Abstract

Virtual reality (VR) has become more and more as an approach for media presentation or gameplay with the development of technology. From a technical perspective that emphasizing the leading role of the user in a virtual environment, VR systems show the following three basic characteristics: immersion, interaction, and conception. However, users motion sickness is a serious problem affecting user experience during experiencing VR environments, especially with a head-mounted display (HMD), which due to the conflict between the user's real actions and their visual actions that may lead to unnatural vision-vestibular sensory mismatch causing side effects such as nausea, oculomotor, disorientation, visual fatigue (eye fatigue).

Such a situation demanding the computing performance very much if we consider only by hardware ways, say, reducing this conflict with a higher refresh rate and resolution. On the software way, alternatively, we can use the field of view (FoV) restriction to reduce the impact of motion sickness, previous research has shown that decreasing (FoV) tends to decrease VR motion sickness. However, the user's vision will be affected due to the VR presenting contents are lost.

Here, I demonstrate an innovative approach that changes the blur filter dynamically in peripheral vision for visual restriction. Future, a user study will be implemented to evaluate the impact of the blur effect in reducing motion sickness. The test environment is crate by Unity3D. 19 participants joined the present study, who use Oculus Quest with Oculus touch controller to operate in the VR environment. There are 10 waypoints in the current VR environment, in which participants are asked to complete the seek task. different visual effects are used for each task. The VR sickness questionnaire (VRSQ) was administered immediately after each task.

VRSQ is a self-reported questionnaire that can be used to quickly measure a degree of simulator sickness in a participant. Which includes fatigue, eyestrain, difficulty focusing, headache, and other questions. the participants evaluated VR motion sickness through the VRSQ using a 4-point Likert scale (0=not at all, 1=slightly, 2=moderately, and 3=very). The final VRSQ score can be obtained through a series of calculations. The results indicate that blur filters in peripheral vision are more effective than traditional methods in reducing motion sickness and have less impact on users.

Besides, when we need to use the high level of FoV limitations for reducing motion sickness, the user who does not want to lose more content better adapt to blur filters

in peripheral vision effects. In practice, this study is expected to be used to help developers design VR environments that reducing motion sickness more effectively.

Future work should explore using a diffident blur parameter. Further experimentation with different degrees of blur and restrict levels could make the effect of reducing motion sickness different. The emergence of more and more standalone head-mounted displays makes VR devices used in different ways, motion sickness in a free-moving state may differ from sitting. We will try to deploy our approach to more VR device and usage scenarios in the future, to find more effective ways to reduce motion sickness.