

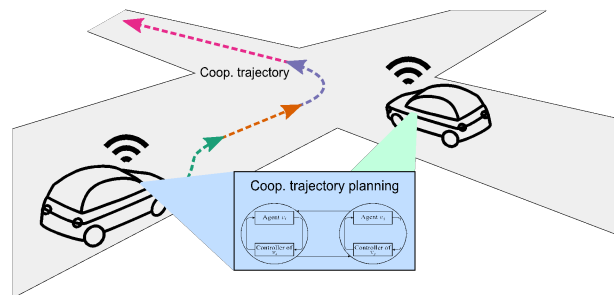
# Student Assistant / Thesis

## Cooperative Interacting Vehicles

### Problem Statement

The DFG priority program CoInCar (Cooperative Interacting Automobiles) is an interdisciplinary cooperation of researchers to provide a holistic system view on cooperative traffic and autonomous vehicles. The Cyber-Physical Mobility Group is working on networked decision-making and trajectory planning.

In a broad sense, the goal of trajectory planning is to find a sequence of control inputs that take a vehicle from a starting position to an end position. The optimal solution of the trajectory planning problem for a system consisting of multiple agents can be obtained when formulating the centralized control problem that considers all agents. In such a system, the complexity grows exponentially with the number of agents. A typical way to reduce the computational load is to distribute the control problem among the agents. However, dependencies and communications links of agents have to be resolved.



There exist two major challenges in distributed trajectory planning. Firstly, planned trajectories need to be collision free. Secondly, the planning algorithm on board of the vehicles should be real-time compliant. This is challenging due to the complexity of the trajectory planning problem, which grows exponentially with every road user that is taken into account.

### Your Tasks

- ▶ Implementation of networked control of multiple vehicles
- ▶ Development of strategies to reduce the computation time
- ▶ Comparison to planned trajectories using centralized control
- ▶ Evaluation in simulation / on real hardware

### Your Profile

- ▶ Knowledge of MATLAB and/or C++
- ▶ Affinity to mathematics
- ▶ Student of Computer Science, Automation Engineering, Mechanical Engineering, Electrical Engineering or a similar study program

### Our Offer

Positions are to be filled as soon as possible and are limited to 3 months. If suitable, an extension is possible/desired. The regular weekly working hours are 7-9 hours.

### Contact

Please read our [Instructions for Applications](#).

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