

## Student thesis



Master thesis

# Motion controller of an overactuated vehicle

## Topic and Goal of the Thesis

The Institute of Automotive Engineering Aachen develops, designs and realizes the research vehicle SpeedE. This vehicle has a wheel-individual steer-by-wire front wheel suspension, which also allows high wheel steering angles of up to 90°. In order to achieve new maneuverability possibilities, an active wheel-individual steer-by-wire rear wheel steering system is to be integrated in the SpeedE. This will provide more degrees of freedom than necessary for the plane movement of the vehicle. The degrees of freedom gained through overactuation can be used for additional goals such as energy efficiency or safety.

Within the scope of this work, the current motion controller is to be further developed. Influencing factors and their effects on the quality of the motion controller are to be determined and evaluated. Furthermore, the steady-state accuracy as well as the robustness against estimation errors and parameter uncertainties shall be increased. The developed approach to improve the quality is to be tested in the IPG CarMaker simulation environment and subsequently evaluated.

## Working Points

- Literature research,
- Familiarization with the vehicle model,
- Listing and evaluation of different influencing factors,
- Design of an approach to minimize these effects,
- Simulation and evaluation of the approach,
- Discussion of the results.

## Department

Vehicle Dynamics &  
Acoustics

## Contact



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## Language

German or English

## Entry Date

Earliest possible date

## Prior knowledge

Vehicle dynamics,  
Matlab/Simulink, Control  
theory