Fast self-collision checking of modular and reconfigurable robots

Background

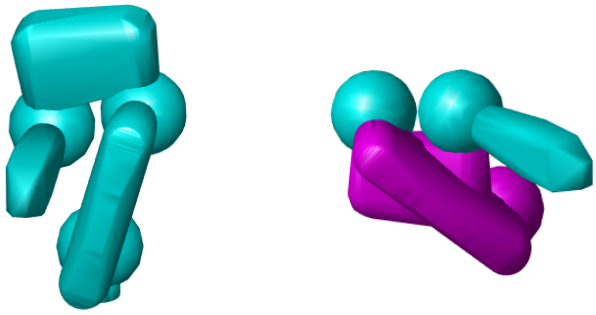
Modular robots have a game-changing potential. A reconfiguralbe modular robot can adapt its own morphology, such that a task can be solved in an optimal way (time, energy, money).

Self-collision checking can be a time-consuming task, especially when not considering search-space reducing heuristics. To optimize a robot configuration, however, a fast self-collision checking is necessary.

Description

This thesis has the goal to investigate efficient methods to the self-collision problem of modular and reconfigurable robots. There are certain challenges:

- **Efficient representation**: What is an appropriate representation of a robot manipulator, such that the collision check is fast, but not overly conservative?
- **Algorithm**: What is an appropriate collision checking algorithm, such that the collision check is fast, but not overly conservative?
- **Heuristics**: Self-collision checking of classical robots can be computationally reduced due to applying robot-specific heuristics. What are generalizable heuristics to reduce the search space for all modular robot configurations?



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Research project:
Delevopment of a modular robot system (ZIM)

Type:
BA/MA

Research area:
Robotics, Collision Detection

Programming language:
MATLAB, Python

Required skills:
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Language:
English

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