2018 Wearable Technologies Workshop
Challenge Request

Challenge Title: Informatics Tactile Display Communication Modality

Organization Name: NASA Johnson Space Center

Teams that could be supported for this Challenge: 3

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Summary of the Challenge and Team Project

Background (brief background on your organization and the problem):

The Human Interface Branch at the NASA Johnson Space Center designs, develops, tests, and manages systems that enable human interaction with spaceflight vehicles. For deep space missions, communication latency becomes a prominent operational challenge, driving needs for technical advancement across many domains, including crew interfaces.

Currently, the spacesuit Informatics team is conducting an assessment of in-suit human interface technologies that will help spacewalking astronauts accomplish their mission with limited support from Earth. These technologies include state of the art visual and auditory interfaces, but to date have not considered the tactile communication modality. The goal of the team should be to develop a tactile display to demonstrate this untapped communication modality.

Problem Statement (a few sentences summarizing the problem to be addressed or the task the Team is expected to perform):

Spacewalking crews are currently limited to visual and auditory communication, not utilizing the sense of touch as a method of communication. Utilizing this sense, known as tactile display, will offload information from the visual and auditory channels and increase the bandwidth for communication, allowing the EVA crew to increase autonomy and efficiency. Other advantages of tactile communication have been identified in research publications.
Important Design Considerations (high level, fundamental or critical requirements for the Team to achieve. These can be discussed, and possibly negotiated, in more detail after the Team has been assigned):

The team will be tasked with developing a tactile display to demonstrate an alternate form of communication. The tactile display should be developed in such a way that is unobtrusive and does not hinder movement. The team is encouraged to perform human-in-the-loop tests and usability assessments throughout development. Proving that communication can be achieved via tactile display is a critical factor.

What funding and/or resources will you provide to each Team?

Usability and technical review. Scheduling of interviews with relevant NASA personnel. No funding is available for this project.

Deliverables (the final product you expect the Team to provide – such as a report, garment, user evaluation, …):

Garment/prototype, documentation, evaluation results

How Will the Results Be Used (what you will do with the results and how the results of this project will benefit/complement the work you are doing in your organization):

The final product will be assessed by the spacesuit Informatics team to determine feasibility in the advanced spacesuit. If the product is determined feasible, further work will be undertaken to mature any prototypes and integrate the capability into the Informatics system.

What deliverables (if any) do you want transferred to you at the end of the project?:

Garment/prototype, documentation, evaluation results