

# Task-Oriented Quantitative Testing for Synthesized 3-D Auditory Displays

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## Abstract

Current human machine interfaces in Navy systems which incorporate headphone listening fail to take full advantage of human binaural sensory processing capabilities. These interfaces can be improved by providing the capability to present multiple spatialized audio channels over headphones using technology which is available today. Before these changes are considered, quantitative testing must take place which addresses the task to be performed, and the impact the spatialization will have on the task. This poster will describe a testing system for quantifying the effects of 3-D audio spatialization on a detection and classification problem similar in important ways to a sonar operator's task.

## 1 Introduction

Advances in electronics, signal processing, and computer technology have made it possible to present to human listeners, via headphones, rudimentary synthetic 3-D multisource sound fields. In considering the best experimental use of existing 3-D synthesis technology, one class of experimental objectives concerns itself with the relationship between auditory spatial perception and auditory information processing. Experiments in this category are especially important if the practical application of 3-D sound is to proceed in a useful and efficient manner. The Advanced Afloat Systems HCI Team at NRaD has been assembling a laboratory facility for evaluating various aspects of audio and visual display capabilities with reference to their possible use in operational Navy human machine interfaces. The first suite of experiments which use this facility is designed to quantify the effect of synthesized 3-D spatial cues on performance in a loudness discrimination task using Gaussian stimuli.