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Beginn: ab sofort möglich **Dauer:** 6 Monate

☒ experimentell ☒ anwendungsorientiert ☐ theorieorientiert

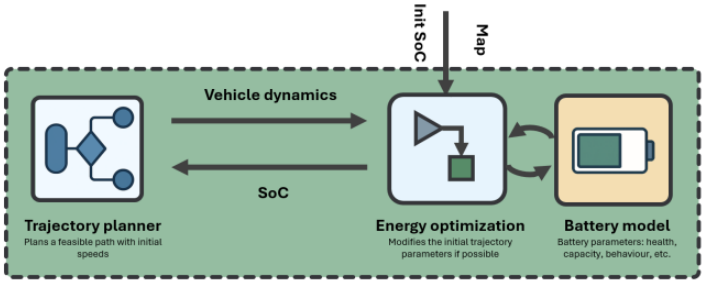
Ihre Interessen:

☐ Modellbildung ☐ stochastische Filter
☒ Identifikation ☐ Regler-/Beobachterentwurf
☒ Neuronale Netze

Master's Thesis

Battery-degradation-aware, safety-critical optimization method for interaction scenarios

Motivation:



As road traffic becomes increasingly automated, artificial intelligence is a promising approach to achieving higher levels of automation. In the AITONOMY project, an integrated framework for autonomous, cooperative, and electric vehicles (ACEVs) is being developed that addresses two coupled objectives: (i) safe, socially aware navigation in complex urban environments and (ii) energy-efficient driving while simultaneously preserving battery health. A key building block for this is robust prediction of the intention/right-of-way intent of vulnerable road users (VRUs) (e.g., pedestrians, cyclists) in negotiation situations (e.g., a desire to cross without a marked crosswalk). Misclassifications are safety-critical; at the same time, overly conservative reactions reduce traffic efficiency and increase energy consumption.

Task description:

The goal of this thesis is to develop a holistic **optimization method** for interaction scenarios (e.g., approaching crossing pedestrians, negotiating right-of-way) that accounts for different **battery states** and integrates **battery degradation** as an explicit cost in safety-critical optimization problems. The core idea is that trajectory planning should be not only safe and efficient, but also battery-friendly (e.g., fewer high power peaks, less aggressive acceleration/braking).

As part of the work, data will be generated from realistic scenarios using a real test vehicle, enabling a comprehensive comparison. The algorithms must be integrated into the **existing ROS framework** and **tested in simulation**.