# Open Thesis (MA)

Robust Feedback Optimization for Dynamical Systems

Description:

Optimization-based control tackles optimization problems whose decision variables consist of the input and output of some running process. If the process model becomes inaccurate, e.g. due to some unmeasurable and unpredictable disturbance, predictive methods like MPC might become impractical. A promising remedy is to design optimum seeking reactive controller, leading to the concept of feedback optimization. Here, the idea is to choose a suitable gradient flow that incorporates feedback measurements, such that the optimization algorithm becomes the controller itself. Case studies show promising results, e.g. for the application on power grid systems.
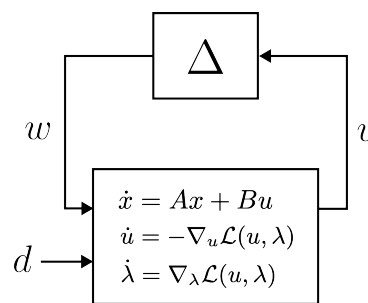
Whereas stability and tracking guarantees for such controllers have been provided, existing robustness analyses so far only focus on static plants. The goal of this thesis is to merge both results, i.e. to develop algorithms with tracking *and* robustness guarantees for *dynamic* plants. The benefits of such controllers shall additionally be demonstrated on some practical use case.

Prerequisites:

- *Konzepte der Regelungstechnik* or an equivalent advanced control course at master level
- Proficiency in either *Matlab* or *Python*
- *Robust Control* or *Convex Optimization* helpful

Supervisor:
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Area:
Convex Optimization
Robust Control

Properties:

Type: **MA**

30% literature
50% analytical work
20% implementation

Beginning:

Anytime. Feel free to appraoch me personally for a first chat.

Further information on www.ist.uni-stuttgart.de/lehre/bama