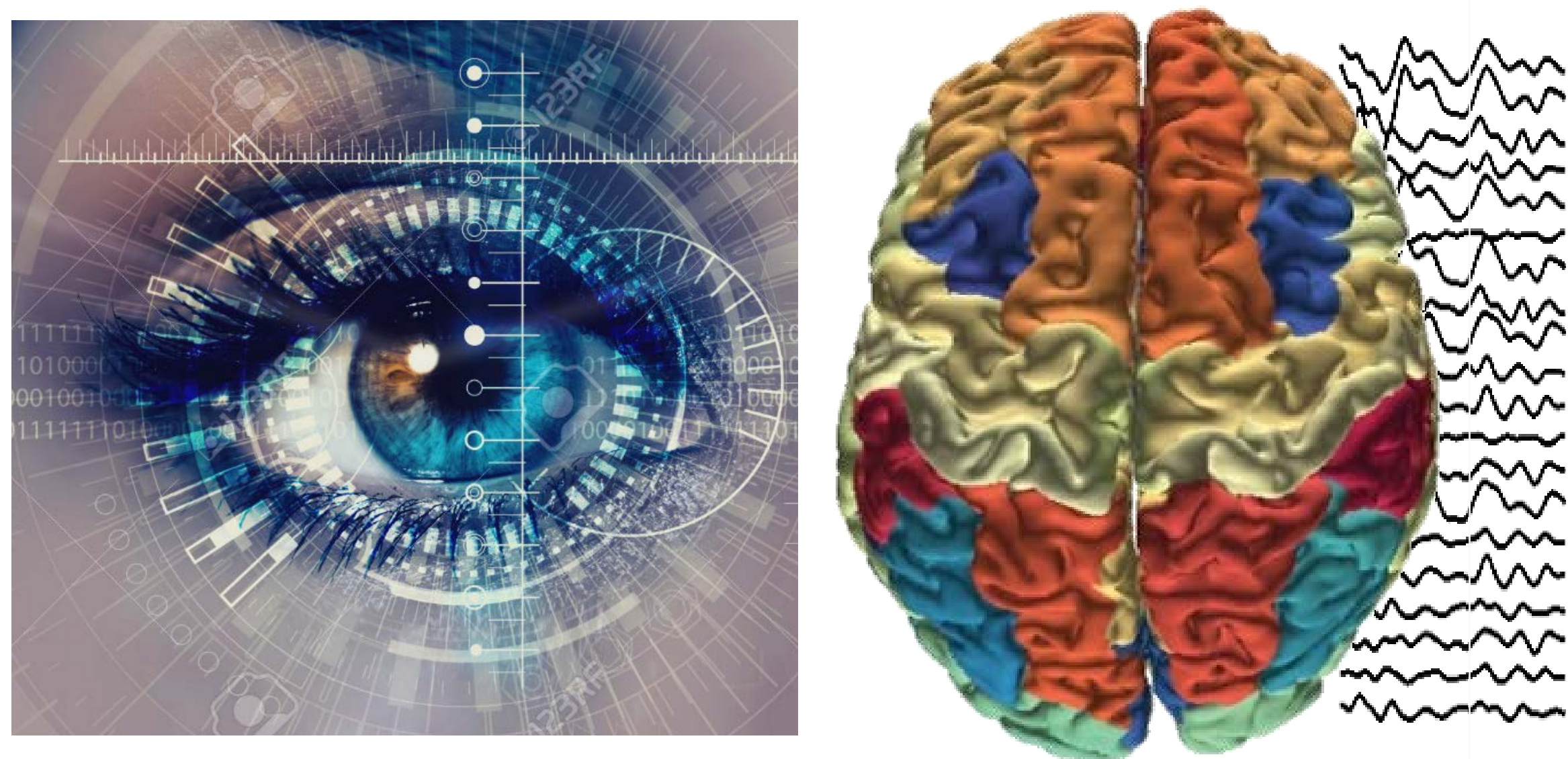


S&T Campaign: Human Sciences
Human Behavior
Real-World Behavior

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Research Objective

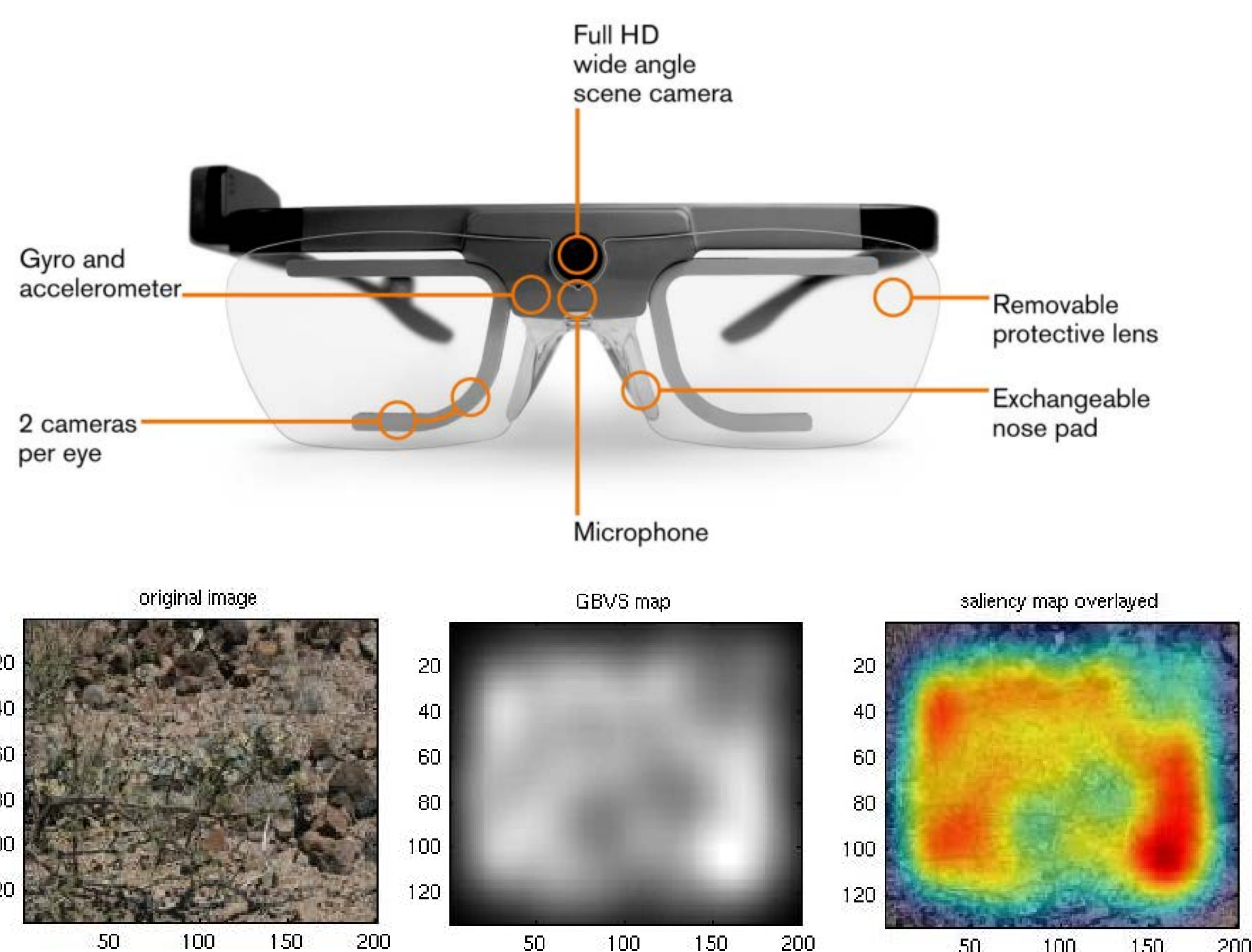
- Quantify visual information processing in tasks representative of real-world behavior
- Leverage mobile eye tracking and synchronized recordings of electroencephalography (EEG) to examine visual perception under naturalistic conditions



Combining EEG and eye tracking enables multilevel analyses of visual perception in real-world search tasks

Challenges

- Understanding how naturalistic search behavior is guided by the relative influences of task-specific demands and features of the environment is critical to interpreting visual perception in real-world settings
- Recording EEG and eye tracking data in real-world environments requires robust hardware and software solutions



Mobile eye tracking solutions enable ecologically valid measures of visual search behavior

ARL Facilities and Capabilities Available to Support Collaborative Research

- Multiple data acquisition platforms for controlled and applied experimentation
 - Eye Tracking – (Eye Link 1000, Tobii Pro Spectrum, SMI RED, Tobii Glasses 2)
 - EEG – (Biosemi, g.tec, Brain Products, Advanced Brain Monitoring)
 - VR – HT Vive with integrated eye tracking, Oculus Rift
- Synchronized data collection from multiple sources including wired and wireless eye tracking, EEG, video, and behavior using Lab Streaming Layer (LSL) network
- Mission Impact for Neurotechnology Design (MIND) Laboratory
- Brain Imaging and Experimental Research Suite (BIERS)
- Diverse expertise in Neuroscience, Biomedical Engineering, Computer Science, Psychology, and Statistics

- Touryan, J., Lawhern, V.J., Connolly, P.M, Bigdely-Shamlo, N., & Ries, A.J. (2017). Isolating discriminant neural activity in the presence of eye movements and concurrent task demands. *Frontiers in Human Neuroscience*.
- Brouwer, AM., Hogervorst, M.A., Oudejans, B., Ries, A.J., & Touryan, J. (2017). EEG and eye tracking signatures of target encoding during structured visual search. *Frontiers in Human Neuroscience*.
- Ries, A.J., Touryan, J., Connolly, P. and Ahrens, B. (2016). The Impact of Task Demands on Fixation-related Brain Potentials during Guided Search. *PLOS One*.

Complementary Expertise / Facilities / Capabilities Sought in Collaboration

Additional expertise needed in:

- Advanced computational and statistical analysis approaches for mobile eye tracking data
- Hardware/software integration for real-time applications

New research approaches sought in:

- Use of virtual environments to study visual search behavior