Time-Multiplexed Auto-stereoscopic 3D Display by Using Scanning LC-lens and Fine-stripe Backlight

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Conventional auto-stereoscopic 3D display[1] has issues for narrow viewing angle and limited observers. By increasing the viewing angle, spatial resolution has to be decreased. In order to have wide viewing angle for multi-user without decreasing the image resolution, two time-multiplexed methods had been proposed: 1. fast scanning LC-lens for multi-view system, and 2. Adjustable Fine-stripe backlight for 2-view system.

For scanning LC-lens[2-4], The fast response Fresnel liquid crystal lens with multiple transparent electrodes had been proposed and optimized. The experiment results indicated that the Fresnel LC lens not only performed fast switching time (~0.2s), but also had the benefit of low driving voltage during lens-on time (~5Vrms). A 4-inch 2D/3D switchable auto-stereoscopic display with Fresnel LC-lens was further demonstrated (Fig. 1). Finally, by driving the multiple electrodes alternatively, the Fresnel LC lens array had potential to generate scanning feature on horizontal direction for temporal scanning auto-stereoscopic display.

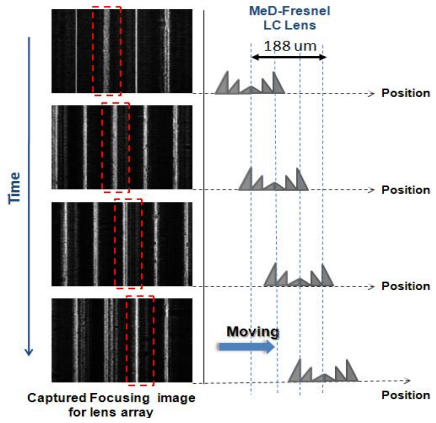

Fig. 1(a) Scanning performance of LC-lens

Fig. 1(b) Demonstration of LC-lens on 4-inch panel

For adjustable fine-stripe (AFS) backlight structure[5-6] with a temporal switched 120Hz LCD, the 3D image could be displayed on high resolution with 2-view system, as shown in Fig. 2. Furthermore, by combining the tracking technology, multi-user can observe wide-viewing 3D images at the same time.

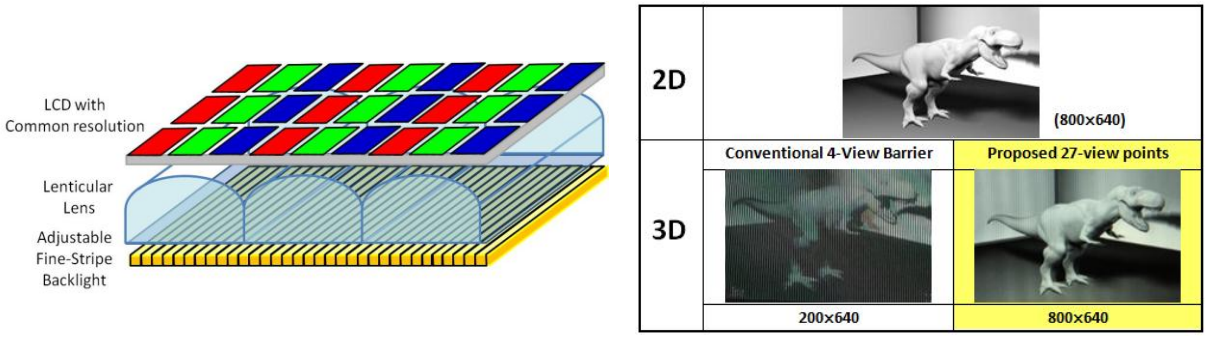

Fig. 2. Schematic plot of proposed high resolution time-multiplexed backlight and the experiment results.

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* Invited talk: 30 min & Regular talk: 15 min