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M A S T E R T H E S I S
for
Kerstin Heunisch
Mat.-Nr. 03603503, field of study EI

Learning strategies for grasping using evaluation of grasps based on empiric experiments of an anthropomorphic hand

Problem description:

The Hand Arm System developed at DLR-RMC is an anthropomorphic robotic platform. Thanks to its construction it is able to perform highly dynamic tasks and it is very robust. It has 18 joints in the hand and 7 joints in the arm.
The great dexterity of the hand enables to grasp objects with numerous different grasp types. Most grasp planners are using a brute force approach, resulting in grasps that are mostly of power grasp type. A novel approach uses a primitive detection method to leverage the quality and the speed of the grasp generation. For example, if a cylindrical primitive is found, a rule says that the approach direction of the hand should be orthogonal to the axis of the cylinder. Depending on the diameter, a second rule specifies e.g. that the fingertips should be placed along a line parallel to the axis of the cylinder. The method significantly improves the generation of the grasps. However, the rules have to be designed manually, which is a tedious and subjective process.
The objective of the work is to identify possible learning methods for the extraction and parameterization of the rules and to implement the most promising one. In order to yield effective rules and parameters, the work shall integrate the experience collected by executing grasps on the Hand Arm System.

Tasks:

- Review of state of the art in grasping and grasp learning algorithms
- Identification of rules and parameters for learning
- Proposal of several learning approaches and implementing the most promising one
- Experimental evaluation and discussion of the learning strategy

Bibliography:

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(D. Lee)
Univ.-Professor