University of Southern Denmark

LARGE STRUCTURE PRODUCTION

Model-, Simulation- and Data-based Control of a Mobile Robot Crane Platform

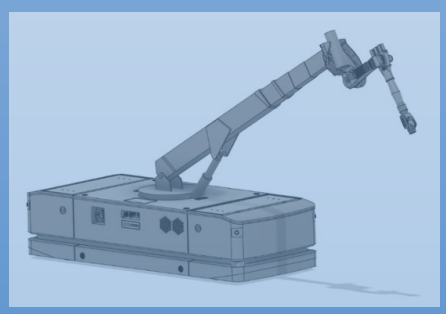
Klara Franziska Schütze

SDU Robotics, The Mærsk Mc-Kinney Møller Institute

Supervisor: Christian Schlette, SDU Robotics

Background and Motivation

The energy-, maritime- and construction-industry demands work like welding or sand blasting at great heights where automation using robots can be a solution. Therefore, the Center for Large Structure Production aims to develop a mobile robot crane platform. To be able to simulate and test the use of such a robot, a modelling and simulation of the robot is necessary. In order to stabilize the system, a control approach is needed.



Goals

- Development of a 3D simulation of the system kinematic and dynamic behavior based on the mathematical and geometric model of the system.
- Development of a real-time controller to generate ideal motions of the robot and crane. The target is to stabilize the tool frame of the robot by compensating motions of the actuators in the redundant system.
- Development of algorithms to generate control signals from the controller to the given hardware controllers of the robot and the crane.
- Controller optimization by evaluating sensor signals gained via proprioceptive sensors of robot and crane and exteroceptive measurement systems tracking selected points of the system.

Methods

- Mathematical modeling in MATLAB
- 3D Simulation in VEROSIM and MATLAB/Simulink
- Control design in MATLAB
- Programming in C/C++ of hardware and sensor interfaces

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