

Bachelor's/Semester/Master's Thesis, Guided Research, Interdisciplinary Project (IDP)

# Developing control algorithms for autonomous driving using novel software development methods

**Keywords:** autonomous driving – control algorithms – software development

## Background

As part of the research project CeCaS, a group has come up to build a new System Architecture for future vehicles with a focus on autonomous driving. The development of new autonomous vehicles requires a rethinking of the systems and software engineering to keep up with the growing complexity and the Implementation of the latest technologies such as AI-based functions in automotive engineering. For this purpose, our developed software is first integrated on an HPC system and then tested on real vehicles.

## Description

A central point in the development of autonomous driving functions is the control along a predefined trajectory using waypoints. Regarding the future processes relating to software and system design, new requirements will be placed on the development of algorithms. The use of artificial intelligence for automated code generation and approaches such as end-to-end autonomous driving also play a major factor. The development of control algorithms as well as the application of innovative software development methods involve many interesting research questions. These include, but are not limited to:

- Application of innovative software development methods for the creation of control algorithms
- Requirement-based generation of control-algorithms
- **Your ideas:** If you have any other ideas for research in this area you are welcome to suggest your own topic.

## Your Tasks

- Familiarization with control algorithms and software development methods
- Research the problem (study state-of-the-art control algorithms)
- Development of a novel solution approach
- Evaluation of the solution in our simulation environment
- Integrating your algorithm into our system

## Requirements

- You are currently studying Computer Science, Electrical Engineering, Robotics, Mechanical Engineering (or similar)
- High motivation and ability to work independently on your research topic as well as contributing to our teamwork.
- Interest in autonomous driving and control algorithms
- High motivation in the fields of robotics, control and AI
- Good knowledge in programming languages: Python, C++
- Experience with Linux

