

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

AI-based End to End Autonomous Driving Systems

Keywords: autonomous driving – ai – simulation

Background

As part of the research project CeCaS, we have 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

In recent years, autonomous driving systems have undergone constant improvements. The latest results from research and development recommend an end-to-end approach when implementing these systems. Neural networks are utilized along the entire autonomous driving chain (detect, plan, control). They are linked to form an overall system using clearly defined interfaces. Using raw data, the system performs all steps until the output of the vehicle control signals without requiring additional coding. While the end-to-end approach offers a lot of improvements still comes with a lot of open research topics e.g. safety.

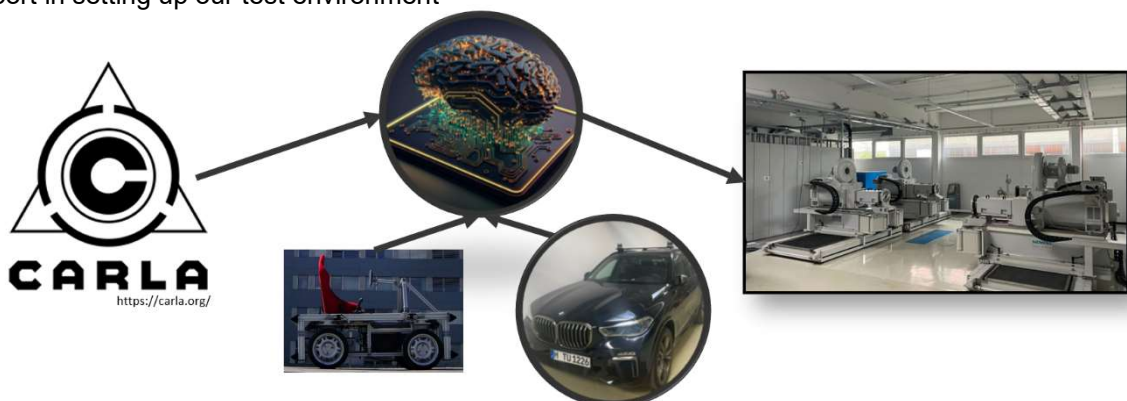
- Research on state-of-the-art end to end autonomous driving systems
- Integration and benchmarking of different neuronal networks for this use case
- **Your ideas:** If you have any other ideas for research in this area you are welcome to suggest your own topic.

Your Tasks

- Familiarization with neuronal networks for autonomous vehicles
- Research the problem (study state-of-the-art end-to-end autonomous driving systems)
- 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 and previous experience in machine learning
- Good knowledge in programming languages: Python, C++



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