

# Nothing but first-class seats at the movies

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A novelty at the Bavaria Film Studios: The mine keeper's ghost, complete with voice, appears in the middle of the movie theater. © Bavaria Filmstadt

Invisible, but audible, is the latest attraction at the Bavaria Film Studios near Munich. The "4D cinema experience" is the second movie theater in Germany to have departed from conventional multi-channel sound. The IOSONO system creates perfect surround sound at every seat.

Visitors to the 4D cinema in the grounds of the Bavaria Film Studios can

plunge into a completely new kind of movie experience. Not only are the images real enough to touch – as is usual in 3D movie theaters – but the sound, too, gives viewers the feeling of being in the thick of events.

Against the backdrop of an abandoned mine, the wind drives bales of dry tumbleweed across the seats of the movie theater. A thunderclap makes the audience flinch – the thunderstorm is right over their heads. Then down comes the rain, so close that they can almost feel it.

A hissing rattlesnake darts out of an old tipper truck and turns into the ghost of the old mine keeper, who takes the visitors on a helter-skelter journey through the haunted mine.

The illusion is created by state-of-the-art video and audio engineering methods. The IOSONO sound system developed at the Fraunhofer Institute for Digital Media Technology IDMT in Ilmenau ensures perfect acoustic reproduction in all seats – regardless whether a viewer is sitting at the front or the back, at the side or in the middle.

Until now, only a few seats offered perfect surround sound. The traditional multi-channel system works by cleverly mixing the sound signals coming from right and left, back and front, but the desired surround-sound effect is only achieved at a central point in the room, the so-called "sweet spot".

IOSONO no longer has such a sweet spot, or rather, the sweet spot is everywhere. A ring of loudspeakers is positioned right round the movie theater. The acoustic signals emitted by the speakers overlap and interact in such a way as to create the perfect surround sound experience in every seat. "The IOSONO technology makes sound waves spread evenly across the room, rather like the ripples you create when you throw a pebble into a pond," explains Dr. Sandra Brix of the IDMT, a member of the IOSONO development team.

A "synthetic wave field" is generated by superimposing the sound waves from all 432 loudspeakers. Although calculated by several computers, this wave field conveys a realistic impression of natural sound. Nothing is left to chance: The sound engineer can place a virtual sound source at any point in the room, and the software ensures that the loudspeakers produce the corresponding acoustic signals – such as the rattlesnake, which appears poised to strike the viewer, regardless of whether he or she is sitting in the front or the back row.

Source: Fraunhofer-Gesellschaft

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