

PriMa

Precise Manipulation



Orion7P Schilling Robotics manipulator
(Source: Schilling Robotics)



Bosch control device



Transponder collection scenario

Development of an intelligent control for motion compensation of an underwater manipulator mounted on an underwater Remote Operated Vehicle (ROV)

In this project, the intelligent control of an underwater manipulator arm will be demonstrated. With the help of a control device developed for mobile working machines, the operator will be able to define the desired pose of the manipulator's end effector in Cartesian space. The manipulator control will calculate the corresponding joint angles and move the end effector to the desired location. Arising position changes at the base (simulated movement of the underwater vehicle by e.g. water flow) are compensated automatically to keep the gripper to the predefined position in space. Overall, technologies in the fields of aerospace and mobile machines are transferred to the subsea sector.

Demonstration Scenarios

The effectiveness of the technology is demonstrated by testing it with realistic underwater manipulation scenarios. The manipulator being used is the Orion7P manipulator from Schilling Robotics. The motion of the ROV is emulated by the motion of a gantry-crane on which the manipulator is mounted. The two primary scenarios being considered are the collection of transponder and remote operation of a blowout-preventer control interface.

A transponder is used in subsea as part of underwater

acoustic positioning systems. These transponders need to be replaced regularly before it runs out of battery. Manipulating a transponder normally without any motion compensation is difficult.

A blowout preventer is used in oil and gas wells to cope with erratic pressures and uncontrolled flow which occurs during drilling. In cases when the blowout preventer does not get activated automatically (e.g. Deepwater Horizon drilling rig explosion) the control interface needs to be operated directly using a manipulator which is mounted on a ROV. Motion compensation and the intuitive control device can make this manipulation task easier.

Duration: 05/2015 – 03/2016

Partners:



Supported by:



on the basis of a decision
by the German Bundestag

This project is funded by the Space Agency of the German Aerospace Center e.V. (DLR) with federal funds of the Federal Ministry of Economics and Technology (BMWi), Grant no.: 50RP1508.

Contact:

DFKI GmbH & University of Bremen
Robotics Innovation Center

Director: Prof. Dr. Frank Kirchner

Phone: +49 421 - 178 45 4100

E-mail: robotics@dfki.de

Website: www.dfki.de/robotics