

Perfect projections on surfaces of any shape

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Projecting brilliantly sharp images as a single picture onto curved surfaces has previously been a very elaborate and expensive process. Now a new software system automatically calibrates the projectors needed so that the images are superimposed with pixel-precise accuracy. Fraunhofer research scientists are presenting the system at the International Broadcast Convention IBC in Amsterdam.

Planetariums and domed movie theaters create very special film experiences in which the audience is virtually immersed in the activity. But it takes a great deal of effort and expense to project films or shows onto curved surfaces. The images are generated by several projectors which have to be coordinated with each other in order to create a seamless total picture. The projectors are either adjusted manually or the projected images are electronically distorted so that they merge. Both methods are time-consuming and inflexible.

Once set, the position of the projectors must not be changed. Research scientists at the Fraunhofer Institute for Computer Architecture and Software Technology FIRST have developed a system which automatically calibrates the projectors and superimposes the images with pixel-precise accuracy. This produces perfectly synchronized projections on surfaces of any shape.

“The calibration software is firstly provided with data on the geometry of the screen and the number, position and approximate alignment of the projectors,” states Ivo Haulsen of FIRST, explaining the system. Digital cameras record the position of the images projected onto the screen.

With the aid of image recognition algorithms, the individual images are then fully automatically distorted and adapted to the projection surface so that the many partial images produce a high-resolution, seamless total picture. The automatic calibration software works quickly and flexibly. Even if a projector slips out of position, its image can be very quickly re-inserted into the total picture.

In principle the new system can be used to control any type of projector – including the special projectors made by Carl Zeiss for use in planetariums or the Sony 4K for digital cinema. It can be used in movie theaters, surround-sound cinemas, planetariums and theme parks, as well as for events, trade fairs and product demonstrations.

The Showplayer makes it possible to combine different types of media such as movies, stills, banners and even live action to create a show, and also to integrate external devices such as fog machines. The content is put together and shown in real time. This saves time because the show does not have to be elaborately computed before being presented in full quality.

What's more, last-minute changes can be made. Up to a resolution of 4K x 4K the elaborate slicing procedure, in which the image data are divided up over several projectors, is not even needed, because the partial images are generated at the moment they are shown. As a result, multimedia shows for uneven and curved surfaces can be produced quickly and easily.

Source: Fraunhofer-Gesellschaft

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