Research Project

Development of virtual soundscapes and innovative audio design

Steps towards an acoustic holodeck by the use of 3D-audio technology

3D-audio technologies as the SpatialSound Wave System (SSW) by the Fraunhofer Institute Ilmenau IDMT allow to locate and treat sounds as three-dimensional soundsources in space. This allows for emulating tangible soundscapes and bringing virtual space-sound-concepts to life. By this 3D-audio leads the way to elaborating new forms of immersive media such as 360°-movies (Fulldome-Cinema), Virtual or Augmented Reality settings, games and the development of innovative, audititory experiences in the field of 3D ear plays as well as to installation and simulation of acoustic holograms. 3D-audio technologies ask for new types of auditory and audiovisual art forms and concepts. Our research program explores the specific dramaturgical, aesthetic and conceptual possibilities and, based on these findings, develops audio-artistic prototypes.

Tangibility
Simultaneity
Deconstruction

Tangibility of sound, can be achieved with 3D-audio technology. By this it is possible to implement highly effective virtual scenarios, benefitting from the plasticity and three-dimensional quality of sound. Tangible phenomena appear as "real" and "true". Such a naturalism can intensify the illusion of an immersive "reality".
At the same time, 3D-audio is best suited to design disruptive, contrasting, torn and collage-related forms, as opposed to homogeneous-illusionary experiences.
3D-audio allows simultaneity of contradictions, so that the „sculputural" positioning of sound in space can also be a method of deconstruction, thus a concept, which is diametrically opposed to an illusionary realism.

three-dimensional
Composing

While other research approaches are mainly technical-orientated and therefore aim mostly at acoustic reproduction through certain recording-methods, our program focusses on the composition of virtual sound-scenarios arranging and merging individual sounds. Within our current research program, specific concepts of form, material and perception, as well as specific methods of production and production logistics have been developed and documented in tutorials, which are used in lectures and workshops. Concerning the specific possibilities of SSW's technology and its novel apparatus, it can be deemed as confirmed and clarified, that sounds occur and stride across the defined positions in room.

Immersion
Illusion
Virtuality

The term *immersion* refers to the hermetical being-surrounded by media created sensory impressions. Sound is surrounding the listener all around and is therefore an immersive experience par excellence.

3D-audio's genuine dramaturgies, concepts and design principles have been explored by means of prototypical pieces, located in the realms of immersion, illusion and virtuality. They unfold their specific artistic characteristic through 3D-audio technology.

Future

3D-audio environments change the role of the recipient substantiall: They lead the listener from a frontal perspective of an observer into the role of an explorer of multi perspectives. The object-based production environment furthermore allows the adequate integration of interactive settings, and supports a multitude of loudspeaker configurations. Productions can be played back via different speaker setups without losing the originally intended spatial arrangement impression. Thus, a re-definition of the recipient's role, the listening process itself and the playback and perceptual settings are crucial design issues in the field of 3D-audio explorations. Currently, we conduct research regarding the comparison of diverse object-based 3D-audio production systems as well as in exploring the consequent implementation of interactive scenarios.

Soundscape
Media Culture
Auditory topography

Since 2011, the Soundscape- and Environmental Media Lab (SEM-Lab) at Darmstadt University of Applied Sciences has been researching and developing specific concepts and methods of 3D-audio design with the SSW, from an artistic-conceptual point of view and by means of critical investigation of the technical-functional settings. An important role in this research play, too, the pre-conditions, deriving from art and cultural history. Based on the term and concept of *Soundscape*, as a Gestalt of listening and a figure of concept, 3D-audio constitutes an autonomous aesthetical concept, which derives from three-dimensional design necessities as genuine means of expression, not as as a "gimmick" or another superficially applied technological sensation.
In tight relation to the soundscape concept, 3D-audio understands and implements the phenomena of sound in art, everyday life and media as a specifically and plastically located sound topography.

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