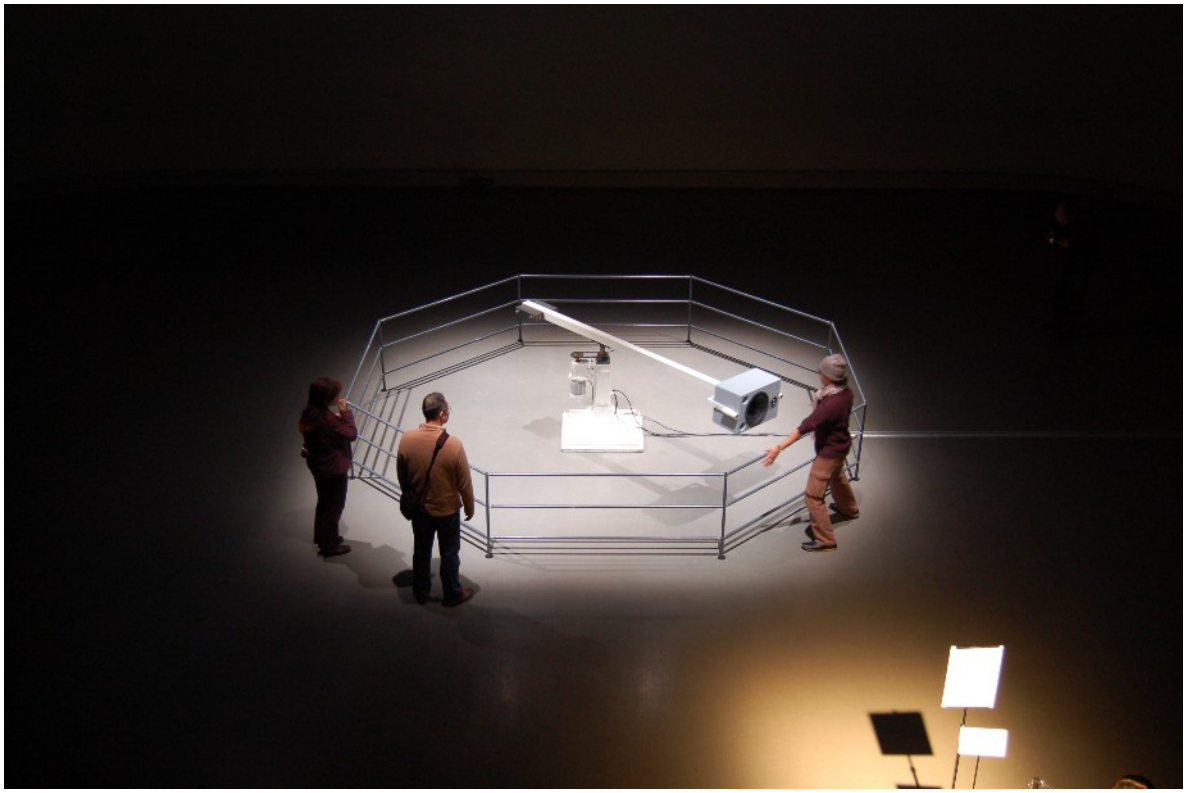
Technical details:

The sound and movements of Spatial Sounds (100dB at 100km/h) are generated in real-time, and the algorithms for generating these are precisely defined. However, the actual sounds depend very much on what visitors do with the installation. Left and right of the speaker ultrasound distance measurement sensors have been mounted that measure the distance between visitors or objects and the speaker. Furthermore there is an angle measurement sensor mounted on the axis of the installation. The data from the sensors is transmitted to the computer that generates the

sound and the movement of the arm. When the installation is placed in a room, it first learns the shape of this room while it is still empty. In this way, it can distinguish between people in a space and the space itself. Thereafter, the computer is able to recognize the various visitors to the space.

Spatial Sounds (100dB at 100km/h) reacts in different ways to its visitors. It can react with movement and/or sound to the behavior of individuals or to visitors in general. And besides reacting to visitors, the sound is also directly related to the speed of the arm and the shape of the room around it.

Spatial Sounds (100dB at 100km/h)



Spatial Sounds (100dB at 100km/h), during DAF Tokyo, 2006

A World Beyond the Loudspeaker 1998

Edwin van der Heide

An installation with 40 channel wave field recording and wave field synthesis

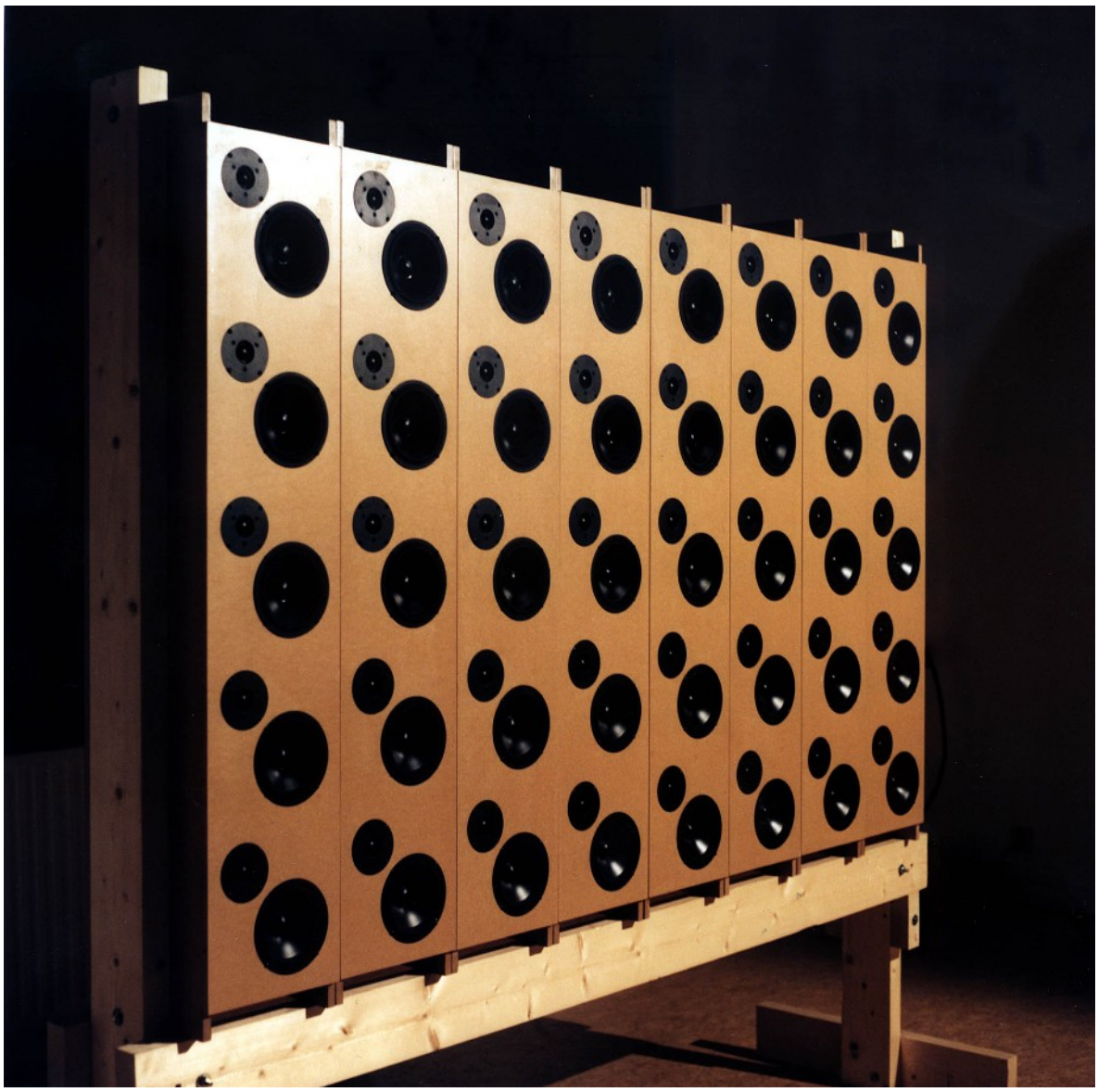
In december 1998 Edwin van der Heide realized his sound installation 'A World Beyond the Loudspeaker'. The installation consists of a surface of 40 individual loudspeakers. The use of this number of loudspeakers with a relatively small spacing creates the possibility to not only 'simply' create vibrations in the air but also to control the spatial shape of the produced waves. Together the loudspeakers form one large spatial wave field synthesizer. Sound production based on wave field synthesis forms the basis for a realistic spatial experience different from other multi speaker setups. To record the sound material for the installation, an identical surface of 40 microphones was used. This surface has the same qualities as the loudspeaker surface; The grid of microphones is able to record the spatial propagation of the sound waves in the air. The playback of the final composition happens from a 40 channel multitrack system.

'A World Beyond the Loudspeaker' is a composition of concrete sounds recorded in the open field. The material exists of recordings made in industrial environments. The main focus is on the Rotterdam harbor, a train track interchange, a construction site for houses, and a shipyard. The differences in spatial nature, acoustical perspective, movement and timbre of the different locations form the base for the compositional structure. The installation is an investigation of spatial movements represented as sonic phenomena. The result is a movie for the ear.

The installation is designed for a closed free space and incorporates a lighting design that evolves over time. The composition has a length of 32 minutes. There is no formal beginning or end and the composition is automatically self-repeating. The audience is free to enter or leave the installation space at any time.

'A World Beyond the Loudspeaker' was premiered on December 10, 1998 in Huis aan de Werf, Utrecht, The Netherlands, as part of the 'Dutch Music Days' festival.

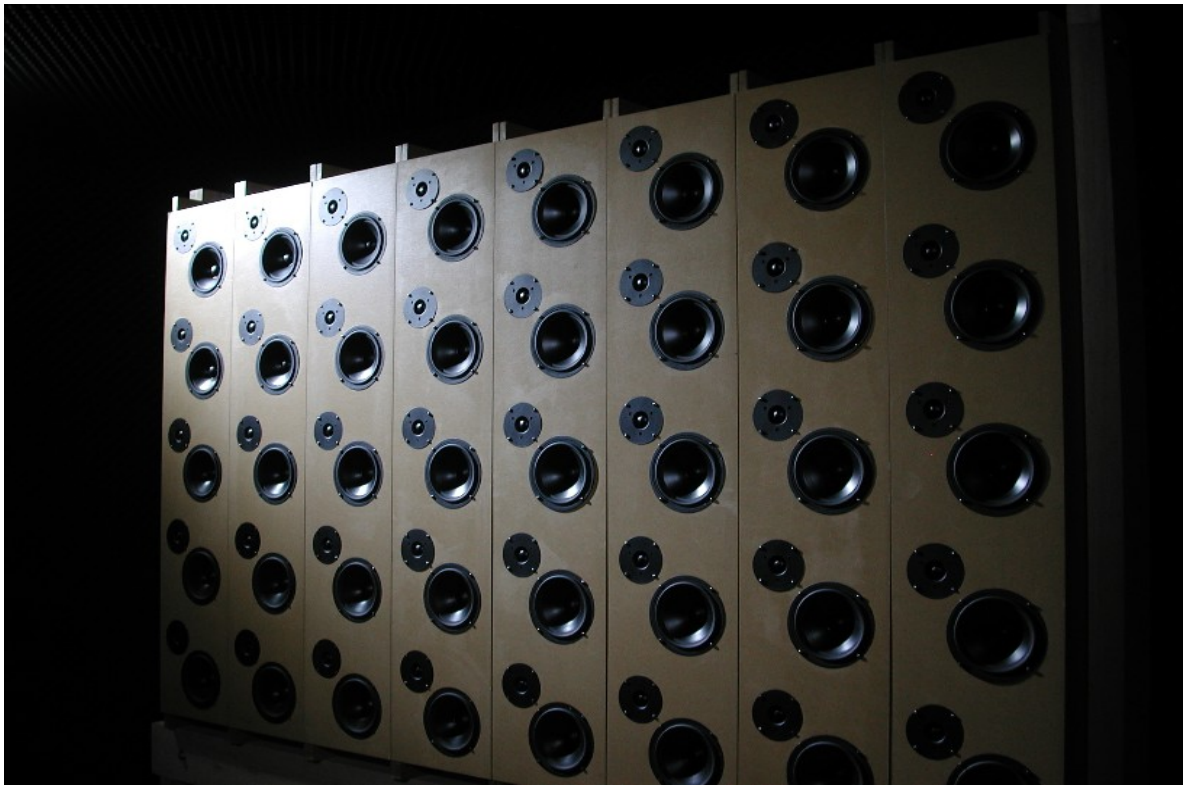
After 'A World Beyond the Loudspeaker' Edwin van der Heide realized the installation 'Impulse #6' (2000) that is using the same speaker installation but instead of using wave field recording, the sound material is electronically generated and spatialized using custom wave field synthesis software.



A World Beyond the Loudspeaker, Huis aan de Werf, Utrecht, 1998

The Microphone Array

The Microphone Array



A World Beyond the Loudspeaker, BIAS sound art exhibition, Taipei Fine Arts Museum, Taiwan, 2005

A World Beyond the Loudspeaker, BIAS sound art exhibition, Taipei Fine Arts Museum, Taiwan, 2005

Water Pavilion 1997-2002

Edwin van der Heide

The concept of the water pavilion is based on the idea of creating a communicating architectural environment. It's an environment where the building, light, projected images, water and sound form one complete experience. The behavior of the environment is based on literal processes and metaphors about water. The fluid structure of the inside of the building is a shell for a continuously flowing and transforming world of water realized both with real water and virtual environments.

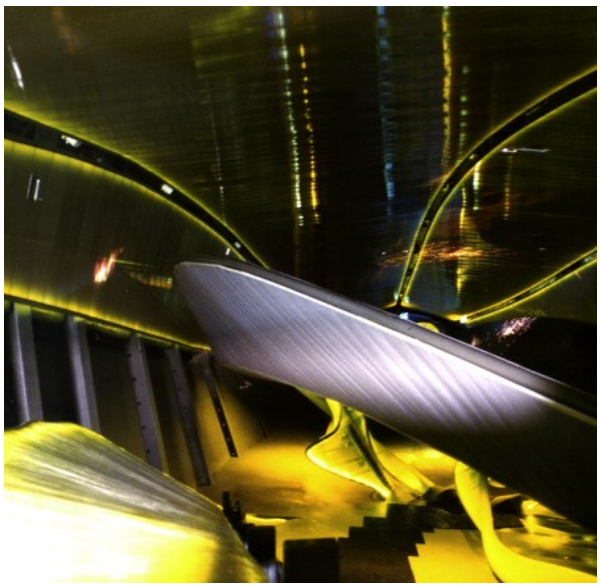
All the sounds are electronically produced. The speakers are placed in such a way that you experience a sounding building instead of sound in a building. There are 60 speakers distributed over the whole building. Each individual sound has its own character of movement and speed over the speakers.

The building exists of two interconnected pavilions: the Freshwater Pavilion and the Saltwater Pavilion. Each pavilion has its own sound environment. The sound environment of the freshwater pavilion is based on metaphors of a river, a water source and a darker underwater space. The saltwater pavilion is inspired by virtual sounding sky, the water surface of the sea and a hydra traversing these. It's presenting metaphors of different weather conditions.

The music in the two different spaces is not a fixed composition but has a generative approach to it and is therefor composed on the moment itself. The rules for how sounds can be combined are predefined; the actual decision of what sounds is made in real-time. This way the music will always be different. Partly the visitors can influence the processes via sensor based interfaces in the building. Furthermore the weather conditions outside of the building are used to control part of the compositional parameters.

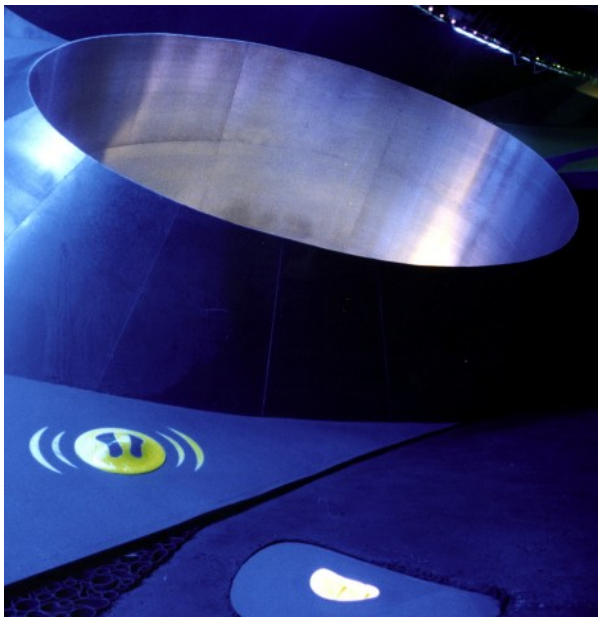
While a traditional concert often aims for a uniform experience of the audience, the Water pavilion has the opposite approach. It's part of the concept to promote individual experiences. Two persons visiting the building can have different experiences and when visiting the Water Pavilion a second time this can lead to again another experience.

Water Pavilion, photo taken from the air

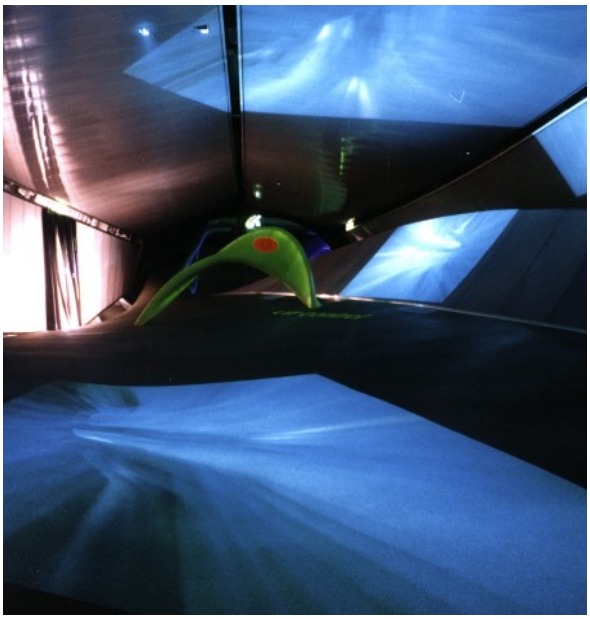


Water Pavilion, The Saltwater Pavilion

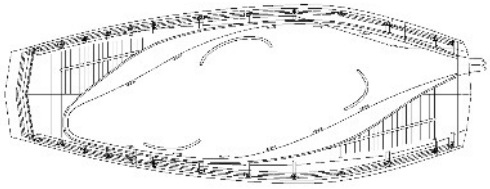
Water Pavilion, The Saltwater Pavilion



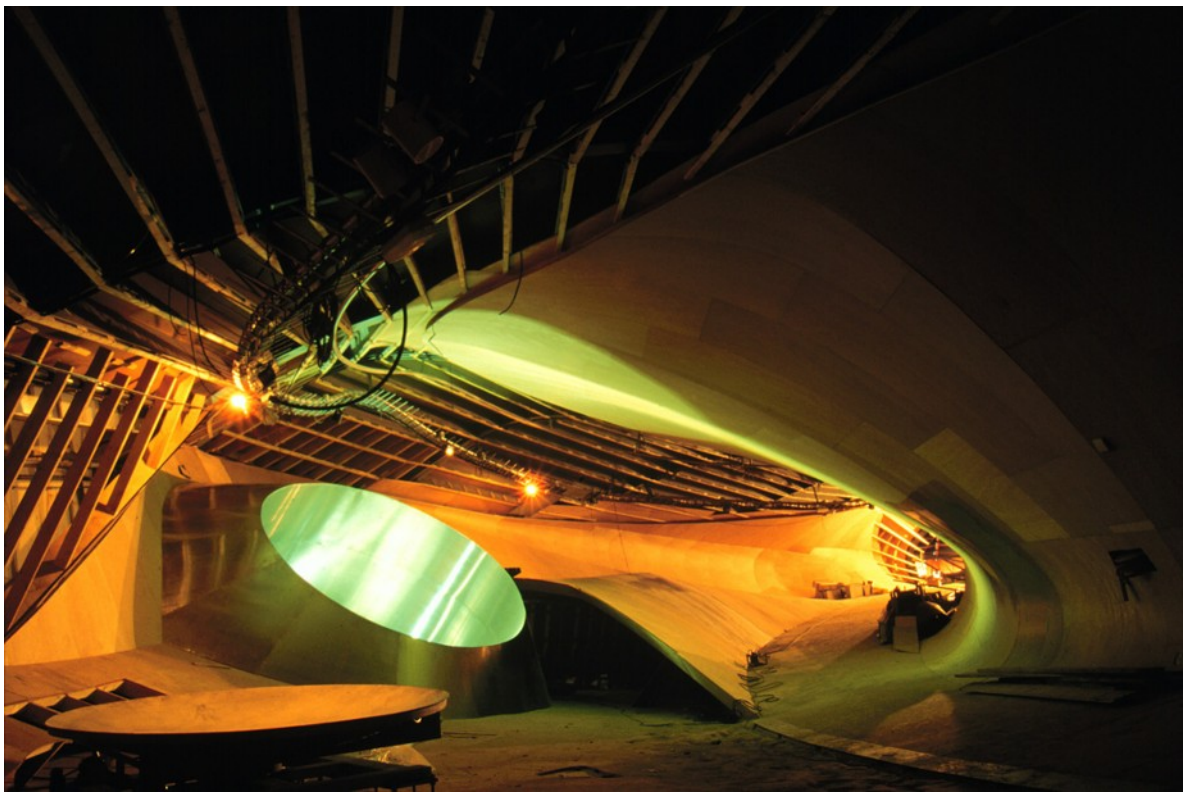
Water Pavilion, The Freshwater Pavilion



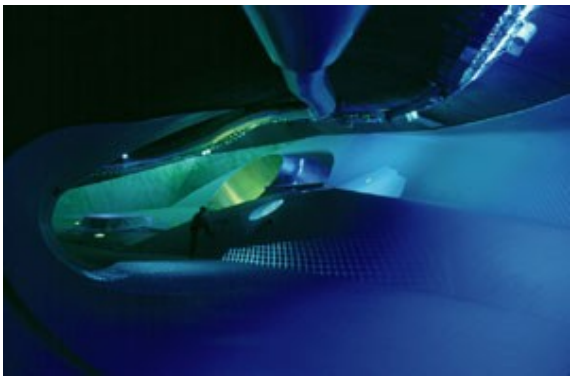
Water Pavilion, The Saltwater Pavilion



Water Pavilion, The Saltwater Pavilion



Water Pavilion, The construction of the Freshwater Pavilion



Water Pavilion, The Freshwater Pavilion

Water Pavilion, The Freshwater Pavilion

Water Pavilion, The Control Room

Water Pavilion, The Control Room

SoundNet 1996

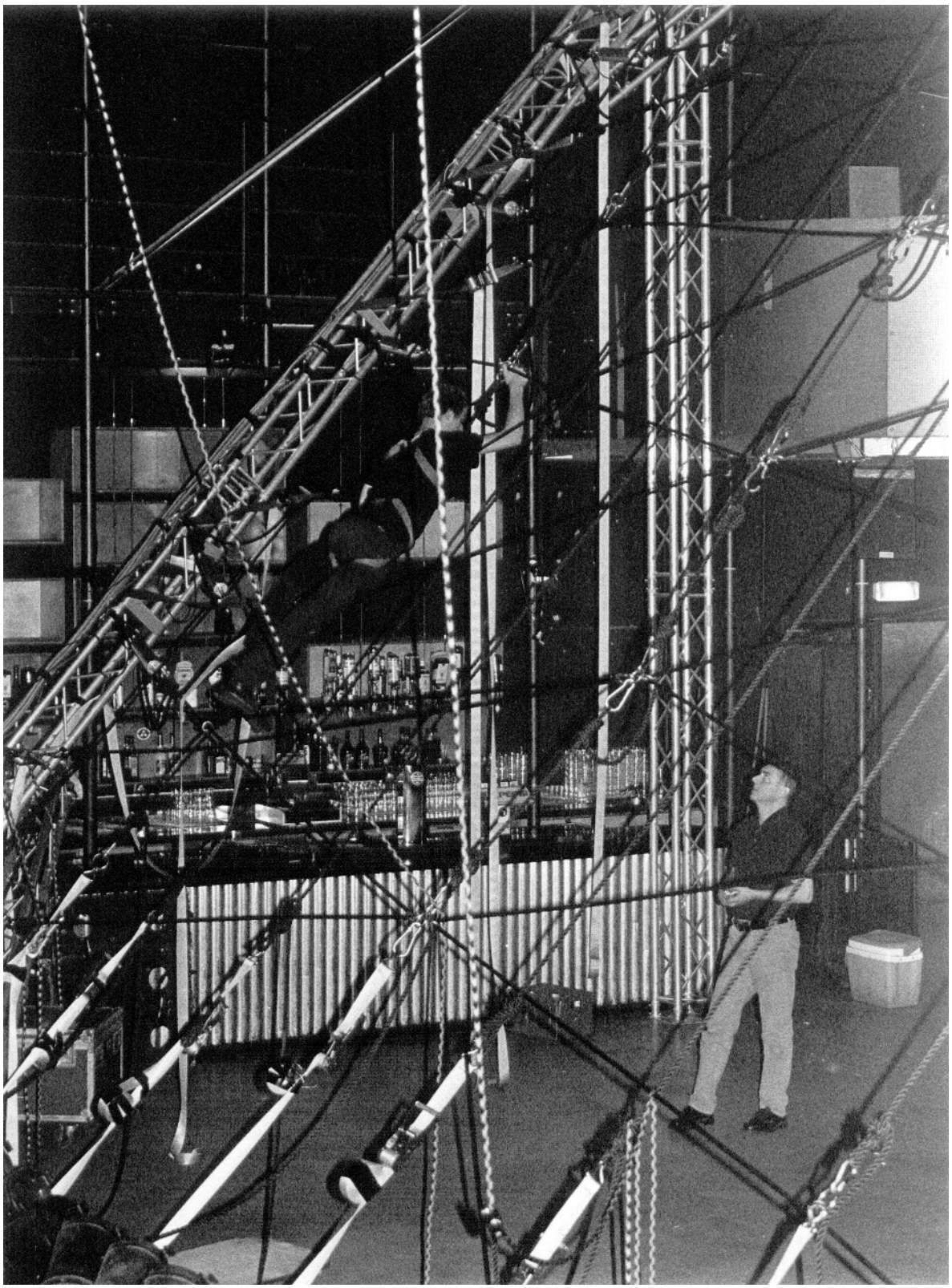
Sensorband: Edwin van der Heide, Zbigniew Karkowski, Atau Tanaka

SoundNet is a live performance musical instrument of monumental proportions. It is a giant web of 11 meters by 11 meters that is played by climbing it. Eleven sensors are placed at the end of the ropes. They detect the tension and movement.

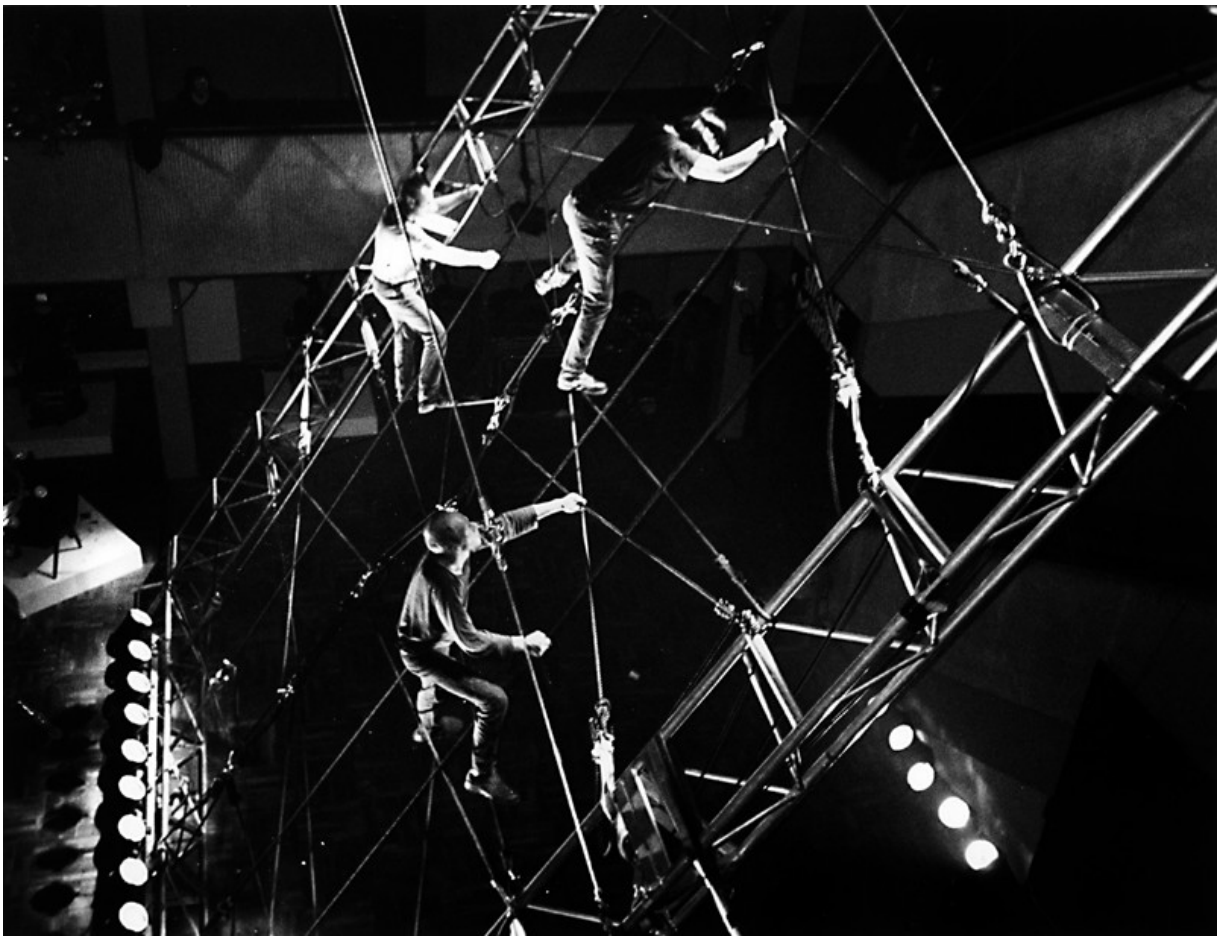
SoundNet is inspired by ‘The Web’, a 1 meter diameter spider's web created by the composer/performer Michel Waisvisz, at STEIM, Amsterdam. The general concept behind The Web is to create a natural complexity between different sound synthesis parameters. When you touch The Web at one point the tension distribution over the whole web changes. Since the sensors are spread over the web one movement results in a complex change of parameters and therefore in a complex change of sound.

SoundNet has the same complexity of control as The Web. However SoundNet is extreme in the relation of physical input and audible output. Instead of playing it with your hands you have to climb and move within it. Human physical limits become part of the performance and the sounding result. The sensors are continuously measuring the different tensions within the net. The values measured are used to trigger sound and more important to control and change the sounds while they are sounding. The data from the sensors goes into a computer where a program performances the rules for the relation between the sensor data and the control of the sound. Furthermore the computer is generating the sound in real-time.

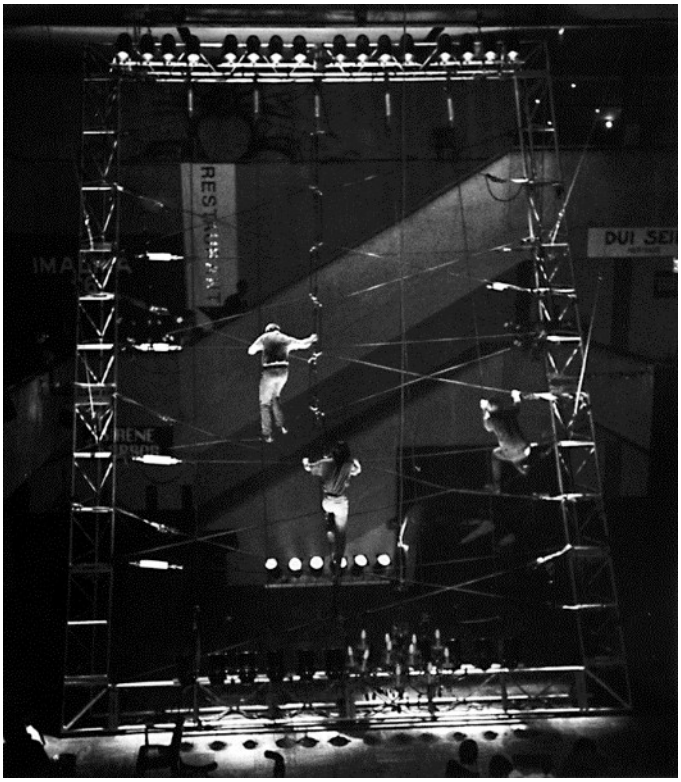
SoundNet is an instrument that is not intended for one player. It's played by three players at the same time. Since the players climb the same web they are interconnected and all controlling the same sound(s). It’s like playing one instrument with three people at the same time. It’s however not comparable to playing the piano with six hands but comparable to playing the flute where the breathing of three players is being added and together controls one flute.



Soundnet, setup of SoundNet for V2_'s DEAF96 festival, Rotterdam, The Netherlands, 1996



SoundNet, performed during the Exit festival in Creteil, France, 1996



SoundNet, Exit festival Creteil, France

Soundnet, The SoundNet Sensor