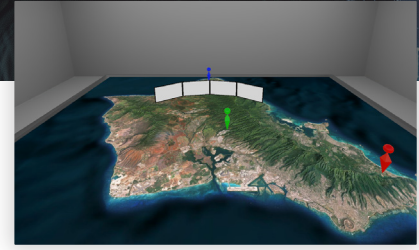# Adaptive HMD Interfaces (AHMDI)

2023 - Current
Project Leader: David Nelson

Background

Recently Marine Forces Special Operations Command specialists said if they could have just one piece of technology to overcome operational challenges it wouldn't be a shiny next-gen weapon or vehicle, but hardware or software that would allow them to fuse the deluge of data into a single system and display. Army officials acknowledged they were "struggling" with data integration and display in their Project Convergence experiments designed to support JADC2.

Objectives

In this applied research effort, the MxR Lab is developing prototyped interactions investigating future adaptive user-interfaces in head-mounted-displays (HMDs), focusing on models to improve user experience and efficacy. Utilizing a Command Center use-case, AHMDI seeks to address the challenge of displaying data on 3D terrain, by finding a balance between providing essential information and minimizing visual clutter, considering factors such as user-context and the platform's visualization capabilities.

The goal is to create a conceptual framework for an adaptive interface tailored to warfighter needs, enhancing decision-making and informing the Army's future modernization priorities for HMDs.

Results

A paper describing the work was accepted for presentation at I/ITSEC 2024.

Year 1 leveraged results from valuable laboratory tests performed by ARL-W researchers and applied them into a representative real-world use case, in order to explore User Interface interactions between a performer and an intelligent system. Higher task performance and usability ratings for the adaptive condition would support the hypothesis that a well-designed adaptive interface will outperform a comparable non-adaptive version in complex decision making scenarios.

Subject matter expert, retired Colonel Jay Miseli, a 1995 graduate of the United States Military Academy, and career Armored Cavalry officer has joined the team as a consultant bringing expertise in planning and executing military operations in combat, training, and exercises.

Next Steps

The MxR team are set to begin a Year 2 formal user study, investigating the effectiveness of adaptive and adaptable user interface features within a mixed-reality (MR) simulation that includes high-cognitive-load situations. Effectiveness of adaptive and adaptable features will be compared based on significant differences in task measures (e.g., speed of decision-making, quality of decisions, post-tests of situational awareness, and sense-making) and self-reported usability and perceived performance. The team hopes to gain valuable insights regarding which conditions these features best support users in tasks requiring intense cognitive engagement and which approach to information flow will enhance sense-making, decision-making, and situational awareness in complex mission command scenarios.

Published academic research papers are available from https://ict.usc.edu/research/publications
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