

## FLATBED-TYPE BIDIRECTIONAL THREE-DIMENSIONAL DISPLAY SYSTEM

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**ABSTRACT.** *We propose a flatbed-type bidirectional three-dimensional (3D) display system for multiple users as an improved version of our previous thin natural 3D display based on the ray reconstruction method. This system is a tool for communication among a small number of people around a 3D image. It is a flatbed-type autostereoscopic bidirectional 3D display system consisting of a flat panel display and a bidirectional holographic lens array sheet. Its notable feature is the ability to display natural 3D images which are visible to multiple viewers at the same time. Because 3D real images float in the display area of the proposed display, it allows two or more people surrounding it to simultaneously observe 3D images from their own viewpoints. This paper describes the system and also gives experimental results.*

**Keywords:** Integral imaging, Three-dimensional display, Autostereoscopic display, Holographic optical element, Flatbed-type display

**1. Introduction.** People working in the fields of medical science, product design and development, and so on need widespread, easily adaptable, and intuitive communication tools to enable efficient communication. A wide scene or panoramic view which is useful for communication can be created from a sequence of pictures combined by image mosaicing techniques, and these images can be transmitted robustly and securely [1, 18-19]. In the medical field, where x-ray CT or MRI volumetric data are commonly used, a three-dimensional (3D) representation is an effective way of presenting data.

Many 3D displays have been proposed, including a thin natural 3D display system based on the ray reconstruction method which we have previously proposed [13,15]. It is one type of real-time one-dimensional integral imaging display system consisting of an LCD panel and a holographic lens array sheet. Its notable feature is the ability to display natural 3D images, like holography, which are visible to multiple viewers at the same time without the need for special glasses. However, although such displays can present 3D images, they can be observed only from the front of the display. Therefore, the back side of the 3D images cannot be observed without turning them around. This manner of operation is the same as the interface used in conventional 2D displays. Moreover, even though the back side of the 3D images can be displayed by turning them around, two or more people surrounding the display cannot observe the 3D images from their own viewpoints