From Space to Underwater: Robotics in challenging environments

Frank KIRCHNER
University of Bremen, Germany

The research at DFKI Robotics Innovation Center focuses on three key elements:

1) System Design of complex mechanisms for extreme environments. While space and underwater robotics is in the focus of our work, terrestrial applications are as well tackled and transferability is seen as a must have payoff.

2) Mobile Manipulation is the second research area and puts emphasis on control architectures and algorithms for highly mobile systems in unpredictable environments and searches for solutions to integrate manipulation capabilities on top of highly mobile systems. Dual arm- and dexterous gripping presents a challenge in itself, however, to integrate it with mobile systems in rough environment tasks for new and system oriented approaches, that goes beyond the state of the art research.

Finally research area 3) deals with Immersive Interaction. Here we are studying concepts for human and machine interaction, based on state of the art techniques, such as cave and HMD systems, but aim to integrate haptic feedback into the control loop by incorporating exoskeleton designs, that can be used to control highly demanding manipulation activities in remote areas. In order to assist the operator further, we also study the online analysis of neurophysiological data, such as EEG and physiological parameters. This online analysis is a key component to assist an operator to control highly complex robots in difficult and challenging environments.

The talk will present examples from the above mentioned areas and open the floor for discussions as each solution presented in fact produces more new questions than it can give answers - which is exactly the reason, why we love being researchers…