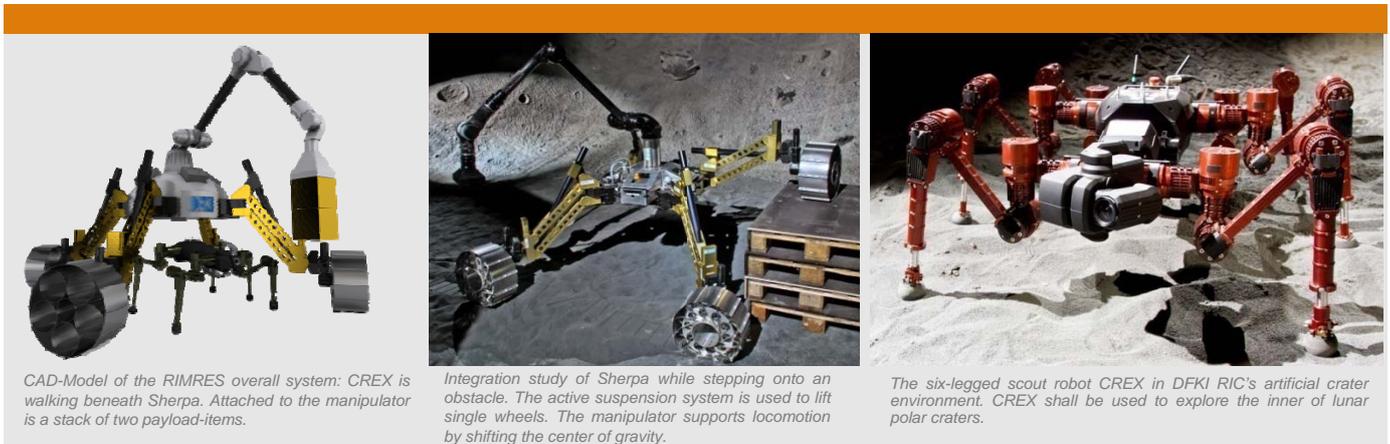




Reconfigurable Integrated Multi Robot Exploration System



CAD-Model of the RIMRES overall system: CREX is walking beneath Sherpa. Attached to the manipulator is a stack of two payload-items.

Integration study of Sherpa while stepping onto an obstacle. The active suspension system is used to lift single wheels. The manipulator supports locomotion by shifting the center of gravity.

The six-legged scout robot CREX in DFKI RIC's artificial crater environment. CREX shall be used to explore the inner of lunar polar craters.

A Heterogeneous Modular Robotic System for Exploration of Celestial Bodies

The aim of the project is the development of core technologies for modular, reconfigurable robotic systems to support the efficient and robust execution of complex tasks in uncooperative and difficult-to-access areas.

Besides new methods for autonomy, navigation, and locomotion, RIMRES focuses on a highly modular system concept consisting of modules for different functions, i.e. locomotion, energy supply, scientific data gathering, autonomy and navigation. These modules are compatible with each other and can be linked via a uniform electro-mechanical interface (EMI).

Extraterrestrial applications such as planetary exploration are in the center of the research efforts. Not only hardware but also software will be kept modular in order to facilitate the addition and removal of components.

The CAD-drawing at the top of the page shows the main hardware components of RIMRES. The system consists of the hybrid wheeled-leg rover *Sherpa*, used for energy efficient locomotion in moderate terrains and the legged scout *CREX* for locomotion in steep crater environments. Cubic *payload-items* can be used to form payload-stacks i.e. scientific or technological infrastructure elements. The payload-items are handled by using *Sherpa's* manipulator arm.

Apart from handling payload-items, the manipulator can be used to actively support locomotion. This can be achieved by shifting the rover's center of gravity (see middle picture above) or by using the manipulator as a 'fifth leg'.

While being attached to the rover via the EMI, the scout is able to use its legs for manipulation purposes, for example to conduct geological sampling. While being connected, both systems act as one monolithic system and share data as well as energy via the EMI. When detached, both systems act completely independent from each other.

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