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PHOENIX "POWER SUPPORT SYSTEM FOR HARSH AND EXTREME ENVIRONMENTS INSIDE ROBEX"

Abstract

The talk will present a planned power support system within the project robotic exploration of extreme environments (ROBEX).Within this innovative and interdisciplinary project, a fusion between deep sea and space scientists had the aim to develop joint technologies and combine the two complementing technological and scientific expertise to cross fertilize each other to have a substantial advancement.

The main tasks of ROBEX are the development of specific instrumentation for the investigation of different scientific topics in the deep sea and on the moon, the development of a robotic infrastructure which is modular and adaptable for different scientific mission and finally to accomplish field tests with these newly developed technologies in respective environments.

The main challenge for the powers system of such an infrastructure the limited energy resources are. The focus of this talk will be the Moons environment in which the long lunar night with 14 earth days of total darkness and the harsh thermal conditions of temperatures lower than 90K are the main design drivers for any long term mission to the lunar surface. For missions in the past with life times longer than one lunar day, RTG's have been utilized.

The aim of Phoenix is to develop a power support system which is modular and consequentiality adaptable for different mission scenarios. It comprises an intelligent power distribution (IPD) unit, a power generation and a power storage unit. Through these different unites it can be individual adapted to several different mission objectives. The core module, on which the IPD is located, controls and distributes the energy to the consumers in dependence of the current lunation, the mission requirements and the available power. The numbers of generation and storage units can be varied in dependence of the required power levels of each mission. Moreover the potential rovers, which accomplish scientific measurements, can be recharge to increase e.g. the measurement duration and used as storage modules as well. The decentralized Phoenix allows a completely new architecture, in which e.g. the power generation can be located on places yielding longest quasi-continuous illumination periods and transfer the power over nods to the core module e.g. close to permanent shadowed craters. The core module on the other hand can charge the rovers whichever accomplish scientific measurements in the crater. Hence Phoenix is suitable for infrastructures in extreme environment and can be an important tool for first step towards a permanent manned moon station.