Studienarbeit / Masterarbeit: Robust Adaptive Control in Vehicle Dynamics

Beschreibung
Within a project in the field of electric mobility of urban cars, an integrated vehicle dynamics controller is developed. The active systems are active front and rear steering as well as Torque Vectoring, which can be extended. The aim of the control is the tracking of a reference car’s trajectory by the vehicle plant, with the focus on its horizontal motion. The secondary objective is to determine the control inputs in an energy efficient way. It is assumed, that only series production measurement techniques are available. With the prerequisite to control an existing detailed nonlinear plant vehicle model in Matlab/Simulink in the presence of uncertainties, measurement noise and disturbances, the control technique of robust adaptive control seems appropriate. Since the control inputs have to be chosen under energy efficiency aspects, the parameter estimation procedure is one focus of your work. In this sense, the proposed thesis should answer the question of how to apply robust adaptive control to vehicle dynamics. You will deal with a systematic analysis, if the parameter estimation should be integrated in the control law derivation or not. You will apply robustness techniques to the vehicle dynamics control problem and concern about the persistence of excitation condition. The preworks of plant and reference model modelling are already done, some approaches of adaptive control and parameter estimation are still successfully implemented. The proposed thesis therefore permits to be creative for appropriate control techniques and furthermore improve the existing concept to a real-time capable and testable integrated vehicle control. Testing will take place in the Stuttgart Driving Simulator. In the sense of Driving simulator tests and the application of the control concept to a real car, subjective assessment is a main point, which places a special focus on feedforward control. If you want to apply your existing knowledge to a real-world problem and deepen it, please feel free to contact me for your application.

Beginn
At any time

Voraussetzungen
• Interests in Vehicle Dynamics and Control
• Ideal Case: Skills in Adaptive and Robust Control
• Sophisticated Knowledge in Matlab and Simulink

Kontakt: Alexander Fridrich
E-Mail: themenvergabe_kraftfahrwesen@ivk.uni-stuttgart.de