

Audio Simulation via Loudspeaker Arrays



S&T Campaign: Human Sciences
Real World Behavior

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Research Objective

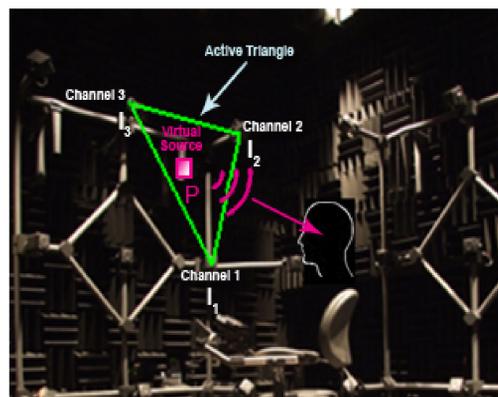
- The research objective is to accurately measure and reproduce sound sources and soundscapes over loudspeaker arrays.
- To understand how well humans can detect, localize, and identify sound sources in military soundscapes.



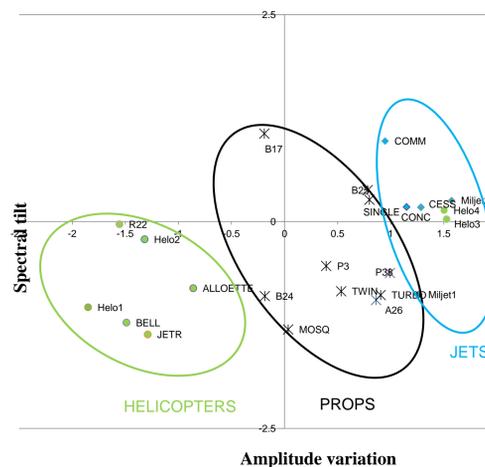
Actual (top) and simulated (bottom) military helicopter sounds.

ARL Facilities and Capabilities Available to Support Collaborative Research

- Experimental laboratory facility:
 - Environment for Auditory Research (EAR) Facility
- Unique test sites:
 - EAR : four laboratory spaces for simulating spatial audio soundscapes. EAR includes the Dome room, Sphere Room, Distance Hall, and Listening Laboratory.
- Unique expertise:
 - Acoustic signal processing for spatial simulation.
 - Measuring and modeling of complex sounds.



Audio motion simulation via Vector Base Amplitude Panning.



Two-dimensional model of air vehicle sound sources.

Challenges

- Measurement and modeling of complex sounds.
- Veridical reproduction of military sound sources and ambient soundscapes over loudspeaker arrays.
- Modeling human performance for the detection, identification, and localization of complex sounds.

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- Simulation of realistic sound sources, including dynamic directivity patterns of sound sources.
- Environment simulation to include diffraction, scattering, and absorption effects of physical acoustic surfaces.
- Long-term access to physical acoustic space simulation and sound propagation algorithms.