Institut für Regelungstechnik
Leibniz Universität Hannover

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Masterthesis

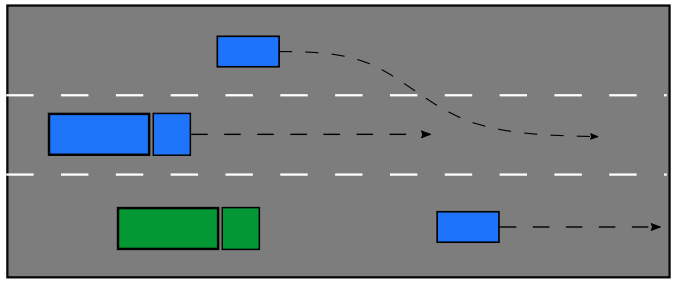
Development of cost function tuning methods in MPC for traffic scenario control

As autonomous vehicles are coming closer road admission, suitable methods to test AVs are in rising demand. Specifically, the behavior of an AV in specific traffic situations needs to be evaluated to address safety concerns. Model predictive control is of particular interest for this purpose as different constraints can be incorporated. Hence, suitable MPC approaches are developed to emulate traffic scenarios and guarantees for their successful simulations are derived.

In this thesis, different approaches for suitable objective functions in multi-vehicle scenarios are to be tested. For this purpose, different driving maneuvers and possible combinations/interactions of such shall be analyzed and common motion patterns shall be classified. Suitable representations of the found motion patterns in the optimal control problem should be developed in the form of appropriate cost function terms and constraints. This may include methods from robotics (e.g. potential fields, motion primitives), stochastic methods (e.g. stochastic MPC), or adjustments of the optimization problem (e.g. utilizing soft constraints).

Requirements:

- Familiarity with Matlab/Simulin, C/C++ may be an advantage
- Strong control background (RT1, RT2)
- Firm knowledge of optimization, optimal control and, especially, MPC



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