



AVIL AUDIO VISUAL IMMERSION LAB

3D AUDIO HIGHER ORDER AMBISONICS SYSTEM

The state-of-the-art sound laboratory AVIL chooses **sonible d:24** amps to create three-dimensional soundscapes. The lab is designed to increase the understanding of the human auditory system.

PROJECT INFORMATION

Location: **Copenhagen, Denmark**

Venue: **Oticon Centre of Excellence for Hearing and Speech Sciences (CHeSS), Technical University of Denmark**

Participants: **sonible, DTU**

Date: **06/2015**

Inside the **Audio Visual Immersion Lab (AVIL)** at the DTU Copenhagen a **Higher Order Ambisonics 3D audio system** was installed in June 2015. Three **sonible d:24** 24 channel amplifiers were used to provide a noise-free, crystal clear signal for the advanced hearing research that is conducted at the Oticon Centre of Excellence for Hearing and Speech Sciences (CHeSS), AVIL is part of.

The institute CHeSS focuses on hearing research such as speech communication, auditory signal processing and perception, audiology, objective measures of auditory function.

AVIL helps to increase the understanding of the functioning of the human auditory system and to provide insights that are useful for technical applications such as hearing aids, speech recognition systems, hearing diagnostics tools and cochlear implants.





CONCEPT

Challenge

The goal of the research inside the AVIL is to better understand unsolved questions of human hearing. Particularly, to improve daily interaction for hearing-impaired and for people with hearing aids.

To **optimize hearing aid technology**, it is important to reproduce realistic auditory scenes inside a laboratory environment. For bias-free results when transmitting acoustic stimuli inside the lab, **high signal integrity** is critical.

Solution

To generate such auditory scenes, sonible provided a high quality immersive speaker array system for perfect sound field reconstruction. At the heart, three d:24 amplifiers were the natural choice because of their compact design (72 channels on 9HE) and noise-free amplification (SNR > 110dB / channel). The spherical speaker system is based on the 3D audio technology Higher Order Ambisonics (HOA). HOA makes it possible to create reproducible sound fields in order to establish deterministic research environments.



The idea [of AVIL] is to bring the reality into the lab to study sound communication, speech communication and also to study the effects of hearing instrument processing systematically.

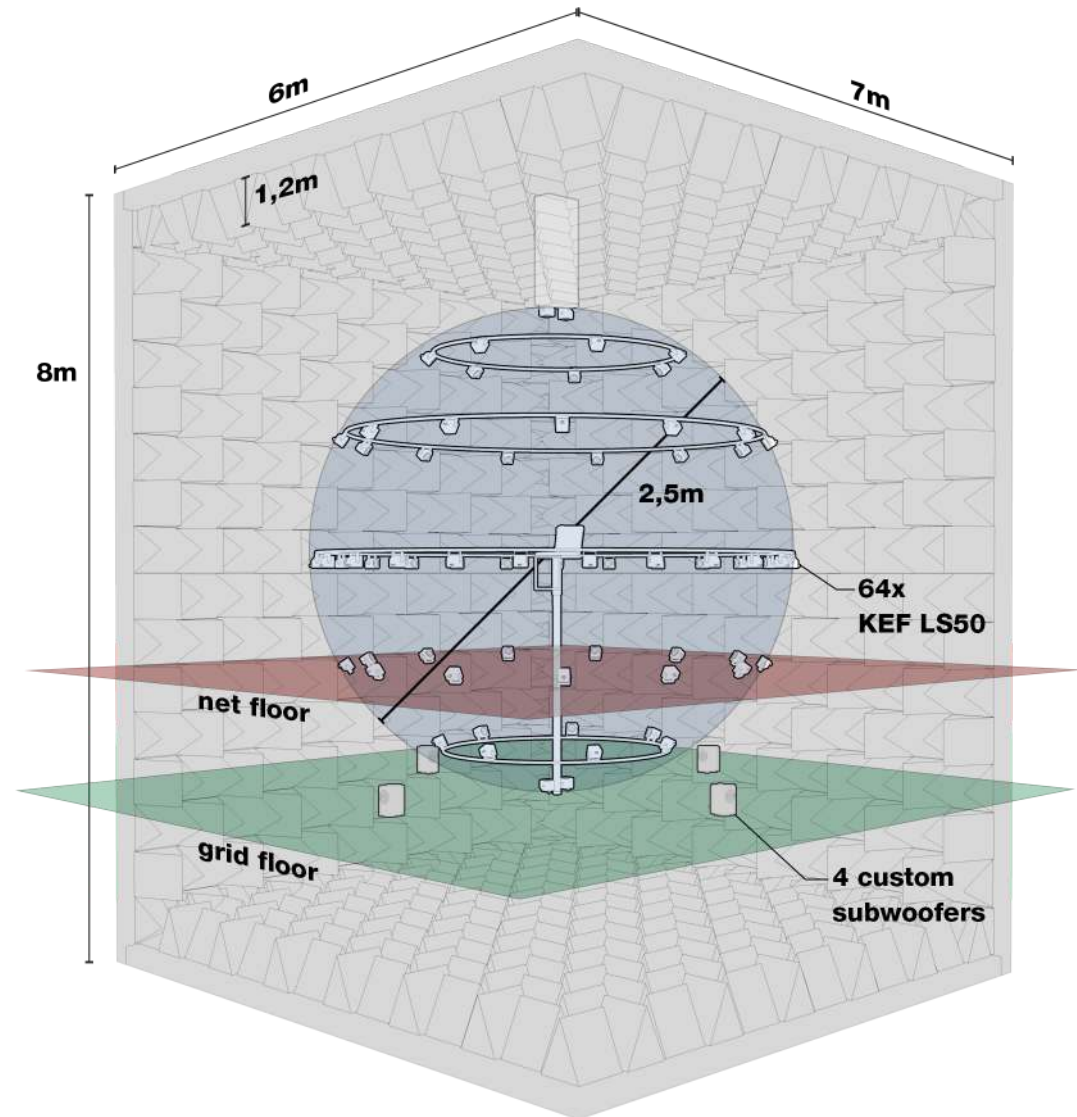
Torsten Dau, Head of Hearing Systems, CHeSS



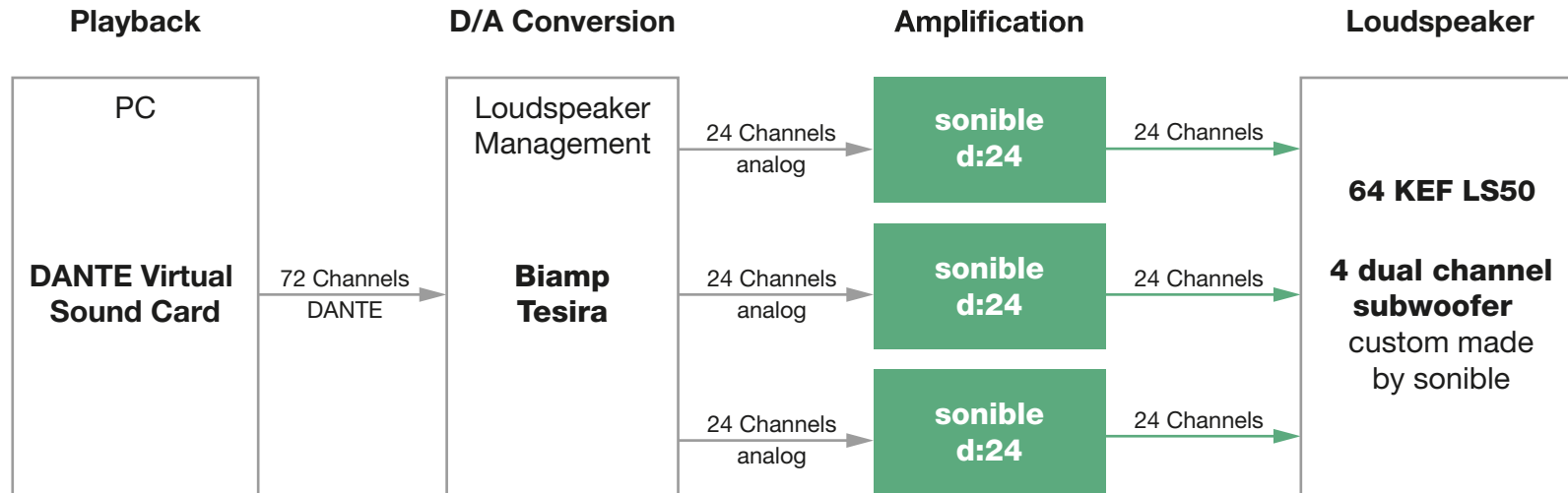
SYSTEM DESIGN

Specifications

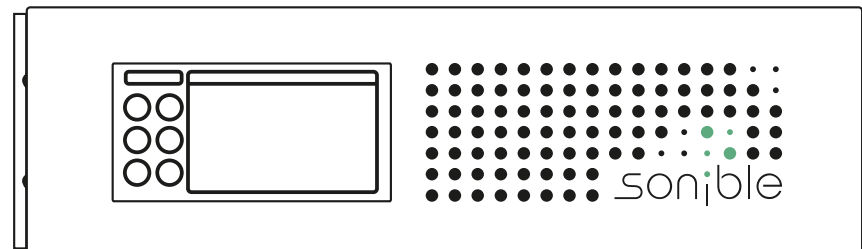
- Anechoic chamber: 6 x 7 x 8 m
- 3 sonible d:24 amplifiers for 72 audio channels
- 64 KEF LS50 coaxial speakers as perfect sphere of 2,5 m radius
- 4 dual channel subwoofers custom made by sonible
- 2 rings and the 4 subwoofers are placed beneath the suspended floor



SIGNAL FLOW CHART



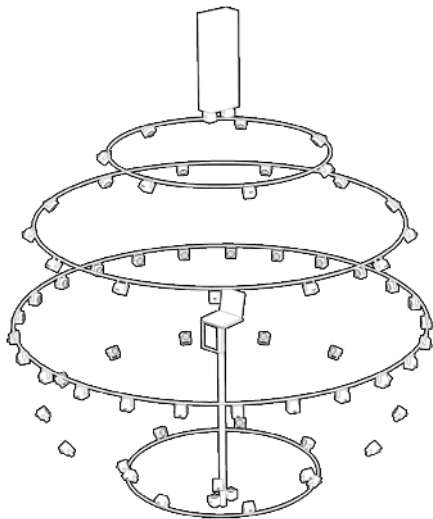
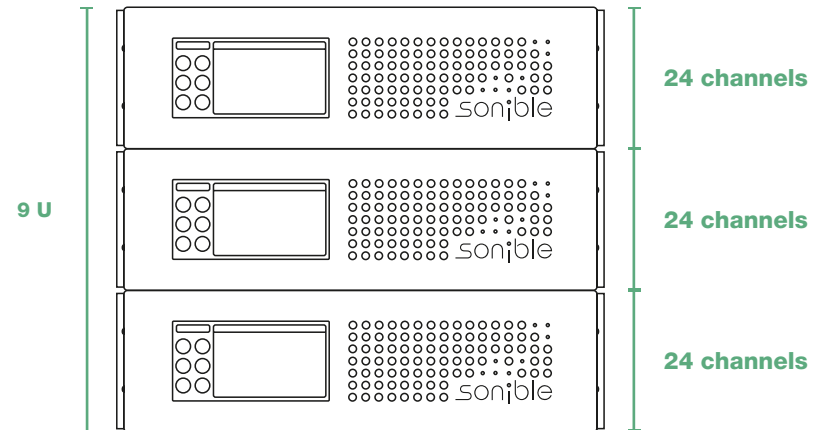
The world class facility AVIL consists of a Higher Order Ambisonics 3D audio system inside a single-walled anechoic chamber. The test subject's ears are directly in the center of the spherical speaker array. Coaxial speakers were chosen because they approximate point sources as closely as possible. It is one of the most complex 3D audio research systems in Europe.





BENEFITS

- + 3 high-end sonible d:24 amplifiers:
only 9HE rack space for 72 channels
- + Absolutely noiseless amplification
(SNR > 110dB / channel)



- + Perfect sound field synthesis
with 5th order HOA system
- + Deterministic and reproducible acoustic environments
for research purposes



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