



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

Systems Engineering for Autonomous Driving Test Bench Design

Keywords: Autonomous Driving - Testing - Systems Engineering

Background

As part of the CeCaS research project, a team has been formed to develop a new system architecture for future vehicles, with a particular emphasis on autonomous driving. The development of new autonomous vehicles requires a fundamental rethinking of systems-/ and software engineering to manage the growing complexity and integrate the latest technologies, such as AI-based functions in automotive engineering. To achieve this, the software we develop is initially integrated on a high-performance computing (HPC) system before being tested on real vehicles in our test environment.

Description

A key challenge in developing automotive software and hardware architecture is effective vehicle testing. To address this, we are building a comprehensive test environment that includes a physical testbench, a vehicle, our simulation environment, and the communication infrastructure linking these components. To manage the complexity and enhance performance, we will adapt a systems engineering approach to model and test the environment. Especially with a focus on novel autonomous driving and software defined vehicle functions many open research questions in the area of test-ing exist.

These include, but are not limited to:

- Modelling of the test environment, including the test bench, vehicle, simulation environment and communication
- Evaluate our current setup and identify areas for performance improvement
- 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 systems engineering and Model-based development
- Research the problem (study state-of-theart test environments for automotive)
- Development of a novel solution approach
- Realization of the approach on Hardware
 and Software level
- Integrating your approach into our system

Requirements

- You are currently studying Computer Science, Robotics, automotive engineering, ...
- High motivation and ability to work independently on your research topic as well as contributing to our teamwork.
- Interest in Systems Engineering (MBSE)
- High motivation in the fields systems engineering, automotive, testing and autonomous driving
- Basic knowledge in programming languages: Python, ...
- First experience with systems engineering



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