SIEMENS

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Thesis Proposal

Autonomous Driving Optimal Control Developments

Autonomous driving that aim for more safety, comfort, and environmentally friendly vehicles, have been growing rapidly in automotive industry recently. Siemens PLM Software is developing the autonomous vehicle technologies from prototype to production at various levels: from chips, software algorithms and low-level integrated sub-systems, to sensor models, driving scenario simulation, and full vehicle-level simulation (https://www.plm.automation.siemens.com//autonomous-vehicles.html).

One of the challenges in autonomous driving development is to design and then validate the control algorithms in a closed-loop fashion, where vehicle dynamics characteristics, sensor configurations and models, and a wide variety of traffic scenarios are taken into account. Besides safety, the designs should also guarantee optimal performance toward precise tracking, and time/fuel consumption.
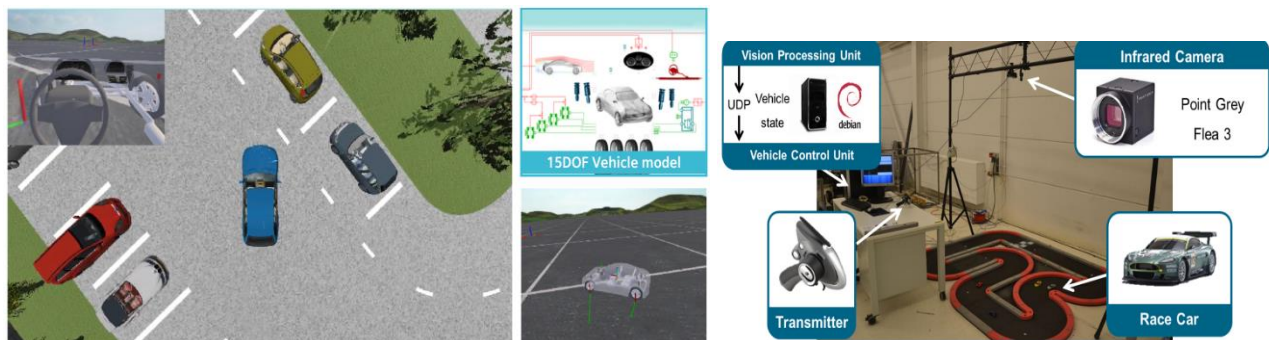
Thesis Goal

We are looking for outstanding students who are eager to do their Master thesis on planning and control topics in a dynamic and international research environment. The topics include:

- Optimal (distributed) planning for one or multiple vehicles for a city traffic scenario

- Learning MPC: to combine MPC with learning model from data in order to improve control performance against disturbances such as snowy slippery road condition

The company provides various tools to support the research activities, for example, Siemens Amesim for vehicle dynamics modelling, Delft-Tyre software, PreScan for sensor (camera, lidar,…) and traffic environment modelling, a miniature car setup for embedded control implementation, and other autonomous driving platform for deep learning and sensor fusion algorithm implementations.

Candidate profile

Background in either control systems, robotics, machine learning, or mathematics, familiar with programming. Experience with optimization, vehicle dynamics, ROS or autonomous vehicles is a plus.

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The work will be performed in collaboration with the R&D Team in Siemens PLM Software, Belgium. Do not hesitate to contact us if you are interested or have any question.