

A Study on Immersive Hand Manipulation for VR Systems (Prof. J. Ota and Dr. N. Miyata@AIST)

In large item small scale production, the following two points are very important: (1) product design generating customer satisfaction, (2) shortening product design cycle. Designing products based on the shapes of user's bodies leads to satisfy customers with good usability of product. But it is difficult for designers to do this because the body shape of a designer differs from users. On the other hand, initial evaluation tools of software simulation are useful to reduce the number of mockups of product, and to shorten design cycle. However, these tools for hand manipulation are almost never available, instead of the fact that most of the products are operated directly by human hand. And a designer can't improve product design viscerally without the mockup. This is a trade-off problem of with/without mockups.

Therefore, we are collaborating with Digital Human Research Center of AIST on developing the VR system by which a designer can evaluate virtual products with experiencing various hand shapes (Fig. 1), and finding out the condition necessary for the system. We are approaching this issue on a condition of sensory stimuli with rich reality as usual because there is a relationship of chicken & egg problem between developing the system and finding the condition.

The experience of hand is confirmed in terms of analogous hand shape as a special case of various hand shapes by using the optical equipment shown in Fig. 2. We investigate the effect of delayed vision on the experience of hand which is inevitable in VR systems by using camera-display system (Fig. 3,4), and it is clear that visual delay up to about 150[ms] is allowable.

Keywords: Various Shapes of Hands, VR System, Product Design, Initial Evaluation

References

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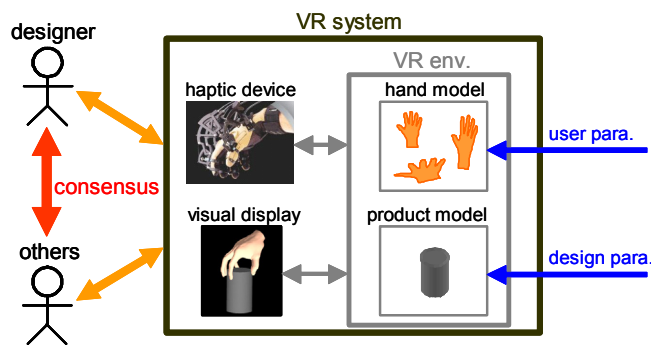


Fig. 1 Overview of Immersive Hand Manipulation System



Fig. 2 Wearable Optical Equipment

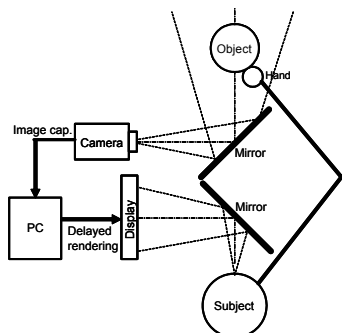


Fig. 3 Concept of Delayed Vision System

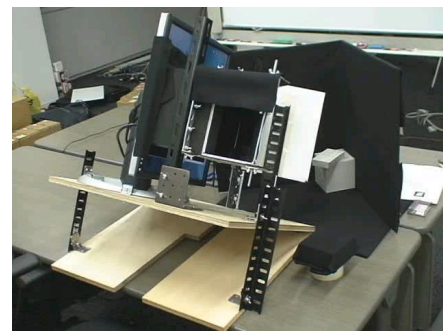


Fig. 4 Implementation of Delayed Vision System