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Ansprechpartner:

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

☒ experimentell   ☒ anwendungsorientiert   ☐ theorieorientiert

Ihre Interessen:

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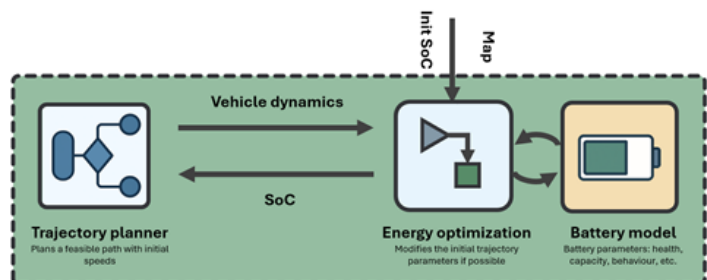☒ Neuronale Netze

Master's Thesis

Coupled simulation environment: macroscopic traffic simulation + human–machine interaction (co-simulation/architecture)

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.

Aufgabenstellung:

The goal of this thesis is to extend an **experimental setup** by adding a macroscopic **traffic simulation environment**, creating a large-scale simulation in which **human-machine** interaction (e.g., AV-pedestrian/cyclist interaction, HMI/communication) is coupled with a network-level traffic environment. This will enable the study of different human behaviors (e.g., risk-taking vs. cautious, rule-compliant vs. rule-violating, group behavior) in larger traffic situations and the inclusion of these behaviors as influencing factors.

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**