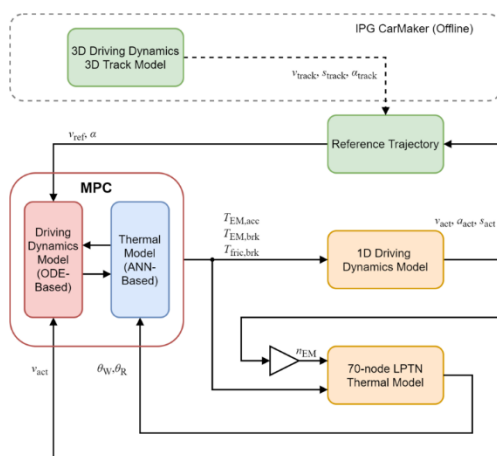




The Teaching and Research Area for Mechatronics in Mobile Propulsion is located between the domains of mechanical and electrical drive components as well as control algorithms. Under the guidance of Professor Jakob Andert, the institute researches innovative, environmentally friendly vehicle drives and particularly emphasizes electrification and simulation-based development methods.

The automotive sector is currently undergoing a major transformation that is in particular affecting the drive technology. Electrification is gaining enormous relevance as one of the key technologies to reduce or avoid emissions. Regardless of the specific technology, a steadily increasing complexity of both the hardware and the associated control algorithms is leading to the evolution of modern drives towards software-intensive, embedded mechatronic systems.



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## Bachelor / Master Thesis

**Start: from now**

- ☒ Faculty 1 - Mathematics, Computer Science and Natural Sciences
- ☒ Faculty 4 - Mechanical Engineering
- ☒ Faculty 6 - Electrical Engineering and Information Technology

### Optimization-based State Estimation for the Powertrain Control of an Electric Vehicle

The thermal load of the electric powertrain is subject to strict boundary conditions due to component protection and wear reduction. In preliminary work, this thermal utilization was optimized by means of a nonlinear model predictive control (NMPC) for the longitudinal drive of an electric vehicle on an embedded system.

Your tasks:

- Sensitivity analysis of the existing control
- Development of a state estimation algorithm for measured variables with Kalman filter and moving horizon estimation (MHE)
- Integration of the algorithm into the existing model and MPC
- Execution and analysis of tests on embedded dSPACE system
- Literature research of the above-mentioned topics

Your competences:

- Knowledge in the field of automotive engineering and (optimal) control
- Knowledge in MATLAB / Simulink. Knowledge in Python, Git, C is beneficial, but not required
- Independent and scientific way of working

**Would you like to know more?**

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