

Researches for ultra-realistic communication system in NICT

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Fig. 1 Hologram system using sixteen 4K-LCDs

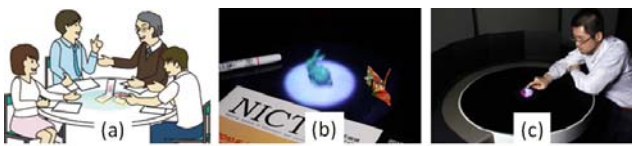


Fig. 3 Tabletop 3D Display "fVisiOn"

1. Introduction

Realistic 3D scene reconstruction is one of the dreams of human being even now. In addition, displaying useful information on the 3D scene reconstruction is also desired for intuitive understanding. Many science fiction movies depict these sorts of information displays. NICT is developing next-generation 3D technologies toward ultra-realistic communication including these sorts of information display. In this talk, I will introduce some of the recent researches in NICT.

2. Hologram technology for 3D display

Holography is the key technology to reconstruct 3D objects ideally in space. Especially, electronic holography that uses electronic devices such as liquid crystal display (LCD) is expected as a future 3D visual system since it can present moving 3D objects. NICT developed the electronic holography system as shown in Fig. 1[1]. Fig. 1(a) depicts the overview of the system and Fig. 1(b) depicts reconstructed 3D objects. This system contains sixteen 4K-LCDs to enlarge 3D image size and optical system to ignore the gaps between LCDs. The total number of pixels is 15360x8640 pixels, and the image size is 8.5cm diagonally with 5.6-degree viewing angle without image gap.

3. Super multi-view technology for 3D display

One of the hardest issues for 3D display is the size of reconstructed 3D objects. We developed 200-inch 3D display named REI (Ray Emergent Imaging) as shown in Fig. 2[2]. In Fig. 2(a), the girl and the boy are real human beings, and the blue vehicle is reconstructed 3D objects. This system includes a 200-inch screen that is specially designed for glasses-free 3D display. REI is open to the public in Osaka, Japan now as shown in Fig. 2(b). Everybody can

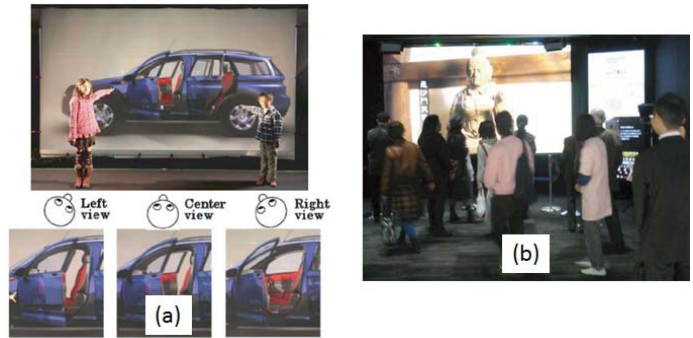


Fig. 2 Large-size Glasses-free 3D Display "REI"

enjoy it anytime. The video contents there are changed frequently, such as aquarium, temples, historical tea set and CG images.

4. Tabletop 3D display

We developed the tabletop 3D display "fvision." [3] as shown in Fig. 3. Fig. 3 (a), (b) and (c) depict the concept of this system, reconstructed 3D objects and overview of the system respectively. Observers can see reconstructed 3D objects freely from any viewpoints around the table. In addition, observers can put some real materials around the reconstructed 3D objects, and see them at the same time. This system would be suitable not only business purpose but also the entertainment purpose.

5. Data compression technology for 3D display

The size of hologram data and super multi-view data is huge, and it is one of the most serious issues in realistic 3D systems. To overcome this issue, Moving Picture Expert Group (MPEG) tries to develop a new algorithm to compress multi-view data efficiently. We developed our new approach and contributed to the MPEG meeting [4]. We have provided some of our super multi-view video sequences for MPEG meeting to contribute the researchers in this research field.

6. Conclusions

NICT develops 3D technologies for next-generation information display.

References

- [1] H. Sasaki, Scientific Rep., sre06177 (2014)
- [2] S. Iwasawa, 3DSA2013 (2013)
- [3] S. Yoshida, SPIE DSS (2012)
- [4] T. Senoh, SPIE Opt. Eng., p.112302 (2014)