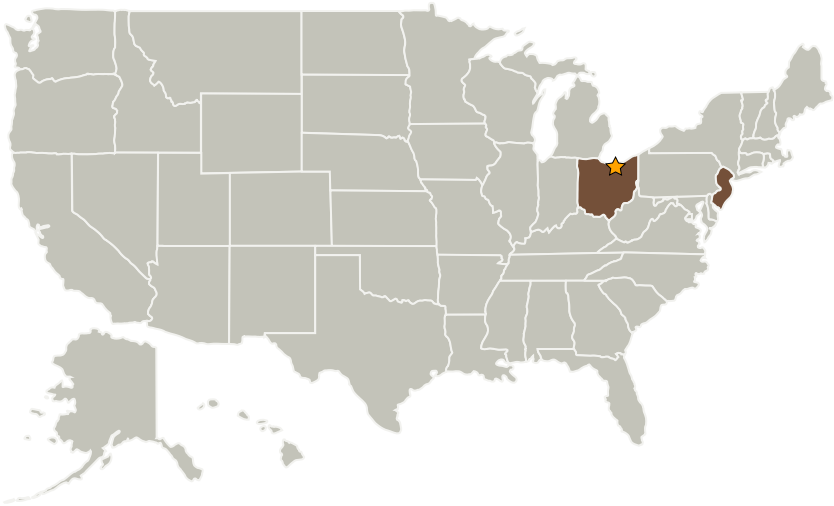
Microphone Array Signal Processing and Active Noise Control for the In-Helmet Speech Communication, Phase II

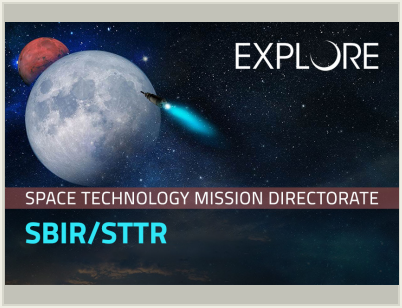
Completed Technology Project (2009 - 2011)

Project Introduction

For in-helmet voice communication, the currently used Communication-Cap-based Audio (CCA) systems have a number of recognized logistical issues and inconveniences that cannot be resolved with incremental improvements to the basic design of the CCA systems. The objective of this research project is to develop an Integrated Spacesuit Audio (ISA) system that can possess similar performance to a CCA while offering users inherent comfort and ease of use. In Phase I, the feasibility of using microphone array beamforming or multichannel noise reduction plus a single-channel postfilter to combat a variety of types of in-helmet noise was validated. Comparative simulations indicated that novel multichannel noise reduction is more practical and more effective than traditional microphone array beamforming for ISA systems. Phase II will pursue advanced development and prototype of the proposed technical solution for the ISA system. Directions for improvement that were established in Phase I will be carefully followed, subjective evaluation will be carried out, and the ISA designs will be further optimized. Finally a real-time demo system will be built using either DSP or FPGA. It should be ready for testing and use by NASA at the end of Phase II.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
WEVOICE, Inc.	Supporting Organization	Industry Women-Owned Small Business (WOSB)	Bridgewater, New Jersey

Primary U.S. Work Locations	
New Jersey	Ohio

Project Transitions

March 2009: Project Start

December 2011: Closed out

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX10 Autonomous Systems
  └ TX10.1 Situational and Self Awareness
    └ TX10.1.1 Sensing and Perception for Autonomous Systems