

Optical Technologies for Image Acquisition, Processing and Display

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Research Topics

- Highly functional displays
- Measurement system based on optical methods

Research Seeds

I am interested in two research fields: information display with high function such as multi-view or 3D; and an automatic measurement system based on applied optics. Interested in both research fields arose from my earlier study of optical computing for image recognition or image processing. It was based on liquid crystal devices and optical interference or optical Fourier Transform.

In recent years, I have engaged in collaborative research for developing multi-viewing displays (see Fig. 1 and Fig. 2). In this system, opposite mirrors were used to realize multiple perspectives with a single projector. In other projects related to an automatic measurement system based on applied optics, we have improved the methodology for rapidly counting viable bacteria. In this study, a new method for acquiring images of small bacterial colonies without focusing was proposed using longitudinal chromatic aberration of imaging lens (see Fig. 3). Subsequently, rapid and automatic enumeration of viable bacteria was realized by consecutive observation using digital microscopy.

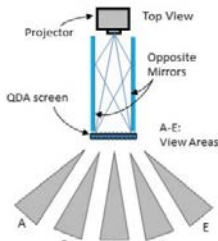


Fig. 1 Simple structured multi-viewing display with a single projector.

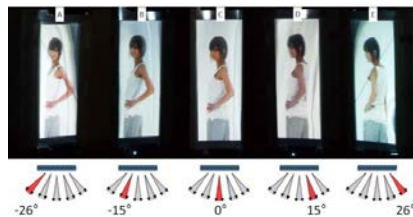


Fig. 2 Five images seen from the viewing angles shown below.

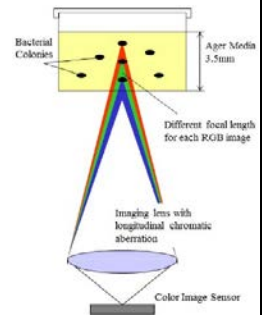


Fig. 3 Deep focusing area by lens with longitudinal chromatic aberration.

Related Technology

- Automatic detection of target bacteria on a stool examination by image processing
- Detection of mycelium with digital holography
- 3D volume display with multilayered fog-screens