

Automatic Search for Optimal Configurations of Robotic Manipulators



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Background

Due to the high price of modern robots, purchasing new robots for every task in a manufacturing process quickly becomes expensive. The use of modular robots will enable the same robot to be used for different tasks. Optimization algorithms can be used to automatically find optimal configurations for given tasks.

Description

Modular robots have been the subject of much research interest because of their high versatility, easy maintenance, interconnectability, low cost and robustness. However, a limiting factor to their uptake is an inability to know how they should be best assembled for certain tasks or sets of tasks. Using the combine of the modular hardware with modular software enables to form the required robot structure for a given task.

In this work, our goal is to find the optimal configuration of modular robots for given tasks automatically. As part of the project, an inverse kinematic model and dynamic model are required and multi-task optimization algorithms are used to obtain the best configuration.

This research is supported by the Marie Curie FP7 SMART-E project. The ultimate aim of the research is to develop an optimal modular and easily reconfigurable robotic system.



Modular Lightweight Robot by Festo AG & Co. KG

Tasks

This project will include the following tasks:

- A literature review of optimization algorithms
- Programming inverse kinematic and dynamic model of modular robot system by MATLAB
- Implementation of optimization algorithm for different situations by MATLAB

Benefits

The candidate will be provided with guidance and leadership during the course of the project. If results are sufficient, there is the possibility to publish.

Links

- Homepage of the Marie Curie FP7 project SMART-E: www.smart-e-mariecurie.eu

Supervisor:

Prof. Dr.-Ing. Matthias Althoff

Advisor:

Esra Icer, M.Sc.

Research project:

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Type:

BA/MA

Research area:

Optimization Algorithms

Programming language:

MATLAB

Required skills:

The candidate must be enthusiastic and self-driven. MATLAB knowledge is required. English knowledge is necessary.

Language:

English

Date of submission:

25. Sept. 2014

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