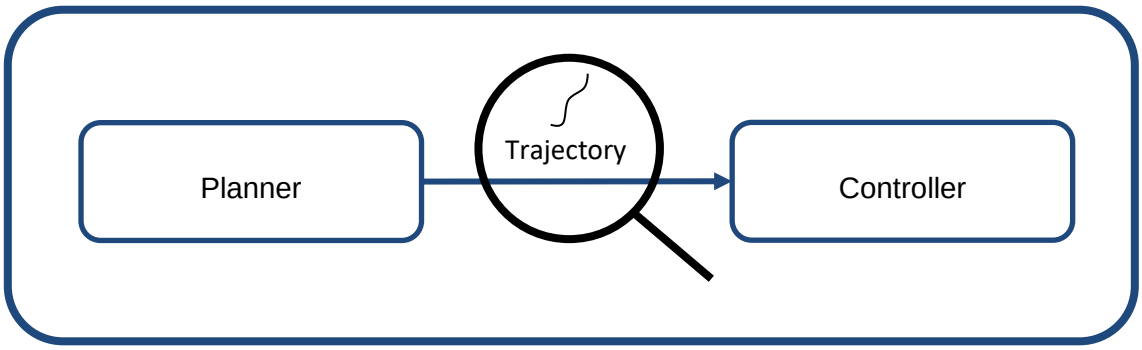
Institute of Automotive Technology
TUM School of Engineering and Design
Technical University of Munich

BA/SA/MA/IDP

Braking the Chain! Abstracting Planner Behavior in Autonomous Driving

The TUM Autonomous Motorsport Team is developing software for the autonomous racecars participating in the Indy Autonomous Challenge. In the past, major achievements have included winning a $1 million prize and autonomous overtaking maneuvers at over 270 mph. To be able to achieve this, the vehicle software must be developed and parameterized in a simulation that is as realistic as possible even before the first real-world tests.



These aforementioned simulations are often done with the full autonomous driving software stack on a Hardware-In-the-Loop (HiL) Simulator. This brings several problems because these tests are time consuming and the performance of an individual module can only be rated in dependency with the current state of the other modules.
Therefore, this thesis should investigate on how to cluster the behavior of the planner module. Afterwards the results of the clustering should be used to identify several abstract behavioral patterns that could be challenging for the controller module.
In the long term, these identified patterns can be used to rate a controller independently from the planner it is paired with.

The thesis is comprised of the following work packages:

- Literature research on pattern identification and interaction modeling in autonomous driving
- Identify influential factors in the Interaction of Planner and Controller.
- Preprocessing and clustering the data available from the Indy Autonomous Challenge.
- Abstracting the patterns described by the cluster centers
- Determining valid amplitudes for each abstract pattern identified during the thesis.

You are welcome to contribute your own ideas and help shape the focus of the work.
The thesis can be written in **German** as well as in **English**!
The thesis can be done from home for the most part. However, if desired, there is also the possibility to work on site at the Institute.

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