RAVE-10 Abstract

Barcelona, March 3rd 2010

Realistic Visual Environment for Immersive Projection Display System

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Abstract

1. One or two sentences providing a basic introduction to the issue at stake in the research.

One of the objects of virtual reality technologies is to present the same environment and to feel the same way as real world. We started this study because we thought we can make more immersive environment if a panoramic image representation which surrounds users by the real images is applied to the CAVE.

2. A clear statement of the problem specifically covered by the study, and the current state of the art.

In virtual reality research field, the CAVE (Cruz-Neira et al., 1992) is a widely used display system for user's immersion. The projectors and the screens of the CAVE are used for users to feel high immersion. They surround users with artificial objects, avatars, background and etc. The CAVE can use a real images or image-based rendering objects to feel more realistic. A real image-based background can be used just as users see in real world and a panoramic image can be viewed like this because it can surround user in the 360° whole direction.

If a panoramic image representation which surrounds users by the real images is applied to the CAVE, we can make more immersive environment. There are several researches about panoramic imaging like QuickTime VR (Chen, 1995) and they are well surveyed in (Gledhill et al., 2003).

We studied about the method how we make the panoramic image representation efficiently and apply it to CAVE system.

3. A section beginning with "Here we show" giving the main result, explaining what new knowledge has been generated.

Here we show a panoramic image representation for the CAVE to increase user's immersion. First we shot background photos of real world using a panoramic tripod head, a digital camera and a tripod. Then we stitch them to produce a panoramic image for background. Finally we make a panoramic image representation for the CAVE using these images. Also we use SCTP (Stewart, 2007) data transfer for reliable data connection in runtime.

4. A section explaining what the main result reveals in direct comparison to what was thought to be the case previously, or how the main result adds to previous knowledge.

There were many studies about a panorama imaging and a CAVE system. Our study presents a little more efficient method of making panorama image representations. By applying the panoramic representation to CAVE system systemically, our study can show a real image based background extend to whole screens of CAVE.

5. A section putting the results into a more general context, and the implications for further research.

We think our results are not so suitable for the environment changed frequently by user's viewpoint. But these can be applied in case of outdoor environments like street view, landscape, outer space and etc. We plan to expand the panoramic image representation to stereo.

References

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Cruz-Neira, C., Sandin, D., DeFanti, T., Kenyon, R., & Hart, J. (1992). The CAVE: Audio Visual Experience Automatic Virtual Environment. Communications of the ACM, 35(6), 64-72.
Gledhill, D., Tian, G., Taylor, D., & Clarke, D. (2003). Panoramic imaging - a review. Computers & Graphics, 27(3), 435–445.
Stewart, R. (2007). Stream Control Transmission Protocol. Retrieved December 16, 2009, from http://tools.ietf.org/rfc/rfc4960.txt