German Research Center for Artificial Intelligence

FT-Utah

Field Trials TransTerrA-Systems in Utah

Robotic systems: SherpaTT, Coyote III, BaseCamp and Payload-Item

Control of Coyote III by using the exoskeleton in the Virtual Reality Lab, Bremen

Coyote III in the desert of Utah, USA

The project FT-Utah deals with the evaluation of robotic systems to be used in the field of planetary exploration. An extensive test campaign with a duration of four weeks is set up within the desert of Utah, USA, to evaluate the systems in a multitude of tests within natural and unstructured Mars analogue terrain.

The field trials will be performed with the robotic systems, as developed and integrated in the project TransTerrA. These are in particular:

- SherpaTT: hybrid walking and driving rover with an active suspension system
- Coyote III: micro rover for the use in unstructured terrain
- BaseCamp and Payload-Items: modular junction station and payload container
- Mobile mission control station at site
- Ground control station including an exoskeleton located in Bremen, Germany, for long distance mission control

The field trial campaign includes system evaluation based on three layers. The primary focus is on the execution of an (semi-)autonomous mission sequence, including all robotic systems as listed above. The main goal is the demonstration of a semi-autonomous cooperative exploration of planetary surfaces, including the installation of a logistics chain, within the context of a sample return mission. In order to achieve this mission sequence a logistics chain is set up by the two rovers, SherpaTT and Coyote III, using the BaseCamps and Payload-Items as supportive elements. In this case SherpaTT acts as exploration and sample acquisition rover, while Coyote III takes the role of a shuttle system, collecting the sample containers and transporting them back to the sample return stage. The mission command and control is based in a ground control station located in Bremen, using a satellite link for communication. The ground control station is equipped with a virtual reality lab for visualizing the mission progress. In order to control the multi-robot mission, an exoskeleton is used by the operator for direct control of the systems.

In addition to the demonstration and evaluation of a full mission sequence, performance parameters of the single robotic systems are tested within the Mars analogue terrain. Furthermore, different aspects of autonomous exploration tasks are evaluated based on single system level, as well as within multi-robot scenarios.

The results of the field trials will also be used within the project TransTerrA, in order to further evaluate extraterrestrial exploration and to study a potential technology transfer for terrestrial applications.

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Partner:

Universität Bremen

Contact:
DFKI GmbH & University of Bremen
Robotics Innovation Center

Director: Prof. Dr. Frank Kirchner
Phone: +49 421 - 17845 - 4100
E-mail: robotics@dfki.de
Website: www.dfki.de/robotics