IWF
Institut für Werkzeugmaschinen und Fertigung
Institute of Machine Tools and Manufacturing

Dynamic Modeling and Gait Control of a Walking Hexapod

Keywords: Robotics, Control, Walking Robot, Hexapod, Physics Simulation

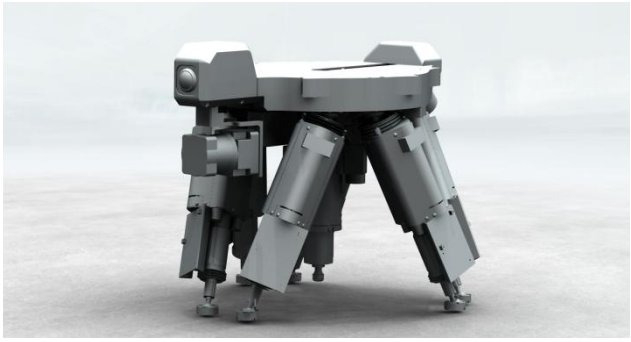
Overview

The MiRoR project develops an articulated tooling machine on the basis of a six-legged robot. At the current stage of integration, all legs are kinematically controlled which enables the robot to only walk stably in precisely known environments (such as simulated environments). The objective of this semester thesis is to gear the MiRoR Hexapod towards a stable walking behavior in real and uncertain environments. Therefore, it will be necessary to dynamically model the platform's motion and to then derive suitable gait or leg articulation control strategies which shall enable the robot to establish the required ground contact forces. Estimating such ground contact forces using the existing sensory means of the system may become a crucial aspect of that strategy.

As the real MiRoR platform will not be physically accessible, we have initiated the development of a rigid body simulator for experimentation, validation, and testing purposes. This simulator will pose the major tool to the proposed thesis and may be extended to further support the objectives of the work.

Tasks

- Familiarize with the Hexapod RBS model
- Propose strategies for estimating the ground contact forces
- Derive a control strategy for establishing desired ground contact forces
- Validate estimation and control in simulation



Skills

- Interest in approaching system-grounded robotics problems
- Robust theoretical background in robotics and control theory
- Programming experience (C/C++, Matlab)

Results

The results of this thesis have to be summarized in a written report and will be presented to the ICVR group in a 20 min talk.

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