A GREATER SENSE OF PRESENCE: SPATIAL INTERFACE IN VR CAVE

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1. Introduction

Virtual environments are three–dimensional spaces presented visually. They combine the user's experience and sense of 'being there' in the virtual environment. Presence is a central element of virtual reality that it is seen as a part of its definition (Steuer, 1992). Direct interactions between participants and the virtual environment generate a more enhanced sense of immersion, thus making the participants feels they are part of that environment (Witmer & Singer, 1998).

2. Problem and Objective

It only provides for a passive reception of visual stimuli that cannot provide sufficient interaction between users and VR-CAVE. Viewers are not able to move freely or intuitively sense themselves in virtual space as they can in physics space. Hence, there is a lack of a user interface for interacting in the VR-CAVE system. We wonder if we could utilize the intuitive motion of human beings to navigate the virtual environment; could we make the viewers experience a stronger sense of presence. The purpose of this research is to develop a preliminary prototype of a spatial interface which provides a better sense of presence in VR-CAVE and enable the user to use intuitive movements of the body to navigate the virtual environment. Such an interface would enable the user to experience a greater sense of presence in the virtual environment.

3. Research Processes

In this research, the intuitive motion of human beings was applied as the major interface for the interaction within the navigating space. Therefore, the intuitive motions of human beings, such as the direction of the four major movements: forward, backward, leftward, rightward will be the basic element. This research will be divided into three steps.

First, through a case study, to find out what intuitive motions generate the sense of presence in a CAVE environment. Mine, Brooks, and Sequin (1997) pointed out that the interactions between users and the virtual environment create greater consensus and exchange of experience. A sense of presence derives from the representation of navigation (movement) of the body (or body parts) as a possible action in the virtual world (Schubert & Friedmann, 1998). This case study determined that the intuitive movements of human beings in the virtual environment must duplicate as near as possible their experience in the real world. Second, build an environment based on a digital model with three different scales of space. Then, design an operation interface in a CAVE environment where intuitive motions of human beings manipulate the action. Based on the results of step one, we create a floor sensor for the four major directions. Users may control their footstep on the step pad to construct an interface of intuitive motion. Third, evaluate the feedback of interactions between the intuitive motions and VE by use of a questionnaire. Ten participants joined the survey, five had architectural-related backgrounds, and five had other academic backgrounds. After watching the same number of digital model VR animations, the subjects used the interactive interface to navigate the space. Then they filled in the survey, which was scored using a rating scale model (Stanney, et al, 1997).

4. Conclusion and Future Work

This research developed a preliminary prototype of a spatial interface that imparts a greater sense of presence using VR-CAVE. Based on the results of the questionnaires, the interactive interface improved by exact intuitive body movements can enhance the sense of presence of users. The contribution of this research is to directly link the experience of human intuitive motion with the virtual environment via an intuitive interface. This increases the users' sense of presence and creates a totally different navigating experience. We provide intuitive stimulation and feedback from perceptions of the human body other than that of vision. Current limitations prevent the development of a real-time interactive 3D VR system. Slowness in the frame display, low efficiency of interaction, and less elaboration of the model limits the

development of such an interface. Future study is needed to improve and solve these issues.

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