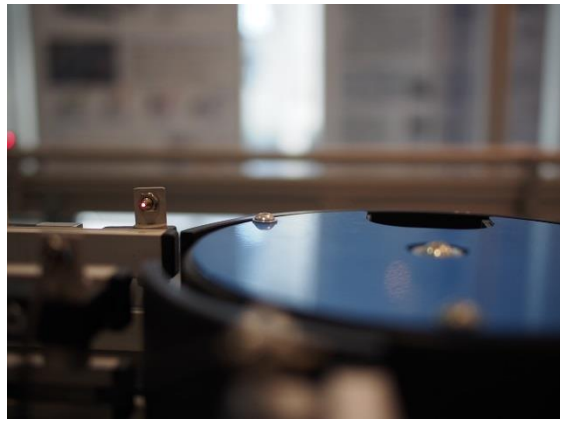
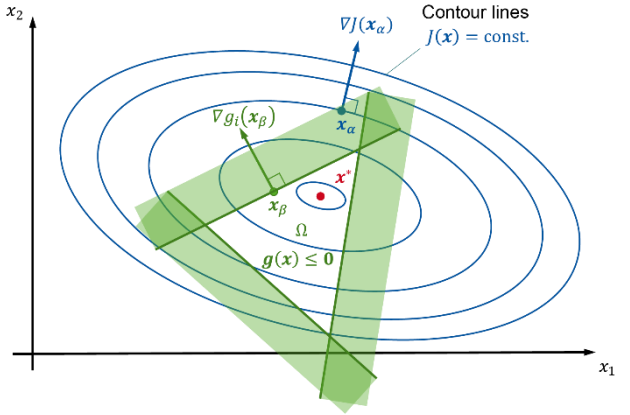


Constraints Modelling, System Prediction, and Control of automated Production (SA/MA)

Lehrstuhl für Automatisierung und Informationssysteme
Technische Universität München
Prof. Dr.-Ing. Birgit Vogel-Heuser

Task Description:

Automated Production Systems (aPS) are constrained regarding real-time and dependability – referred to as the Action Space. Normally, constraints are met using statically defined control software, making runtime behavior reconfiguration impossible. Model Predictive Control (MPC) is an advanced control method repeatedly predicting the system's future behavior over a moving time interval. Thereby, state fluctuations of real-world aPS can be accounted for within explicitly defined boundaries. Thus, imminent boundary violations may be detected and counteracted at an early stage.



Source: RWTH, IRT, Lecture MPCES

In this thesis, the applicability of MPC in aPS shall be evaluated based on a highly modularized behavior model of the controlled system. Thereby, the process, behaviors, and constraints must be mathematically modeled. The applicability of state-of-the-art methods and tools for real-time state prediction shall be investigated. Possibilities for a runtime intervention in the strategy planning should be discussed.

Preliminaries:

- Good mathematical/control engineering background (experience in MPC beneficial)
- System identification, modeling, programming experience beneficial (Python/Matlab, CasADi)
- Experience with PLCs advantageous (e.g., lecture/practical course Automation Technology)

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