The WADER Environment: Facilitating Systematic Design of Touchless Interactions with Wall-sized Displays

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Meeting rooms, design studios, and laboratories in the industry as well as academia are increasingly adopting ultra-large, Wall-Size Displays (WSD). Such adoption is expected only to increase due to the dropping cost of large display technology and the growing need to visualize large volumes of data. To facilitate interaction and collaboration around WSDs, next-generation interaction modalities like touchless have opened up new, unprecedented opportunities. Yet to explore this uncharted design space, there is a lack of controlled, experimental environments that can support rapid and flexible design iterations and user-evaluations of touchless interaction techniques. To address this problem, we propose the Wall Display Experience Research (WADER) environment, a reliable, reusable and easily modifiable experimental environment that supports user studies on touchless interaction prototypes. The current deployment of WADER leverages off-the-shelf markerless sensors, Kinect™ and the 160" X 60", ultra-high resolution, wall-sized display (15.3 million pixels) available at UITS in IUPUI. By varying design parameters, WADER enables batteries of experiments to be carried out very quickly and efficiently. It evaluates user experience by recording performance metrics. In a time span of one month, we have successfully conducted an 18-participant empirical study to investigate alternate visual feedback designs for touchless selection and movement tasks. During this study, we iteratively designed and incrementally developed prototypes for different design alternatives and conducted eight empirical experiments. In a more-recent RSFG-funded project, HCI researchers are leveraging WADER to explore and evaluate novel interaction techniques to enhance collaboration on WSDs in a context, where users are sitting comfortably at a distance from the display. The establishment of WADER environemnt is a significant step towards fast pacing the iterative design of touchless user interactions for the next-generation of wall-display interfaces.

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