

19TH IAA SYMPOSIUM ON HUMAN EXPLORATION OF THE SOLAR SYSTEM (A5)
Interactive Presentations (IP)

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HOW TO IMPROVE THE EFFICIENCY OF EXTRA-VEHICULAR ACTIVITIES ON MARS ?
DEVELOPMENT, ASSEMBLY AND TEST OF A NEW EMBEDDED RECORDING INTERFACE
FOR EVA

Abstract

The spacesuit is a kind of personal spacecraft that shall provide the astronaut with everything needed to work efficiently, while ensuring security. From Mercury spacesuits to current EMU or Orlan spacesuits, they have kept evolving and they will also have to adapt to Mars environment.

The embedded system that this experiment would help to design could contribute building the next generation of spacesuits. Indeed, it would for sure help the astronaut to work on a more autonomous basis, while optimizing the presentation of the data collected by all the instruments that are part of this embedded system.

To do so, a micro-computer will be connected to different sensors and carried with the spacesuits used during a Mars-analog mission (MDRS 164), from February 20 to March 6 at the Mars Desert Research Station (Utah). For now, the material list is composed of a micro-computer RaspberryPi connected to a GPS chip, humidity and temperature sensor and sunlight exposure (UV, visible, IR) sensor to be brought on the top of the backpack during EVAs. All this information that can help to contextualize the events that happen during an EVA will be stored on the SD card that contains the software and will help to build an embedded graphic interface to be used for future missions.

In the final version, many add-ons can be imagined such as tools to measure the characteristics of the environment as well as physiological sensors. Then a screen on the wrist will allow interacting with an interface to get all the information necessary to the marsonaut during an EVA (navigation, software tools, audio report, etc.). However, preliminary work has to be done before being able to design this tool as efficiently as possible.

It comes within the scope of previous experiments aiming at recording data from Marsonauts, in the Hab (NEEMO project) as well as during EVAs (personal assistant currently developed at the CNES). We expect to have the final system, with a functional graphical interface, to be operational for the Mars Arctic 365 mission. Tests in Mars-analog conditions at the MDRS are thus greatly needed for efficiency and usability assessments.