Masaru Miyao et al., J Clin Exp Ophthalmol 2017, 8:7(Suppl)
DOI: 10.4172/2155-9570-C1-075

Visual ergonomics of 3D stereoscopic images: Augmented reality using smart glasses

Masaru Miyao and **Hiroki Takada**
University of Fukui, Japan

Recently, binocular see-through smart glasses have become available. These glasses stereoscopically overlay a virtual image on a real world image and are used as a form of augmented reality (AR). People can utilize these devices in many ways, including in industrial environments. We aimed to quantitatively estimate the efficiency of information seeking when using these smart glasses. We employed a uniquely developed "Route Tracking Test (RTT)" using 3D imaging and AR technologies. With the help of 143 volunteers participating, we evaluated the ease and accuracy of an information seeking task. A comparison was made between using and not using the smart glasses. Also, we measured their accommodation when they watched 2 targets of real and virtual images. We found that the smart glasses significantly increased the ease and accuracy of the task. Finally, we confirmed the advantage of the smart glasses compared with conventional operational work based on paper instructions. We propose the following guideline for good visual recognition with binocular see-through 3D smart glasses. 1. In AR work guidance, these glasses stereoscopically overlay a virtual image so that the workers can see the operating field and the guidance simultaneously. The viewing distance of the virtual guidance should be the same as or a little closer than the operating objects. Otherwise, the glasses cannot superimpose the guidance and working field. 2. The inter-pupillary distance (IPD) of the smart glasses should be suitable for most users and controllable. If the IPD setting of the glasses is wider than that of users, the users will not be able to recognize the virtual guidance. The IPD setting should be controllable between 57 mm to 69 mm for the 95 percentile of Japanese of both sexes. 3. The luminance of the virtual guidance images and real operating fields should be similar.

Recent publications:

1. R P Lege, R Kimura M Miyao et. al. (2017) Increasing efficiency in information seeking by using stereovision with binocular see-through smart glasses. J. Mobile Interactions. 7(1): 1-8..
2. K Fujikake, M Omori, S Hasegawa, H Takada, H Tahara, M Miyao (2014) Stereoscopic displays and accommodative focus. Forma. 29:S53-S63.
3. A Hasegawa, S Hasegawa, M Omori H Takada, T Watanabe, M Miyao (2014) Effects on visibility and lens accommodation of stereoscopic vision induced by HMD parallax images. Forma. 29:S65-S70.
4. H H Hori, T Shiomi, H Takada, M Miyao et al. Comparison of 2D and 3D vision gaze with simultaneous measurements of accommodation and convergence. Forma. 29:S71-S76.
5. T T Shiomi, T Kojima, H Ishio, H Takada, M Omori, T Watanabe, M Miyao (2013) Simultaneous measurement of lens accommodation and convergence in natural and artificial 3D vision. J. of the Society for Information Display. 21(3):120-128.

Biography

Masaru Miyao, MD, PhD received his Ph.D. in medical science from the Graduate School of Medicine, Nagoya University in 1985. From 1987 to 1988, he was a Visiting Scholar at the University of California, Berkeley. He is a former professor of Nagoya University. Currently, he is a project guest researcher in the Graduate School of Engineering, University of Fukui. His fields of specialty are ergonomics and industrial health, and his current research focus is on the human interface of 3D displays.

Hiroki Takada, PhD graduated from Graduate School of Mathematics, Nagoya University in 2002. He received doctorate by way of dissertation (DSc) in 2004. He is currently at Graduate School of Engineering, University of Fukui. Broadly, his research lies in Mathematical Physics.

miyao@yc4.so-net.ne.jp
takada@u-fukui.ac.jp