Paper ID: 32039
oral

HUMAN SPACEFLIGHT SYMPOSIUM (B3)
Human and Robotic Partnerships in Exploration - Joint session of the Human Spaceflight and Exploration Symposia (6-A5.3)

Author: Mr. Yuval Brodsky
Newton VR Ltd., Israel, yuval.brodsky@gmail.com

Mr. Franco Carbognani
Italy, fcarbogn@gmail.com
Mr. Ezio Melotti
The Mars Society, Italy, Finland, ezio.melotti@gmail.com
Mr. Enrico Carbognani
Italy, enrico.carbognani@gmail.com

THE USE OF ELECTROENCEPHALOGRAPHY FOR CONTROLLING ROBOTIC ASSISTANTS DURING PLANETARY SURFACE EVAS

Abstract

Upon arrival on other planetary bodies, astronauts will be required to perform a multitude of tasks to establish human presence there; be it for the short, medium, or long term. Recent mission architectures propose that extravehicular activities (EVAs) undertaken for habitat construction, scientific research, exploration, and other purposes will be supported by robotic assistants.

There are numerous ways of commanding and controlling these robotic assistants, and interacting with them in order to achieve the mission objectives. In order to ensure optimal performance during these EVAs, and to ensure crew safety, it is important to match ideal control mode to the type of robot and mission objectives. The operation of the robot must not impede other tasks in which the astronauts are engaged. It must not distract the astronaut from critical tasks, and should be as natural as possible.

This research investigates the use of electroencephalography (EEG) as a tool for controlling a robotic assistant. The subjects' performance as a rover operators using EEG will be compared to that using other control modes. In these experiments, the user is able to control one degree of freedom (yaw) of a four-wheeled rover through the EEG. A standardized course is to be driven, and the operator performance is evaluated based on deviation from the optimal path, time to complete the course, and critical errors.