

Hardware Abstraction of Vehicle Components and Computing Units

Keywords: autonomous driving – simulation – testing

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

To be able to integrate a software system with a hardware setup, it is obviously necessary for the software to be able to communicate with the hardware. Over the years, the amount of different hardware available and required in the automotive sector has increased dramatically, so it is crucial to abstract the underlying hardware from the software to make it easier to write software in the automotive industry. This allows manufacturers with many different car models to manage their software efficiently, no matter how much the hardware varies from model to model. Additionally, it eases the way of changing manufacturers for a hardware component e.g. to save money, since the new hardware will behave in the same way from a software perspective.

- Research on state-of-the-art vehicle hardware abstraction
- Implementation and integration of an own hardware abstraction layer
- **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 hardware abstraction concepts
- Research the problem (study state-of-the-art hardware abstraction layers)
- Development of a novel solution approach for the specific problem
- Evaluation of the solution in our simulation environment
- Support in setting up our test environment

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
- Interest in simulation environments like CARLA
- Good understanding of hardware abstraction
- Good knowledge in programming languages: Python, C++

