The Multimedia Dome: Look, Listen and be Amazed

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The Multimedia Dome, the first digital dome theater to feature natural spatial sound, envelops visitors in a fascinating universe of video pictures and sounds – with superb acoustics at all seats. © Fraunhofer FIRST/allsky.de

Making its first public appearance at the IFA international consumer electronics fair in Berlin, the Multimedia Dome is the first digital dome theater to feature natural spatial sound: it envelops visitors in fascinating universe of video pictures and sound. Developed at the Fraunhofer Institute for Computer Architecture and Software Technology FIRST and the Fraunhofer Institute for Digital Media Technology IDMT, the

Multimedia Dome can be admired at the Science and Technology Forum TWF (Berlin, Germany).

In the cinema of the future, instead of being confined to a screen at the front of the theater, the action will unfold on a semicircular surface that wraps itself around the auditorium like a dome, giving the audience the sensation of being completely immersed in the action. The present systems used to screen films or multimedia shows on the curved walls of a planetarium, for instance, still involve a great deal of preparatory work: The videos have to be recomputed for showing at each new venue.

"The biggest challenge is getting the pre-distortion right. The video signals have to be processed in order to reproduce the images in the correct scale and orientation on the curved screen and ensure there are no seams between them," explains Manuel Schiewe from FIRST.

He and his colleagues have developed a simpler, less time-consuming solution for projecting images on the dome. Working in collaboration with Carl Zeiss, they have produced a software that makes it easier to put together multimedia shows and fine-tune the projectors. "Our Show Player recently went into operation at the Jena Planetarium," reports Schiewe."It is a relatively easy task to fit together the six separate split pictures that make up the total projected image."

An intuitive user interface, with similar functions to those of a standard video editing program, allows the various components such as video, still-image, text and audio files to be combined to produce a multimedia show. The same software analyzes the position of the projectors and controls their alignment. The distortion correction of the different images are carried out by several PCs according to the size of the dome and the position of the projectors, enabling the show to be screened in real time.

The Multimedia Dome measures 4.5 meters in diameter. It is equipped around its circumference with an array of almost 100 loudspeakers, which form part of the IOSONO® wave field synthesis system developed at the IDMT. The sound they produce is distinctly superior to that offered by a conventional movie theater using systems like Dolby Digital.

Whereas Dolby uses five separate audio channels – three in front of the rows of seats and two behind – the acoustic signals produced by the wave field synthesis speakers overlap and complement each other to create an optimum 3-dimensional listening experience at every seat. "The processing software is object-oriented and requires input of the audio signals and data defining the position of the sound sources. From this set of data it calculates the different signals required by each individual speaker to ensure that the wave fronts are superimposed in the correct manner. The resulting pattern of sound is so natural that it creates the impression of being live," declares Dr. Sandra Brix of the IDMT, who helped to develop the IOSONO® system. An added advantage is that the perceived origin of the sound remains the same wherever the listener might be seated. The data processing and control functions of the wave field synthesis system are handled by several off-the-shelf PCs. The Multimedia Dome on show at IFA 2006 is the first time that the IOSONO® sound system and the Show Player have been combined in this way.

This dome projection system gives the audience the sensation of being completely immersed in the action. This makes it suitable for use not only in planetariums but also in movie theaters, theme parks, simulators and multimedia installations.

Source: Fraunhofer-Gesellschaft