

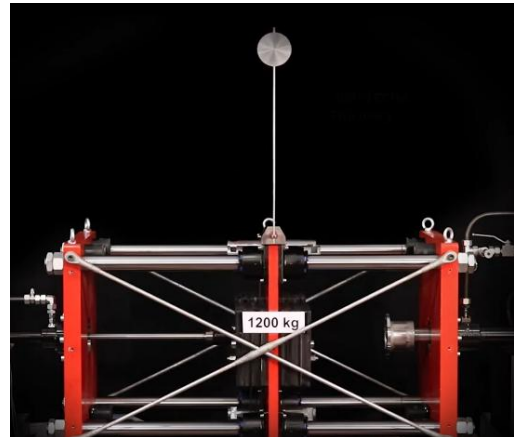
Masterarbeit

International project: Reinforcement Learning Control of an EHA-driven Inverted Pendulum

The application of electro-hydraulic actuators (EHAs) for high performance motion control has gained significant attention. The motion control of electro-hydraulic actuators is challenged by nonlinearities and uncertainties, such as fluid dynamics and friction.

In this study, an electro-hydraulic actuator driven inverted pendulum (as shown in the figure) is set as the control objective. The inverted pendulum is a classic problem in control theory and is used as a benchmark.

Reinforcement Learning (RL) control will be employed to achieve the electro-hydraulic inverted pendulum control based on an existing test bench at Tongji University, which is in cooperation with a joint project, Sino-German Center for Mechanical Engineering (CDZM). In addition, simulations and experiments will be carried out on the EHA-driven pendulum test bench in Tongji University, Shanghai.



The following steps are planned for the thesis:

- Research and survey on the topic.
- Reinforcement Learning controller design for an electro-hydraulic inverted pendulum.
- Simulation based on the existing hydraulic test-bench in Tongji University, China.
- Visit Tongji University, Shanghai, to conduct experiments for **three months. The project will cover the round-trip tickets (Germany-China) and accommodation expenses in Shanghai.**
- Documentation & presentation of results.

If you are interested in this project, please feel free to send your application documents (i.e., a brief cover letter, curriculum vitae, and transcript) to the email address below.

Type of work :

- Main emphasis: RL control, EHA, experiments
- Areas: RL, control theory, and electro-hydraulic systems

Start and duration:

- From: January, 2025 or upon agreement
- Duration: 6 months

Requirements :

- Interested in control, reinforcement learning, and electro-hydraulic systems.
- High degree of independence.
- Motivation for international academic travel and exchange.
- Good academic performance, very good knowledge of German and English.
- Knowledge in RL, control, and Matlab Simulink are of advance.

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[Picture source] <https://www.youtube.com/watch?v=8A71tWyEYOM&t=72s>