

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

## HMI design for a testbed in the context of autonomous driving

**Keywords:** autonomous driving – human machine Interaction – psychology – design

### 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 key challenge in this context lies in the testing of the Hardware- and Software components as well as the quality of human-machine interaction. A mechanical test bench was set up for these tests and the foundation for the interaction of our system with a human driver has been laid. The testing of autonomous driving functions as well as the communication between the simulation, the testbed and a human driver involves many interesting research questions. These include, but are not limited to:

- Design of an HMI system for the interaction between a driver and the vehicle
- System design and realization at both hardware and software level
- **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 human machine interaction and testbed design
- Research the problem (study state-of-the-art HMI methods)
- Development of a novel solution approach
- Realization of the approach on Hardware and Software level
- Integrating your HMI into our system

### Requirements

- You are currently studying Psychology, Computer Science, Mechanical Engineering, Human factors Engineering, ...
- High motivation and ability to work independently on your research topic as well as contributing to our teamwork.
- Interest in test methods and human machine interaction
- High motivation in the fields autonomous driving, psychology and HMI-design
- Basic knowledge in programming languages: Python, C++
- First experience with Linux

