

# CREX

## A Walking Robot for Lunar Crater Exploration

### System Description

The robot CREX (Crater Explorer) is a six-legged walking robot. Based on the experience from the SpaceClimber project, it has been developed as a scouting system in the RIMRES project. The robot enables us to research methods for autonomous exploration of deep lunar craters in search for water ice or other volatile substances.

Originally the system was equipped with an electro-mechanical interface on its back, allowing the robot to connect to the Sherpa rover for travelling longer distances or to mount additional modules such as battery modules and scientific instruments. As part of upgrades, this was converted to accommodate another computer and laser scanner. Furthermore, the body joint and the movable head were replaced with a larger battery compartment and depth imaging cameras.



(09/2009 - 08/2012)

### Technical Details

- **Size:** 0.82 m x 1 m x 0.22 m (normal posture)
- **Weight:** 27 kg
- **Speed:** max. 0.12 m/s
- **Payload:** max. 10 kg
- **Runtime:** approx. 1.5 h w/o payload (50V, 7Ah battery)
- **Actuation/Engine:** 24 joints in 6 legs (BLDC motor RoboDrive ILM50x8, 1:100 HarmonicDrive, FPGA electronics)
- **Sensors:** 1x VLP16 Velodyne laserscanner, 1x IMU, 6-DOF force-torque per leg, battery cell voltages, per actuator: current, voltage, velocity, position (absolute and inkremental), temperature; 2x Picoflexx depth image camera
- **Computers:** 1x Intel NUC i7 10. Gen for motion control, 1x COM Express Board with Intel i7 5. Gen for navigation and mapping
- The robot receives its mission tasks via a wireless connection. Each task can be performed autonomously or manually controlled by an operator.

