

SONIC VISTA

Bruce Odland + Sam Auinger (O+A)

Sound Installation, Deutschherrnbrücke in Frankfurt am Main, Germany, October 2011–

SONIC VISTA sound installation by O+A on the Deutschherrnbrücke in Frankfurt am Main, part of the urban greenbelt project.

The Deutschherrnbrücke is a railway bridge over the river Main that has pedestrian and bicycle lanes linking the Frankfurt districts of Sachsenhausen and Bornheim. It also is an important junction/node/threshold between the city of Frankfurt and its greenbelt.



Deutschherrnbrücke

It's easy to see why Frankfurt is dubbed "Mainhattan", an allusion to their similar skylines. The installation site we selected at the midpoint of the Deutschherrnbrücke displays this view at its best ... from here, the iconographic Frankfurt skyline can be experienced from a splendid panoramic perspective.



View of Frankfurt from installation site

The work **SONIC VISTA** is designed to bring attention to the auditory dimension of Frankfurt's urban habitat. **SONIC VISTA** introduces a conscious study and exploration of the sonic aspects of urban city design within the larger greenbelt concept.

The Deutschherrnbrücke, accessible on foot from the city center, is not only a special vantage point for the eyes. It is one of the rare places where the visual feel of the space matches the aural experience, one of the very few urban locations in Frankfurt in which a broad open space can be experienced both aurally and visually in equal measure. From here, the times of day and the seasons can not only be seen, but also heard.

From both the left and the right banks of the Main, the city's nearby infrastructure systems can always be heard in distant hums of activity of various kinds.

The customary Frankfurt airplane noises are also omnipresent here, but all sound events are present in such a way that none steal or override the "observational-listening space". The "auditory space" can extend to a radius of up to 5 km. But when passing passenger and freight trains interrupt the stillness at the observation point this shrinks to the immediate vicinity of the listener.

Citymap with locationmark



Deutscherbrücke including blue and red "Sphere Loudspeakers" installed

SONIC VISTA is an installation in large scale urban sound space that helps an observer listen in to the inner workings and complexity of the city and hear it's patterns of sound as a whole in the moment. The urban sound sources are subtly transformed in real-time with "tuning tubes" enhancing harmonic patterns that the human brain can read out as music, as rhythm.

The ear and eye of the observer become engaged in noticing the city's sonic patterns and forming a new mental map of the sources of its vibrations. The effect is one of decoding new information, hearing the sound of your culture as a sophisticated whole organism for the very first time. It is the sound of ourselves, our "hive", our cultural inputs and outputs heard as an advanced urban musical pattern.

Resonance tubes generate harmony from the urban sound environments on the north and south banks of the river Main.

Sounds of construction, road traffic, bicycles, human voices, jets, helicopters and trains are transformed in real time to harmony which is played back in real-time from two "Sphere Loudspeakers" suspended overhead.

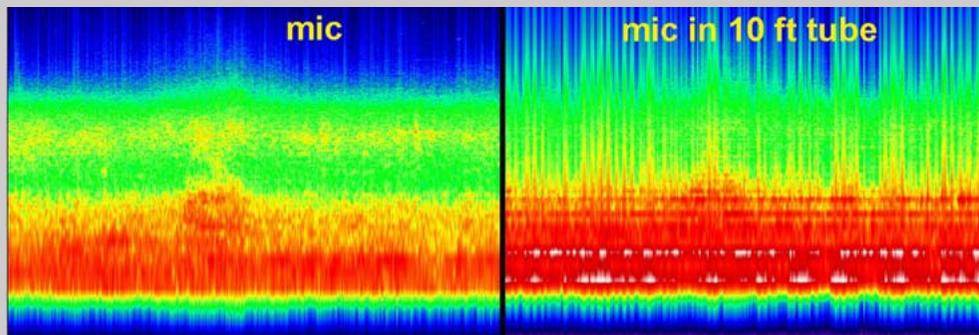
Elements of the Installation

2 tuningtubes

Fis tube overtone serie and mount on north side of the bridge



The overtone series of the 12 foot long north tube is in the key of "F sharp" as shown on the left. Busses and SUV's activate the first 3 or 4 overtones, cars motorcycles, voices move into upper notes. The result is like a digeridu played by a city, a shifting chanting sound which organically changes with whatever is going on around it. People tend to find listening to the harmonically altered traffic less fatiguing even meditative. The position of the microphone within the tube is of importance. It can be used to defeat certain overtones, and bring others into prominence. Pythagoras mathematics for overtones on strings can be effectively used to predict mic positions. Our favorites tend to be $2/7$ $3/7$ and $3/13$ the length of the tube.



Pure signal spectrogram

Tubes signal spectrogram

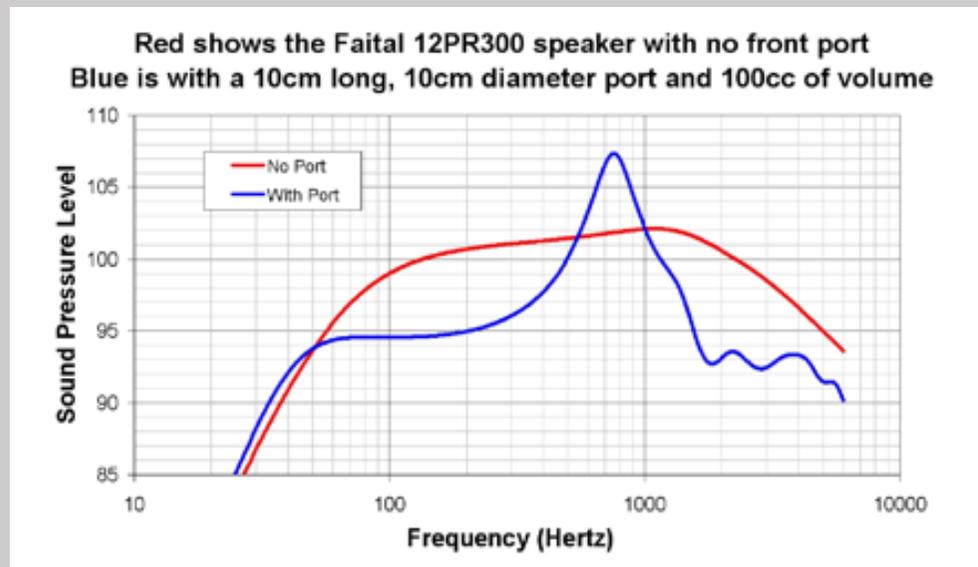
To the left you can see a spectrographic image of traffic passing. Far left, is the microphone in the open air, on the right is the microphone at that same moment in the tube. The bands of color represent the overtone series in the tube. Time passes from right to left, the vertical axis represents the range of human hearing.

Elements of the Installation

2 "Sphere Loudspeakers"

New speakers had to be developed for the project:

With the help of acoustician Kevin Bastyr, O+A designed two "Sphere Loudspeakers" for this outdoor installation. Where normal speakers tend to create a "spotlight" of intense sound with disturbing phase characteristics as a visitor passes in and out of the sound field. The "Sphere Loudspeakers" create a "field" of sound that disperses in all directions with no phasing.



"This front cavity does lead to the loss of almost half of the sound output, but it's a high sensitivity, 300 Watt maximum driver, so they are still more than capable of being loud enough. This all means that it is a small price to pay for the tremendous improvement in radiation pattern and listener experience.

How can the speakers be designed so that listeners walking along the pedestrian bridge hear a uniform sound pressure level as they walk? The problem with overhead speakers is that they typically send most of their sound straight downward – so it is much louder directly under them. The problem is more challenging because the lowest notes are ~60 Hz, and the highest notes are ~3000 Hz.

A 12 inch diameter woofer needs to be positioned behind a ~3" diameter hole that all the sound must exit through. This greatly improves the radiation pattern for the highest notes. The heights and horizontal spacing of the two speakers also play an important role in setting how loud the sound will be when one is in between the two speakers. Interestingly, we were able to balance these factors and the system as built achieved a pressure that was uniform within a few dB as listeners walk along the bridge. The second problem arose due to the solution of the first: That the speaker radiates through a 3" diameter hole created an undesirable resonance that I correctly predicted through the use of a computational acoustics model. This resonance was actually eliminated by simply equalizing the speakers electrically."

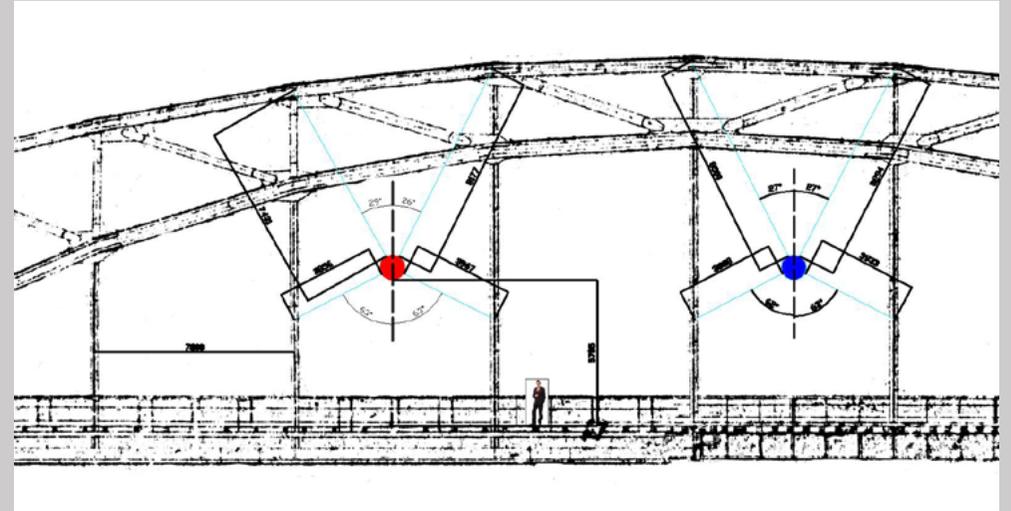
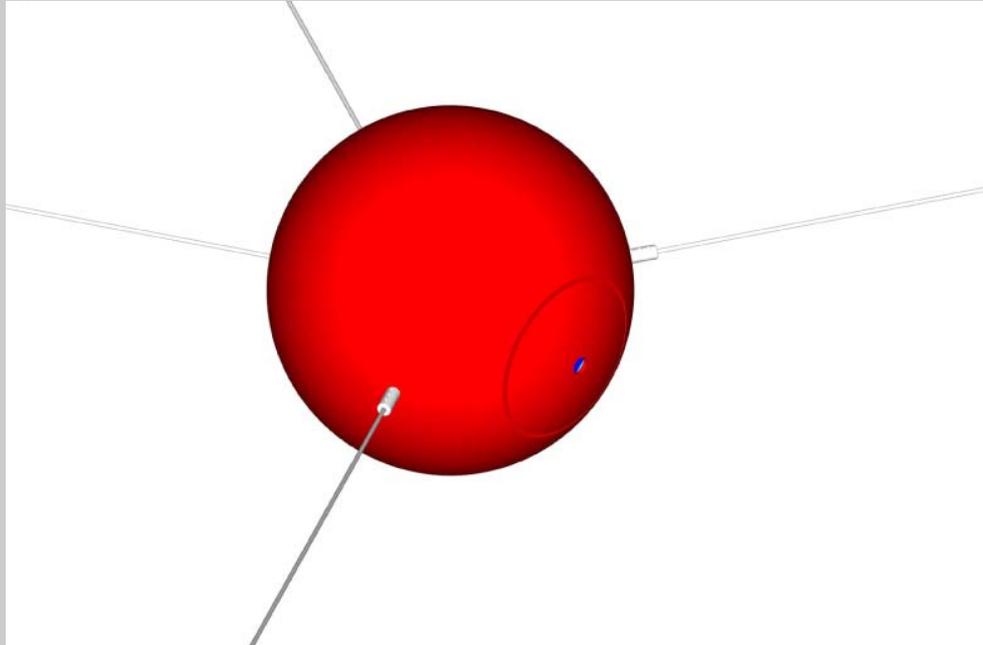
Excerpt from Kevin Bastyr's blog
<http://milwaukeeemakerspace.org/2011/10/sonic-vista/>

Front cavity design



Mount

Rigging design by Werner Lorke



"Sphere Loudspeaker"



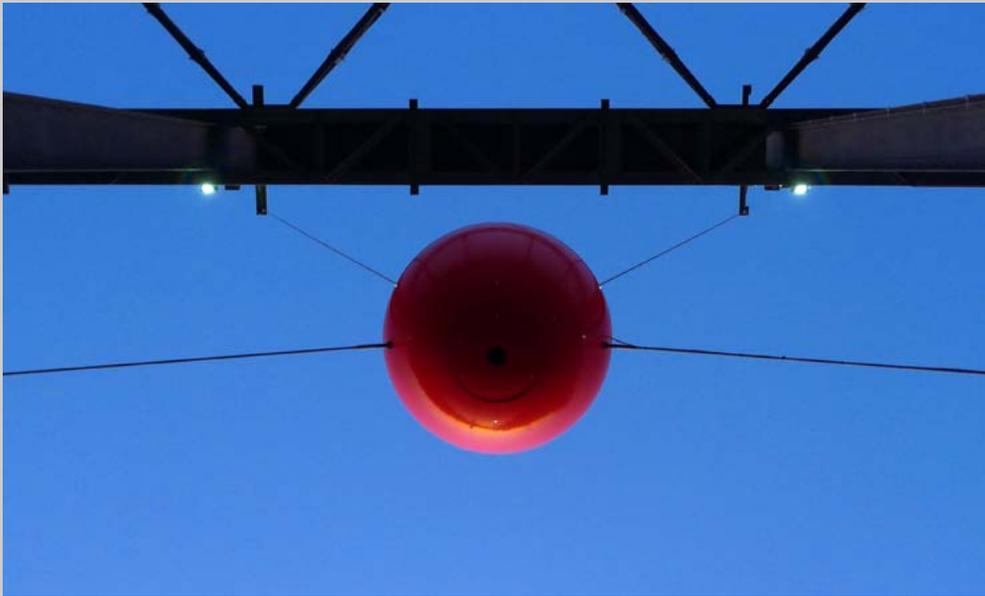
Amp, EQ and Limiter



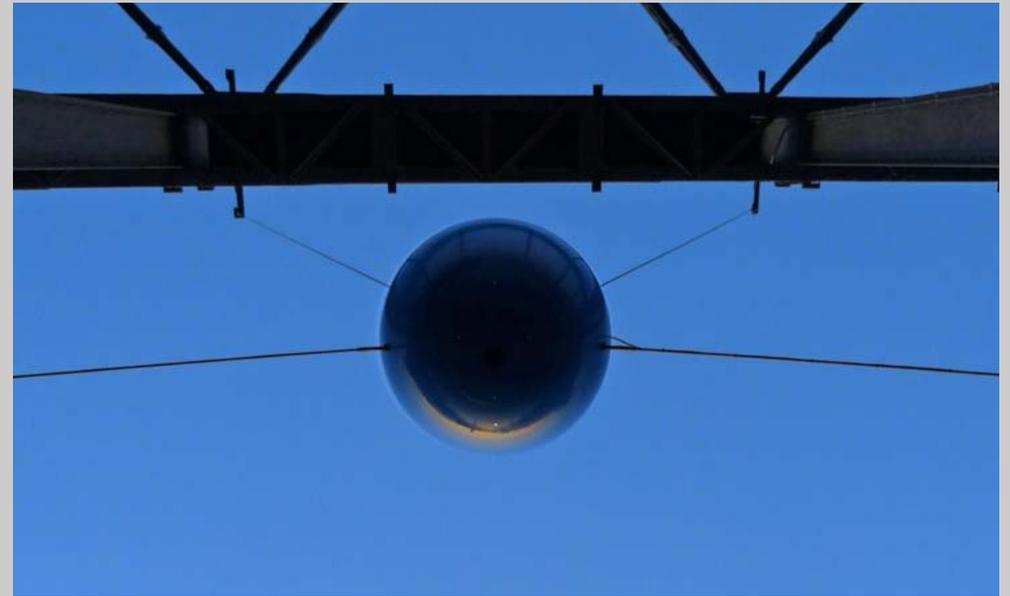
B tube Deutschherrnbrücke south

To install SONIC VISTA, the railwaybridge had to be shut down.
With the help of a great crew the piece could be installed in one night.





Red "Sphere Loudspeaker" playing fis tube (north)



Blue "Sphere Loudspeaker" playing b tube (south)

SONIC VISTA on a sunny afternoon (October 2011)



SONIC VISTA (2011)

Bruce Odland + Sam Auinger (O+A)

Sound Installation,
Deutschherrnbrücke, Frankfurt am Main, Germany, 2011
as a part of the city "GrünGürtel"-project, opened: 1.10.2011

commissioned by: Stadt Frankfurt am Main, Germany
with the support of EZB.
GrünGürtel – project manager: Klaus Hoppe
auinger – project manager: Wolfgang Galler
technical realisation: iO Interdisziplinäre Objekte, Frankfurt
iO – project manager: Werner Lorke
Consultant "Sphere Loudspeakers": Kevin Bastyr
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O+A was founded 1987 by Bruce Odland and Sam Auinger.

Their central theme is "hearing perspective". Their work is known for large scale, public space sound installations which transform city noise into harmony in real-time. Their projects include **Garten der Zeiträume** (Ars Electronica 1990, Linz), **Traffic Mantra** (at Trajan's Forum in Rome, 1991), **Balance** (Sonambiente Berlin 1996), **Box 30/70** (beginning in 2000, Siemens, Berlin), **Blue Moon** (New Sounds New York, 2004), **Requiem for Fossil Fuels** (Ear to the Earth 2007, NYC), **Sonic Commons** (NYC 2009), **SONIC VISTA** (Frankfurt 2011). 2009 O+A started on the **Sonic Commons** questioning the dominance of the visual culture in our perception of the world.
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