An Experimental Comparison of Perceived Egocentric Distance in Real, Image-Based, and Traditional Virtual Environments using Direct Walking Tasks

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Abstract

In virtual environments, perceived egocentric distances are often underestimated when compared to the same distance judgments in the real world. The research presented in this paper explores two possible causes for this reduced distance perception in virtual environments: (1) real-time computer graphics rendering, and (2) immersive display technology. Our experiment compared egocentric distance judgments in three complex, indoor environments: a real hallway with full-cue conditions; a virtual, stereoscopic, photographic panorama; and a virtual, stereoscopic computer model. Perceived egocentric distance was determined by a directed walking task in which subjects walk blindfolded to the target. Our results show there is a significant difference in distance judgments between real and virtual environments. However, the differences between distance judgments in virtual photographic panorama environments and traditionally rendered virtual environments are small, suggesting that the display device is affecting distance judgments in virtual environments.