Stereo-to-Multiview Conversion

AFX plug-in suite for 3D content generation for autostereoscopic displays from live-action S3D

Glasses-free 3D using autostereoscopic displays in digital signage is going to become a competitive alternative to conventional 2D presentations. Several companies already provide fully integrated 3D solutions for digital signage. Content creation, however, is still a major problem. While computer-generated content can easily be converted to multiview representations required for autostereoscopic displays, content creation or conversion of live-action video still remains a challenge. Fraunhofer HHI now provides an easy-to-use Adobe After Effects plug-in solution for high-quality 3D content conversion from live-action stereo footage.

Challenges

Conventional glasses-based 3D displays use stereoscopic content to generate a depth impression for the viewer. In contrast, glasses-free 3D displays, so-called autostereoscopic multiview displays, require many different camera perspectives of the same scene instead of just two images to produce depth. While stereoscopic 3D content is readily available and fairly easy to produce, multiview content is still difficult to obtain.

Suitable live-action content can either be produced with a related multi-camera array or can be converted from conventional stereoscopic 3D video. Multi-camera arrays are difficult to use and the number of cameras and their inter-ocular distance are specific to the targeted multiview display. Furthermore, multi-camera rigging supporting high-quality 3D is a highly complex endeavor. Conversion of stereoscopic 3D content circumvents these problems by using conventional stereo footage as input to generate a display specific multiview representation.

Fraunhofer HHI's well reputed stereo-to-multiview conversion already enables a high-quality conversion process using existing stereoscopic content to drive autostereoscopic multiview displays. The conversion is display agnostic. Thus, it can target many different types of autostereoscopic displays with the same stereo content. Moreover, it allows a flexible adjustment of various parameters like inter-ocular distance between adjacent views – multiview baseline – or horizontal image translation – definition of zero-parallax plane – to achieve the optimal depth impression on the targeted autostereoscopic multiview display. Now, Fraunhofer HHI has conveniently combined all this long-lasting experience in an easy-to-use Adobe After Effects plug-in suite.
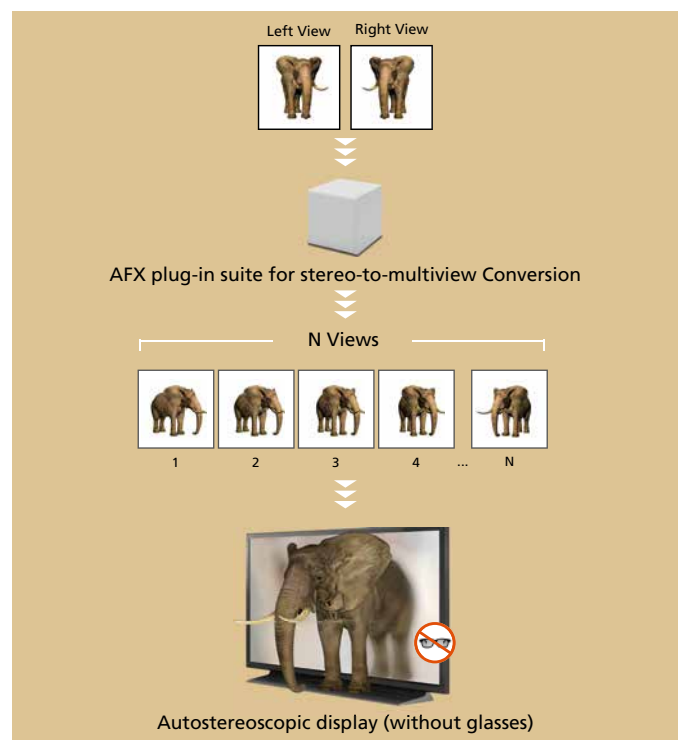
Conversion of generic stereoscopic 3D video to multiview by generating virtual camera images

Estimated disparity maps

Multiple video-plus-depth

Final multiview image

Depth-based content generation with AFX plug-in suite for stereo-to-multiview conversion by Fraunhofer HHI

Benefits

- Fully automatic or manually guided stereo-to-multiview conversion

- Conveniently available as Adobe AFX plug-in suite

- Use of existing stereoscopic 3D content to drive autostereoscopic multiview displays

- Support of 3D Digital Signage without glasses

- Future proved for new 3D multiview video formats

- Easy adjustment of depth parameters IO, HIT, etc. to achieve optimal 3D viewing comfort

Technical Background

To generate content for autostereoscopic multiview displays the AFX plug-in suite of Fraunhofer HHI's stereo-to-multiview conversion creates additional virtual camera perspectives from available stereo input. The generation of additional views is based on disparity maps estimated from the initial stereoscopic images. Disparity maps represent pixel-by-pixel information about the depth of the scene. Sophisticated confidence measures and consistency checks coupled with detection of mismatches and tricky post-filtering of disparity maps ensure robust depth calculation.

With this depth information, additional virtual camera perspectives can be generated by applying depth image-based rendering DIBR. Thus it is possible to generate an arbitrary number of views and adapt the number and position of these virtual views to the specific properties of existing and future glasses-free 3D displays. To produce the optimal 3D viewing experience, the depth representation can be adapted individually to each autostereoscopic display under consideration. This includes the level of perceived depth by adjusting the inter-axial distance IO as well as the position of scene objects in relation to the screen plane by adjusting horizontal image translation HIT. To this end, by using Fraunhofer HHI's AFX plug-in suite it can be guaranteed that the presented 3D content is always in the comfortable viewing zone of a specific autostereoscopic 3D display.

Specifications

- Adobe After Effects plug-in suite developed for CS5 64-bit and above

- Multi-threaded implementation to take full advantages of the newest multi-core CPUs

- Compatible with both 8-bit and 16-bit S3D content

- Support for many commercially available glasses-free 3D displays like Alioscopy, Tridelity, Magnetic 3D, Zero Creative, etc.

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