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Technique of obtaining visually perceived positions using movements of users' bodies

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We proposed a technique of obtaining the visually perceived positions of virtual objects presented in front of the screens of 3-D displays, and evaluated it. Applications where users' own bodies, which are actually seen by users unlike video captured images, interact with virtual objects are attractive applications of 3-D displays. Users expect interactions to be executed when their bodies are seen at the same positions of virtual objects because it is natural for them. Executing interactions when users' bodies are at the visually perceived positions of virtual objects is the crucial requirement to interactions between the bodies and objects. Conventional techniques execute interaction when users' bodies are at the positions calculated from binocular disparity of virtual objects. However, the visually perceived positions often differ from the positions calculated from binocular disparity, so that conventional techniques make it difficult to meet the requirement. In contrast to conventional techniques, the proposed technique can meet the requirement by obtaining the visually perceived positions of virtual objects from body movements. According to previous studies on body movements, the velocity of reaching movements as a function of time follows a bell curve. In the proposed technique, the velocity of reaching movements when users reach out to virtual objects is first fitted into a Gaussian function. The final positions of reaching movements are then obtained based on the fitted functions before the movements are finished because virtual objects are seen there. Therefore, the requirement is fulfilled by executing interactions when users' bodies are at the positions obtained in last step. In the evaluation, we demonstrated the feasibility of the proposed technique by examining the accuracy and precision of the positions obtained with the proposed technique. We also demonstrated the usefulness of the proposed technique by examining the exactness of interaction executed with the proposed technique.

Biography

Masahiro Suzuki received his BA, MA and PhD degrees in Psychology at Chukyo University in Nagoya, Aichi, Japan in 1994, 1996, and 2002 respectively. He joined the Imaging Science and Engineering Laboratory of Tokyo Institute of Technology in Yokohama, Kanagawa, Japan in 2003 as a Post-doctoral researcher. He then joined the Human Media Research Center of Kanagawa Institute of Technology in Atsugi, Kanagawa, Japan in 2006 as a Post-doctoral researcher. He joined the Department of Psychology of Tokiwa University in Mito, Ibaraki, Japan, in April 2017 as an Assistant Professor. He is currently engaged in research on 3-D displays and augmented reality. He is a member of Japan Society of Kansei Engineering, Japanese Cognitive Science Society, Japanese Psychological Association, Optical Society of Japan, and Vision Society of Japan.

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