



Zeiss-Planetarium Jena uses SpatialSound Wave

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Since November 2011 the Zeiss-Planetarium Jena has been using a new audio and video concept: SpatialSound Wave, a sound system developed by Fraunhofer IDMT, together with the full-dome laser image projection system by Carl Zeiss AG, provides a fantastic three-dimensional experience for visitors' eyes and ears.

Challenges

To provide a sound system that

- is capable of rendering three-dimensional sound sources,
- allows to replay existing productions in the highest audio quality,
- can be integrated with the existing technical environment,
- can be synchronized with other systems (image projection, light, show laser, video).

Technical Solution

Loudspeaker Concept

The layout and number of loudspeakers of the sound system represents a perfect compromise between reasonable economic calculation and functional requirements in terms of acoustics. Overall, 60 loudspeakers and four subwoofers, each of which can be controlled individually, have been installed in various positions in order to ensure a differentiated positioning of the sound sources also with regard to the range of low frequencies. The entire system consists of

- 36 speakers on the horizontal level, arranged in a circle around the visitors,
- 23 speakers on different height levels behind the image projection screen, and
- one speaker in the zenith.

“Using innovative technologies made in Thuringia the Zeiss-Planetarium Jena is among the most advanced planetariums in the world. The novel effects brought about by these technologies have substantially added to our educational and entertainment program, making the discovery of the night sky an unforgettable multimedia experience.”

**Jürgen Hellwig, Managing Director of
STERNEVENT GmbH, operator of Zeiss-Planetarium Jena**

Sound System

SpatialSound Wave has been developed on the basis of many years of experience Fraunhofer IDMT has with three-dimensional audio rendering technology, such as Wave Field Synthesis. SpatialSound Wave allows to

- simultaneously reproduce up to 32 freely positionable and movable audio sources, with intelligent signal processing allowing to control each of the 60 speakers individually,
- comfortably position and animate the sound sources in 3D,
- reproduce all animations in an automated and project synchronous fashion,
- provide direction accurate sound reproduction on the entire image projection screen.

Production

The object oriented production system allows to create both simple, static and complex, dynamic productions. All audio sources can be positioned individually, and object movements and characteristics can be recorded and automated.

Replay

SpatialSound Wave allows to replay both object based content and channel based material (in stereo or 5.1. surround format) in the highest audio quality. Each channel can be positioned separately and freely as a virtual audio source both in the horizontal level and in the dome.

System Specifications

- Audio sample rate: 48 kHz
- Number of audio inputs (virtual audio sources): 32
- Number of audio objects: unlimited
- Number of audio outputs: 64
- Audio interface: MADI
- Timecode input: SMPTE-LTC
- Operating system: Linux



Zeiss-Planetarium Jena

- Longest serving large sized planetarium worldwide, offering 260 seat capacity
- Outside dome diameter: 25 meters
- Inside dome diameter: 23 meters
- Current show repertoire comprises more than 20 productions
- Up to seven shows each day