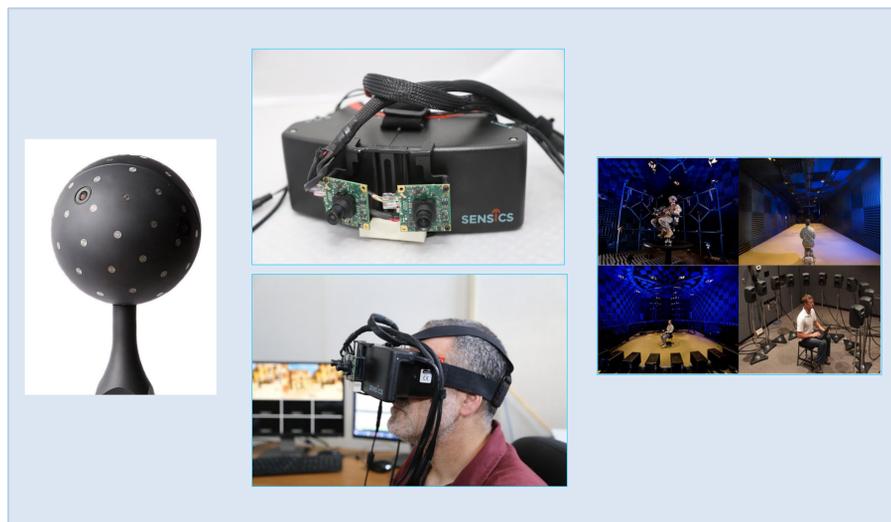


S&T Campaign: Human Sciences Integration of Humans and Systems Integration Technologies

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Research Objective

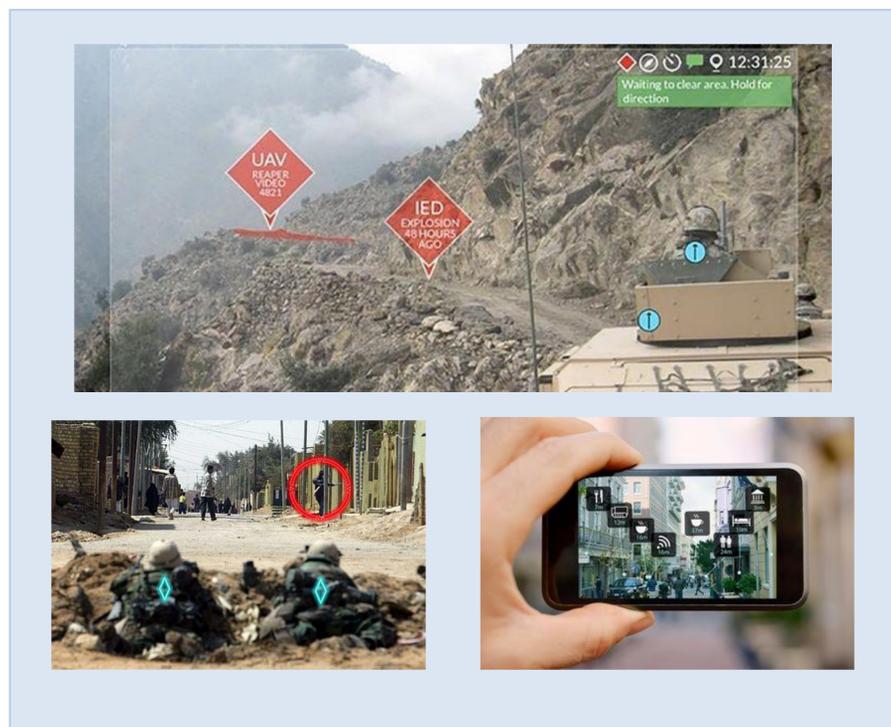
- Enable robust, versatile, closed-loop systems that augment Soldier capabilities
- Develop methods for the integration, and interpretation of multimodal information to optimize sensory-perceptual-motor and decision making cycles



Collaborative Research Facilities: Head-mounted display for multisensory testbed (center); RealSpace 360° Acoustic Camera (left); EAR facility (right).

Challenges

- Adaptive tuning of multisensory display parameters to optimize human perceptual performance
- Algorithms and hardware-software solutions for real-time augmented sensory/perceptual performance



Augmented Perception Concepts

ARL Facilities and Capabilities Available to Support Collaborative Research

- **Multisensory augmented reality testbed platform**
 - Wearable, head-mounted, highly immersive
 - Flexible, reconfigurable sensor arrays
 - High-resolution, wide field, stereoscopic visual displays
 - Embedded eye tracking capabilities
 - Depth sensing, including hand and finger tracking
- **Audiovisual 360° capture capabilities**
 - High density acoustic array with real-time beamforming capabilities for accurate spatial audio
 - HD camera array for rendering real-time 360° video
 - Native playback over HMD's
- **Multi-aspect real-world measurement capabilities**
 - Wearable, un-tethered operation
 - Flexible, fully customizable user interface
 - Multiple modalities: EEG, EKG, EDA, respiration, blood pressure, motion, posture, and others
- **Environment for Auditory Research (EAR)**
 - One-of-a-kind, world-class capabilities
 - Multiple, reconfigurable spaces
 - Unique stimulus arrays, suitable for visual and auditory, as well as tactile displays
- **Unique ARL expertise includes:**
 - Sensory & perceptual processes
 - Adaptive mechanisms in multisensory integration & perception
 - Real-world experimental design and analysis

Complementary Expertise / Facilities / Capabilities Sought in Collaboration

- **Additional expertise needed in:**
 - Sensor-level fusion for multisensory displays
 - Systems and adaptive control theory modeling and controls systems engineering
 - Hardware/software integration for real-time applications
- **Innovative new research approaches sought in:**
 - Novel sensor systems and multi-sensor fusion concepts
 - Alternative displays and interfaces for multisensory user interactions
 - Biofeedback applications for optimizing human performance