AUTONOMY RESEARCH CENTER FOR STEAHM

Human-Machine Teamwork with Explainable AI

Human-Machine Teaming: NASA Mars and Europa Missions

Image: VR On Mars View: Adobe Firefly Text Prompt AI
Source: Generated, PAR-D Lab Team 2024
Edits & Modifications 2024: PAR-D Lab Team, Adobe .psd Version: 2025

Image Source: Ortmoragency: (www.ortmoragency.com/blog/night-vision-ar-goggles)
Image Name: military_goggles_vr
Type: Web Search: Microsoft's Night Vision VR Goggles US Military Usage

Synopsis

- UX encompasses a user's perceptions, emotions, and responses that result from their interaction with a particular product or service.
- It involves understanding users' needs and behaviors, conducting user research, creating user personas, and designing interfaces that optimize the overall experience based on the research and data collected.
- Research and Strategy - Design - Wireframe - Prototyping - Interaction/Visuals Testing - User Usability - Feedback - KPI Audit

Research Objective

Task: To investigate different augmented reality (AR) systems and how they compare.

Goal: The user experience will provide a more efficient method to assess AR technology as well as discover potential areas for improvement in contemporary AR devices. This will ultimately improve human systems integrations.

Research Approach

We interviewed approximately 15 participants at a time per day (N = 45). Conversation and verbal decisions relating to planning and their context were documented. The research team then coded key words and categorized them in groups and their sub-soft skills:

- **Corporate Knowledge Gluer:** to fill in knowledge gaps
- **Bridge Builder:** to create collective understanding between teams
- **Efficiency Optimizer:** streamline tasks
- **Vibe Dispatcher:** assess/conduct actions based on team emotions

Citations

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Saraiva J. Janet Vertesi, Seeing Like A Rover: How Robots, Teams, and Images Craft Knowledge of Mars. Chicago and London: University of Chicago Press, 2015. 318 + XI PP. ISBN: 978-0-226-15596-8. HoST - Journal of History of Science and Technology.2016;10. doi:10.1515/host-2016-0007

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Research Results and Products

Products | Immersive Headsets Used: Microsoft Hololens II & Apple Vision Pro

Research, Results, & Observations:

- **Visual Challenges**: Off-set peripheral visuals, impaired visual depth of field when interacting with display.
- **Off-Balance/Mobility:** Potentially connected to the visual problems & device calibration. Users where aware of wearing the device and displayed extra cautionary movements.
- **Situational Awareness:** Issues with vertical adjustments and readjusting to a digital and real-world environment.
- **User Experience/Physical:** Lag in interactions and movements and overdramatized motions.

Commercialization and/or Societal Impact Opportunities

Healthcare & Rehabilitation:

- The precision and realism required could translate to advancements in AR/VR-based rehabilitation and mental health treatments.
- AR/VR environments could inform us about the psychological and social effects of isolation, confinement, and the challenges.
- AR/VR research drives innovations in healthcare, including AR/VR-assisted surgeries, medical training, and mental health treatments like exposure therapy for PTSD, anxiety, and phobias.

Training & Remote Collaboration Tools:

- This technology is invaluable for sectors such as architecture, engineering, medicine, and education, as it pushes forward collaborative tools that allow scientists, engineers, and other industries to interact with remote environments in real time.
- AR/VR research is widely applied in training programs for industries like aviation, military, and healthcare. By offering immersive, risk-free.

Team Names & Collaborators

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