



Technische
Universität
Braunschweig



Control of a Triple Pendulum in Theory and Practice

Lecture of

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The stabilization of a simple pendulum in the upright equilibrium is a common control task and can be realized with basic algorithms and basic hardware like Lego Mindstorm. The double pendulum is a popular example for a chaotic system which means that the influence of small perturbations leads to unpredictable behavior. Still, linear feedback controllers that counteract perturbations in real time are capable to stabilize equilibria of a double pendulum as well as trajectories. For the control of a triple pendulum, the same linear theory applies. The third segment, however, adds additional technical difficulties that need to be tackled with powerful hardware.

In this talk, I will explain the principles of a linearization based 2-degrees of freedom controller design which is the combination of a feedforward control that prescribes a target trajectory and a feedback loop for stabilization of the system. For the nonlinear mathematical model of a triple pendulum, already the computation of the target trajectory and the feedforward control is a challenge. Further, I will discuss details of the implementation and practical problems that come with a physical setup.