NASA SBIR/STTR Technologies

Conformal Light Augmented Single Substrate Head-Mounted Display

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Identification and Significance of Innovation

NASA is seeking technologies to reduce the risk during extravehicular activities on the lunar surface. Specifically, space suit displays are required for integrating and displaying suit/health status information, as well as procedures and tasks. Current helmet-mounted displays (HMD) are not space qualified and are bulky and heavy. POC's proposed conformal low-profile head-mounted display and the accompanying rendering electronics with voice recognition interface offers a unique situational awareness and task efficiency in the potentially hazardous lunar environment.

Expected TRL range at the end of contract (1-9):
Phase I: Level 4
Phase II: Level 6

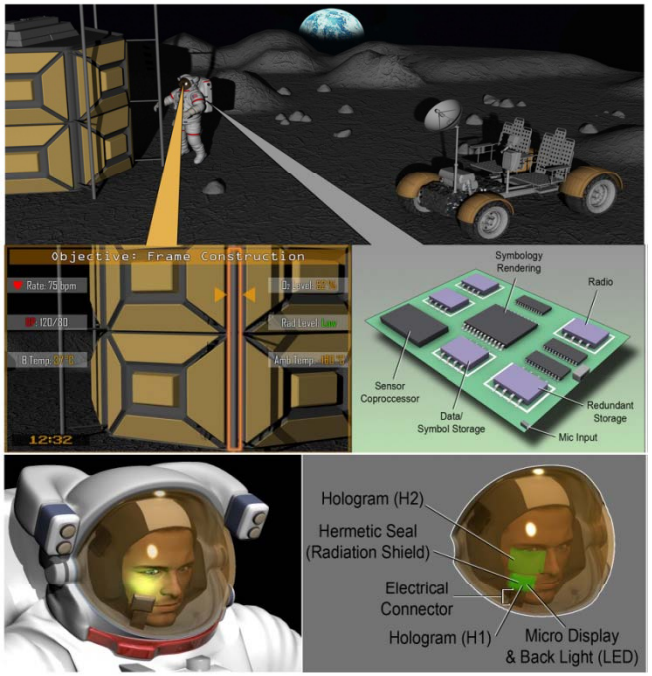
Technical Objectives and Work Plan

The overall goal of this project is to demonstrate for the first time the feasibility of the CLASS-HMD system. Phase I specific technical objectives include:

- Development of the three-color (RGB) CLASS-HMD design by analytical computer modeling and optical ray-tracing.
- Demonstration of aberration-corrected three-color (RGB) WAM-HOE on curved substrate.
- Demonstration of curved substrate holographic image projection.
- Demonstration of the multiple display optical tiling concept.
- Exploration of the commercial scenario for CLASS-HMD optics technology.

The work plan includes the following tasks:

- Develop System Level Design for the Proposed CLASS-HMD System
- Design CLASS-HMD Holographic Optics by Computer Modeling
- Fabricate WAM-HOE on Curved Substrate
- Fabricate a Set of WAM-HOEs for Optical Tiling
- Procure COTS Microdisplays for Testing
- Develop Radiation-Hardened Microdisplay Electronics Design
- Develop CLASS-HMD Firmware Design
- Demonstrate Integrated CLASS-HMD Concept
- Explore Commercial Potential
- Prepare and Submit Reports



NASA and Non-NASA Applications

The success of the CLASS-HMD project will ensure that technology is available to NASA to reduce the risk associated with activities such as spacewalk or lunar and Martian exploration by providing life-support information on a see-through display to enhance situational awareness. The CLASS-HMD technology can be directly applied to space-tourism, security, search and rescue, fire fighting, hunting, and entertainment.

Contacts

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NONPROPRIETARY DATA