Enhanced Closed-Loop Perception

S&T Campaign: Human Sciences
Human-System Integration

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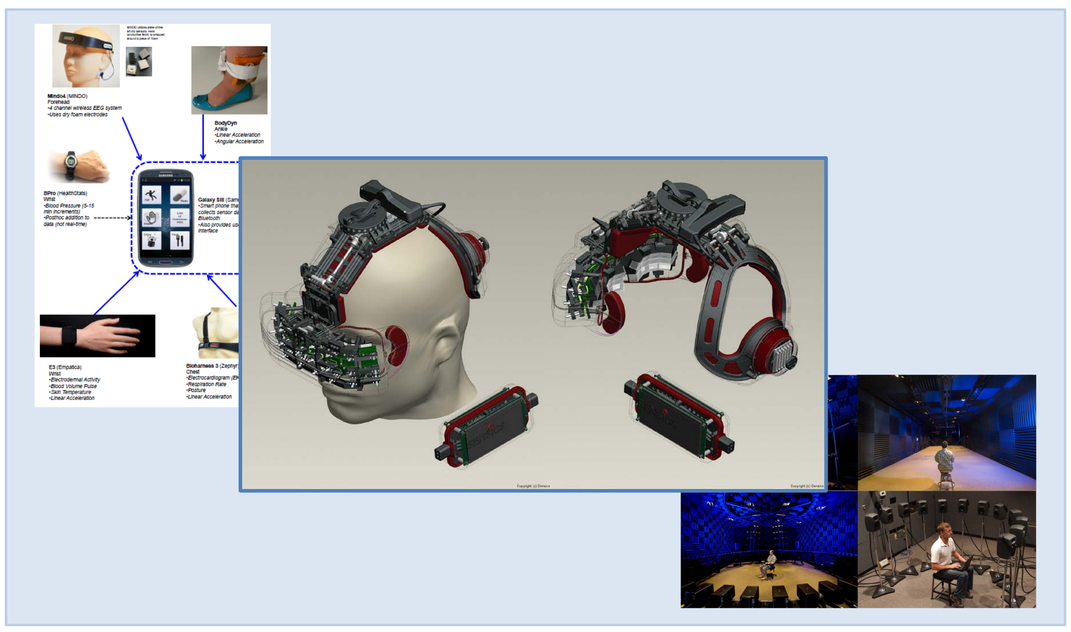
Research Objective

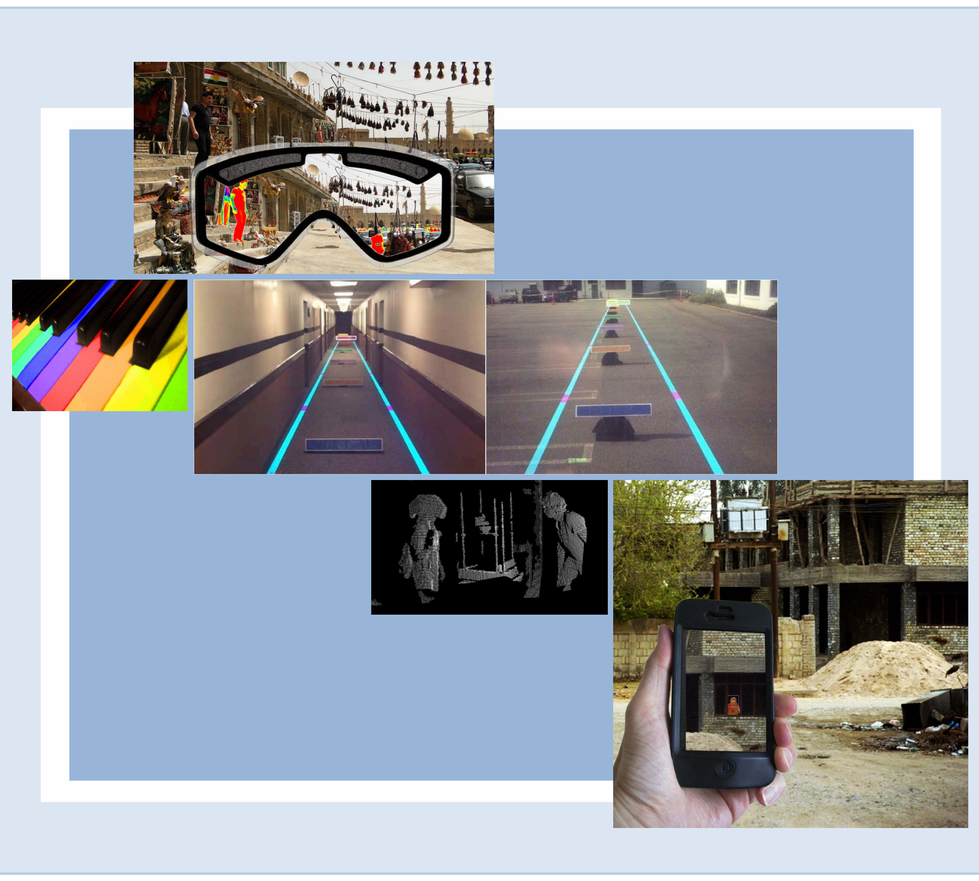
- **Enable robust, versatile, closed-loop systems that enhance Soldier capabilities for integrating, interpreting, and utilizing multimodal information in the sensory-perceptual-motor and decision making cycles**



Collaborative Research Facilities: Head-mounted display for multisensory testbed (center); Multi-aspect measurement system (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

- **Available Facilities (APG, MD)**
  - **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
  - **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**