

Enabling astronaut-robot partnerships for future Moon-Mars surface exploration

MOONWALK



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The goal of project MOONWALK was to develop and test technologies and training procedures for astronaut-robot cooperation in earth-analogue environments as it applies to Extra-Vehicular Activities (EVAs) on the moon and Mars.

Surface EVA on planetary missions primarily involves soil sampling and exobiology activities. Robots can help carry material for the astronauts, assist in the installation of equipment, scout sites that are too dangerous for humans and assist in search and rescue activities.



Photo credit: Bruno Stubenrauch 2016



German Research Center for Artificial Intelligence

DFKI Robotics Innovation Centre
Project Coordinator, robotic platform, robot-control interface



COMEX
Technical coordination, EVA training suit, subsea simulation



Airbus Group Innovations
Biomedical monitoring for EVA



LIQUIFER Systems Group
Scenario design, EVA training suit support, EVA tools design



Space Applications Services
System architecture, EVA human-machine interaction technology



NTNU Centre for Interdisciplinary Research in Space
Human dependability, simulation campaign evaluation



Instituto Nacional de Técnica Aeroespacial - Centro de Astrobiología (INTA-CSIC)
Astrobiological field support, Rio Tinto Mars analogue

Project Coordinator:

GERMANY

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For Project MOONWALK, two mission simulations were conducted. Mission scenarios outlining human-robot collaboration were tested at subsea Marseilles, a lunar analogue site and at Rio Tinto, Spain, a Martian analogue site.

The earth-analogues enabled the MOONWALK team to analyse, research and test operations and technologies as well as train future astronauts with limited cost and risk. The analogue sites were able to provide similar constraints and conditions as those that would be encountered by astronauts and their robotic assistants during real Extra-Vehicular Activities (EVAs) on a lunar or Martian surface.

Such constraints include the restriction of movements caused by pressurized EVA spacesuits, reduced gravity, potential contamination from planetary dust or exobiological elements, psychological stressors in isolation and confinement in an extreme environment and limited communication capabilities with Earth mission control.

These operational and technological challenges were met with exciting new design solutions by the engineers, scientists and architects that worked on project MOONWALK.

www.projectmoonwalk.net