

Graduate School of Science and Technology Master's Thesis Abstract

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Thesis title	Have A Seat: an Enhanced Reactive Alignment of a Single Target's Position and Angle		
Abstract			
<p>Redirected Walking (RDW) techniques allow users to explore virtually infinite environments within constrained physical spaces. However, achieving precise alignment between physical and virtual targets remains a significant challenge. In particular, when both position and orientation are considered while maintaining immersion and realism. This thesis introduces a revised version of the Reactive Alignment (REA) controller that simultaneously minimizes the Angular and Positional Distance Error between a physical and a virtual target. The proposed method enhances spatial alignment and optimizes user navigation by integrating Saccadic Redirection and novel rotation gain control algorithms. In addition, a new metric, $\Delta \alpha$, is proposed to quantify the angular alignment, complementing the redefined Physical Distance Error (PDE) for positional accuracy. I have implemented the algorithm on Oculus Quest head-mounted display and utilized the HMD's physical space tracking to locate the physical prop's location without the need of any external tracking. Experimental results from user studies demonstrate that the revised REA achieves reduced PDE and reset counts while significantly improving user interaction with physical props. These advancements elevate immersion, enhance alignment accuracy, and facilitate seamless integration of haptic feedback in room-scale virtual environments.</p> <p>Keywords: Virtual Reality, Locomotion, Redirected Walking, Environmental Alignment, Passive Haptic feedback, Redirection Controllers</p>			