

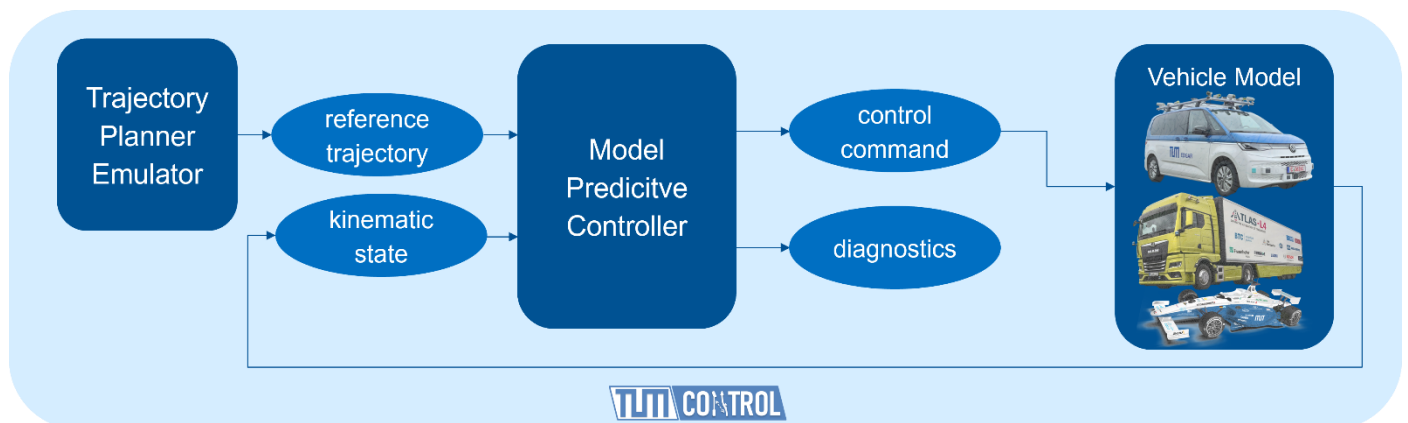
BA/SA/MA

## Machine Learning & Model Predictive Control for Trajectory following of Autonomous Vehicles

Are you eager to be at the forefront of cutting-edge technology shaping the future of autonomous vehicles? Our team pioneers the development of a revolutionary learning-based, self-adaptive, and robust Model Predictive Controller for trajectory following. Here, you'll engage in groundbreaking projects, developing Machine Learning algorithms to enhance performance and ensure robust control of vehicle dynamics.

This isn't just about applying theoretical knowledge; it's about broadening your skill set, embracing new concepts, and becoming an expert in your field while making tangible real-world impacts with your ideas. Join us and witness your contributions come to life on actual vehicles.

If you're interested in taking on this challenge, don't hesitate to send us an initiative application and we will arrange a call to discuss the topics. Just send me an e-mail with a short motivation, curriculum vitae, and a recent transcript of records. We can't wait to see what you bring to the table.



Currently, you can handle one of the following topics in your thesis upon agreement:

- Learning-based & self-adaptive MPC topics:
  - Deep Reinforcement Learning and Bayesian Optimization for MPC parameters
  - Explainable Deep Reinforcement Learning
  - Online learning & parameter estimation for an adaptive prediction model
  - Uncertainty Estimation for Adaptive Stochastic Nonlinear MPC
  - Comparing Stochastic and Robust NMPCs for motion control using a real passenger vehicle as a benchmark
  - Enhancing MPC prediction model with Gaussian Process Regression
- Investigation, modeling and sensitivity analysis of uncertainties and disturbance on the system state in the vehicle context (e.g., crosswind)

Prof. Dr.-Ing. Johannes Betz

Supervisor: Baha Zarrouki, M. Sc.

Issue date: \_\_\_\_\_

Submission date: \_\_\_\_\_