

## INTRODUCTION

The first stereoscopic viewing device was introduced by Wheatstone in 1938. Since then, many stereoscopic imaging techniques have been introduced. However, until 1980, most of the techniques were based on several simple optical means and required to wear an eye-glasses with a certain optical property to watch the stereoscopic images, except several stereoscopic-photos and holograms. Entertainment and souvenirs are their main application for that time. However, since 1980, as the necessity of the 3-D imaging technology widened, for the purposes of tele-operation, surgical operation, games, scientific visualization, simulation and for the realization of telecommunication with a reality feeling, the worldwide research activities have concentrated to develop 3 dimensional(3-D) imaging systems requiring no eye-glasses. Increased speed of electronics and display devices along with new optical components made it possible to develop many new non-glasses type 3-D imaging systems such as holographic video, autostereoscopic 3-D systems based spatial- or time-multiplexing, and eye or head tracking techniques and volumetric imaging systems. These 3-D imaging systems are now in the feedback loop of technology development process. The capabilities of the systems will be further improved with an image synthesizing method, a new improved image compression/decompression method, new high density storage devices and high speed optics and electronics along with multiview 3-D graphics. Human factors related with stereoscopic image perception mechanism are also a very important subject for the 3-D imaging research. It allows to design more comfortable 3-D imaging systems. The ultimate goal of 3-D imaging research is to make a 3-D TV. In spite of its long history, the current 3-D imaging technology is far away to reach this goal due to the lack of a standard method and necessary supporting technologies. Many researchers in many research institutes in the world are now working hard to develop a better 3-D imaging system for the future 3-D TV.

To keep up with the worldwide research activities, a group of researchers in Korea organized a small scale international workshop on the 3-D imaging media technology in 1995 as an annual event. From 1996, this workshop was held together with Photonic Information Processing Conference organized by Photonic Information Processing Branch of Optical Society of Korea because both the workshop and the conference can be a part of each other. The idea of making this special issue is to attract more participants, to level up the workshop and the conference, and to make more researchers meet with this important area of research. The papers in this special issue are selected from the papers presented to "5th International Workshop on 3-D Imaging Media Technology" and "4th Photonic Information Processing Conference", held

at Kyung-Won University in Sung-Nam City on August 19-20, 1999. The special issue under the current title will be published annually. This special issue is the first.

In this special issue, 9 papers related with 3-D image processing, optical memory and human factors are listed. The papers by Jae-Soon Kim *et. al* and Bahn Ji-Eun *et. al*, deal with full color transmission type holographic screens which is used for 3-D image projection. These paper present a way of minimizing color distortions due to Bragg condition mismatch and shrinkage of the emulsion layer in the screen and the value of the object width for optimizing viewing zone sizes, respectively. The paper written by Jung-Young Son *et. al* reports on a multiviewer screen and its performances. The screen consists a Fresnel lens combined with a beam dividing prism array. The paper by Ho-In Jeon *et. al* presents a conceptual design of a scanner for a pixel based super multiview 3-D imaging system. A paper written by Shioiri is related with Human factors. He advocates that human visual system has two different mechanisms for motion in depth. The paper from Kyu-Bong Doh *et. al* is related with Electro-holography and describes on the twin image noise in optical scanning holography. He shows that the noise is more noticeable as complexity of the object increases. The paper by Jin-Seon Yoon *et. al* shows the effectiveness of Genetic algorithm for designing the diffractive optical element for generation of areal arrays of point beams and that the element can be formed on SLM, hence real time generation of various sizes areal array of point beams. The paper by Ju-Seog Jang is on the properties of the extended fractional Fourier transform. He shows that the transform performed any multiple lens systems can be expressed by cascading many unit transform system. The paper by Youn-Sup Park *et. al* describes the performance of the holographic memory recorded with a phase code multiplexing technique. He shows that the crosstalk appeared at the reconstructed images is independent to the pixel size of the phase code.

Finally, I would like to thank the Optical Society of Korea and the editorial board of JOSK for bringing this issue to fruition as well as many reviewers who have given their time to provide valuable comments on the articles in this issue. I am also much indebted to Drs. Ho-In Jeon and Sang-Hun Shin for their valuable assistance in putting this issue together.

Jung-Young Son

*Feature Editor*

*Information Processing and Three Dimensional Display*