

Tactile Data Entry System

For task-saturated, dynamic environments

Future spacesuits may be equipped with onboard computing, networking, and helmet-mounted graphical displays to provide astronauts with access to some of the same applications that terrestrial smart phone users now take for granted. These may include textual and voice communications, map-based navigation, video/image acquisition, document viewing/editing, and news/weather alerts. Unfortunately, bulky space suit gloves make it impractical to employ conventional user interfaces, such as a touch screen, keyboard, or mouse.

The patent-pending Glove-Enabled Computer Operations (GECO) design leverages extravehicular activity (EVA) glove design features as platforms for instrumentation and tactile feedback, enabling the gloves to function as human-computer interface devices. Flexible sensors in each finger enable control inputs that can be mapped to any number of functions (e.g., a mouse click, a keyboard strike, or a button press). Tracking of hand motion is interpreted alternatively as movement of a mouse (change in cursor position on a graphical user interface) or a change in hand position on a virtual keyboard. Programmable vibrotactile actuators aligned with each finger enrich the interface by creating the haptic sensations associated with control inputs, such as recoil of a button press.

Prototype GECO gloves were developed in collaboration with Flagsuit LLC and the University of Washington Biorobotics Laboratory and successfully evaluated in two separate test campaigns in the Advanced Suit Laboratory at NASA's Johnson Space Center.

Applications

NASA

- ▶ Surface navigation
- ▶ Document editing
- ▶ Communications
- ▶ Telerobotic control

Commercial

- ▶ Underwater construction and repair
- ▶ Firefighting
- ▶ Explosive ordnance disposal
- ▶ Hazardous material handling
- ▶ Military aviation



Background: NASA; inset photo: Barron Associates, Inc.

Phase II Objectives

- ▶ Develop a glove-integrated data entry system for EVA human-computer interaction
- ▶ Demonstrate system effectiveness for EVA data entry operations
- ▶ Deliver a demonstration unit compatible with testing by suited crewmembers

Benefits

- ▶ Provides a human-computer interface for task-saturated, dynamic environments
- ▶ Replicates the familiar capabilities of standard desktop interfaces
- ▶ Enables an expansive set of information system applications

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