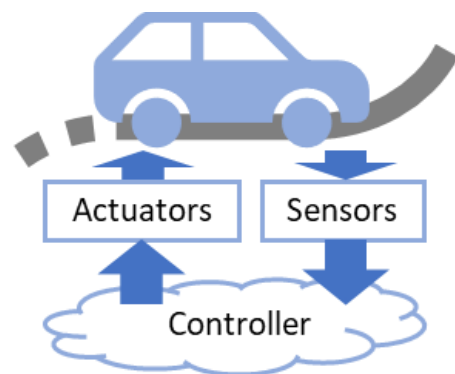


## Bachelor Thesis in the Field of Lateral Vehicle Control

# Design of a Line Tracing algorithm based on an Optical Sensor for a 1:10 Model Vehicle

As part of a project concerned with cyber-security of autonomous, connected vehicles we want to set up a realistic test environment comprising a fleet of 1:10 scaled model vehicles which are controlled in an autonomous manner. To realize this scenario, we begin with implementing the basic functions of autonomous driving separately, namely controllers for the lateral and longitudinal motion respectively. The latter has already been realized as a basic speed controller.

This thesis project shall focus on the lateral motion control of the vehicle to smoothly follow a marked track on the ground by means of optical sensors. A survey and comparison of various existing control strategies shall be conducted. Part of the work will also be an evaluation of possible optical sensors and how they can be arranged to achieve the described task most effectively. Modeling the sensor output and characterization of the vehicle behavior by driving experiments paves the way for selection and application of an appropriate control algorithm, which will be implemented and validated to conclude this work.



### Focus of work:

- Comparison and selection of an appropriate algorithm to follow a given trace
- Identification of an appropriate set of sensors to detect a trace
- Modeling of the vehicle motion and the sensor output
- Experimental plant characterization (steering and lateral motion)
- Implementation and validation of the selected algorithm

### Preferred skills:

- (Mandatory) Basic knowledge in C programming
- (Preferred) Experience with embedded system development
- (Preferred) Knowledge in control theory
- (Preferred) Knowledge about vehicle dynamics and modeling

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