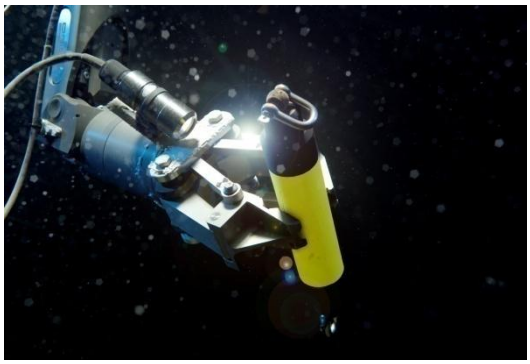
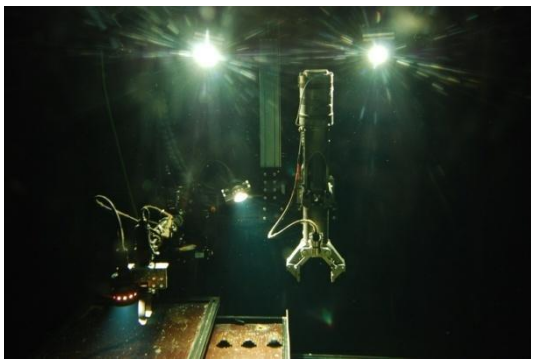
CManipulator

An Autonomous Dual Manipulator for Deep-Sea Inspection and Maintenance



The Schilling deep-sea robot arm, which is used in the CManipulator project



The CManipulator System in the test tank at the DFKI RIC

CManipulator mounted on the MOVE of MARUM during tests in open water

The goal of the CManipulator project is the development of an autonomous and modular dual-arm underwater-manipulator. The system will be designed so that it can be easily adapted as an additional payload to existing and future underwater vehicles.

An increasing trend in the offshore industry is to mine deep-sea resources, e.g. oil or manganese. At present, this is a very expensive endeavor. Especially, cost-efficient 24-hour systems for the inspection and maintenance of deep-sea production facilities are needed. In the last decades, more and more ROVs (Remotely Operated Vehicles) with tele-operated manipulators have been deployed. Because of their permanent connection to the surface, they are inherently cost-intensive.

Furthermore, highly trained personnel is necessary for the control and monitoring of these vehicles, which is mostly done from special ships. By using a new autonomous manipulator system like CManipulator, the running costs for installation and maintenance of underwater facilities can be significantly reduced in the future.

CManipulator will be the first deep-sea underwater robot able to autonomously detect previously defined objects, grasp them and set them down or connect them to other objects. The complete system will either act completely autonomously or semi-autonomously with an operator as supervisor.

It will be able to grasp a range of different objects up to a weight of 30 kg in water. The project mainly focuses on objects with the following properties:

- cylindrical objects which have the form of underwater-transponders
- objects with a handle enabling them to be grasped by CManipulator

To further enhance the relevance of the project, it is planned to autonomously connect electrical power connectors. This would allow autonomous docking of underwater vehicles by CManipulator and could thus increase the utility of AUVs and ROVs using a CManipulator. Within the project it is planned to transfer the results on a deep-sea capable vehicle.

CManipulator was successfully finished in October 2009 with a series of open water tests in the Baltic Sea.

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Contact:
DFKI Bremen & University of Bremen
Robotics Innovation Center

Director: Prof. Dr. Frank Kirchner
E-mail: robotics@dfki.de
Website: www.dfki.de/robotics

Universität Bremen