Chair of Automatic Control

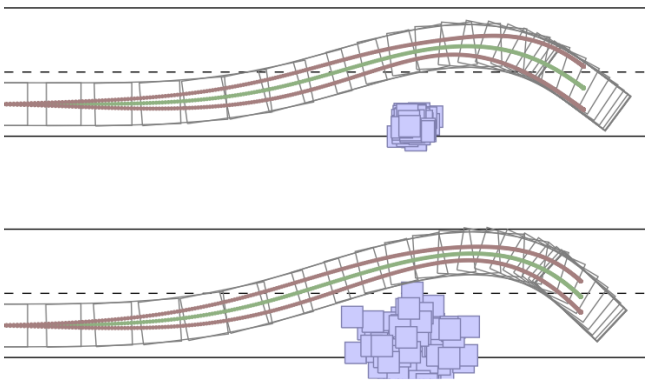
FAU

Announcement for Bachelor/Master Thesis

Integration of Uncertain Obstacles in Stochastic MPC

Motivation

To ensure safety, autonomous vehicles have to plan and track trajectories that are collision-free. As obstacles can only be localized with uncertainties, appropriate countermeasures have to be taken. Stochastic Model Predictive Control (SMPC) allows to take into account the probabilistic nature of the sensors and, by introducing chance constraints, ensures that the probability of collision is below a predefined limit.



Task description

The aim of this thesis is to investigate different methods for the representation and consideration of uncertain obstacles within the MPC problem. The control problem is to be implemented both deterministically in GRAMPC [1] and stochastically in GRAMPC-S. The methods should then be compared in terms of their assumptions, computational complexity and resulting solutions.

Requirements

- Experience in Matlab programming
- Numerical Optimization and Model Predictive Control

References

[1] T. Englert, A. Völz, F. Mesmer, S. Rhein, und K. Graichen, „A software framework for embedded nonlinear model predictive control using a gradient-based augmented Lagrangian approach (GRAMPC)“, *Optim Eng*, Bd. 20, Nr. 3, S. 769–809, Sep. 2019, doi: 10.1007/s11081-018-9417-2.

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