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JKU Research Project Enables First Panoramic Light Field

The buzz on recent breakthroughs in light field photography is getting louder. Multi-dimensional light field imagery is bringing a new dimension to conventional photography, enabling the user to not only re-focus an image after taking the picture, but also change the image's perspective, reconstruct scene depth, and even create true panoramic images. The Johannes Kepler University is carrying out research on these cutting-edge new technologies.

Multi-dimensional photos and images will soon play a key role in the future development of digital cameras and display screens. The special optical elements found in light field cameras limit the image resolution which is distinctly lower than for images taken with conventional digital cameras. Panorama imaging techniques, however, are already an integral part of today's commercial digital camera and mobile phone camera technology.

Scientists at the Institute of Computer Graphics (Johannes Kepler University (JKU) Linz) have developed a worldwide unique procedure for recording panoramic light fields and together with Raytrix Ltd. (www.raytrix.de), the JKU presents the first panoramic light field with a spatial resolution of 22 megapixels (17.885x1.275 pixels). Individual recordings using a commercially available Raytrix R11C camera offer a spatial resolution of up to 3 megapixels. The initial focal stacks were calculated with the Raytrix software.

Enabling a Panoramic Light Field

The procedure involves first converting single, overlapping light-field recordings to focal stacks. These focal stacks are then combined to a panoramic focal stack. Ultimately, the resulting panoramic focal stack can be converted to a panoramic light field. Images are captured much in the same way as when using a normal camera - by rotating the camera around one or two axes. The result, however, is not a simple panoramic image but rather a panoramic light field which allows the user to not only re-focus the image after taking the picture, but also change and re-define the image's perspective and even view the content three-dimensionally.

The procedure is still in the early stages of development and currently limited to diffuse scenes. Although light refraction and view-dependent specular reflections are not currently supported, researchers in Linz intend to focus closely on this field in the future. Click <http://youtu.be/yxctDnqIRel> to view a video in English on panorama light field imaging.

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Photo and Video Material:

<http://youtu.be/yxctDnqIRel>

<http://www.jku.at/cg/content/e48343/e154921/teaser.jpg>

http://www.jku.at/cg/content/e48343/e154917/far_focus_full_resolution.jpg

http://www.jku.at/cg/content/e48343/e154919/near_focus_full_resolution.jpg

Raytrix GmbH: www.raytrix.de