

Assessing Virtual Reality Sickness in Highly Immersive Virtual Laboratory Environments: Simulator Sickness Questionnaire and Mitigation Strategies

Abstract

Virtual Reality (VR) sickness, a common challenge among VR users, has increasingly gained attention in academic research due to its adverse side effects. The Simulator Sickness Questionnaire (SSQ) has been traditionally employed to measure simulator motion sickness; however, the extent to which it measures symptoms specifically attributable to VR sickness remains underexplored. This study investigates the applicability of SSQ in assessing VR sickness in a virtual semiconductor laboratory environment, with a focus on reducing motion sickness in VR devices. A total of 97 participants performed target selection tasks using HP Reverb G2 and Oculus Quest 2 headsets in a virtual laboratory setting. The original SSQ was revised to create a VR Sickness Questionnaire, which served as the measurement index for VR-induced symptoms. The primary objective of this research was to determine the prevalence of VR sickness and explore ways to mitigate motion sickness in VR devices. The Results indicate that the majority of VR-related side effects pertain to nausea dysfunction, with a limited number of symptoms linked to cybersickness arising from various factors. These findings hold significant implications for future studies aiming to measure and design interventions for simulator sickness in VR environments. By shedding light on the effectiveness of the SSQ for evaluating VR sickness, this study contributes to the development of improved VR experiences and technologies.

Keywords

Cybersickness; Head-mounted display; Human-computer interaction (HCI); Motion sickness; simulator sickness questionnaire (SSQ); virtual laboratory; Virtual reality