360-degree cylindrical directional display

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Recently, lots of volumetric three-dementional(3D) displays have been studied in order to make the observers feel comfortable and enjoy realistic 3D contents[1]. Among them, the techniques to provide the different view in time-sequence have benefits in optical design since high-speed display modules are usually applied and the dipslayed image changes synchronized according to the position of the apeture[2,3]. In some systems, the aperture is located in angular spectrum plane and in others, the aperture is located right behind the image plane.

Our system is inspired from Zoetrope[4]. Zoetrope is a device to provide an animation by rotating the slits which are positioned at the side of the cylinder. On the inner surface of the cylinder, the series of images are drawn and when the slits rotate, the observer watch the series of images through the slits sequentially.

In our system, this method is modified to provide 3D contents and the slit plays a role to define the direction of emission from the image to observer. The great advantage of this system is that the image screen is positioned opposite side to the observer. The distance from the image on the inner surface to the slit is enough and the observer focus on the image on the opposite side to watch the contents. Therefore, this configuration has a potential to convince observer that the contents is located inside of the cylinder since the mismatch between the vergence and accommodation becomes smaller than the case when the image is positioned right before the slit.

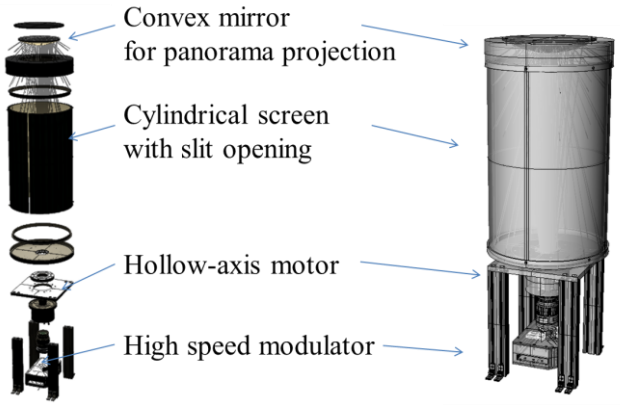

Fig. 1. The schematic of 360-degree cylindrical directional display

Figure 1 shows the schematic of 360-degree cylindrical directional display. Here, the image on the inner surface of the cylinder is projected by use of a 360-degree panorama mirror. This image is changed by a high speed DMD and it is synchronized to the motion of the slit. The view is identified by the relative position of the portion of image to the slit.

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