

## Bachelorarbeit, Masterarbeit

# Handling Unmodeled Scenarios in Autonomous Driving Systems for Robust Decision Making

### Motivation

Autonomous driving systems rely heavily on models and simulations to predict and navigate the complexities of real-world traffic. However, these models cannot account for every possible situation, particularly rare, novel, or dynamic events that deviate from standard behaviors. Unmodeled scenarios, such as unusual pedestrian actions, spontaneous road hazards, or unpredictable weather conditions, pose significant safety risks. Addressing this gap is critical for advancing the reliability and acceptance of autonomous vehicles.

### Task description

This research will focus on integrating event-driven decision-making techniques to enable real-time adaptation to unforeseen events. The thesis will involve identifying key types of unmodeled scenarios, such as rare traffic conditions, unexpected pedestrian behavior, or environmental factors, and developing methods to handle these events effectively. It will explore the application of decision-making frameworks that allow for dynamic updates to the vehicle's behavior, ensuring safety and reliability. The thesis will also include simulations and case studies to evaluate the performance of the proposed methods in a variety of challenging scenarios, assessing the trade-offs between responsiveness, safety, and efficiency.

Finally, comprehensive documentation will be compiled to support future research.

### Prior knowledge

- Basic knowledge of signal processing
- Basic experience in python
- Previous knowledge of SUMO helpful
- Interest in academic work

### Research area

- Automated driving
- Signal processing
- Simulation

### Course of study

- ☒ Elektro- und Informationstechnik
- ☒ Mechatronik
- ☒ Informatik

### Orientation

- ☒ Research
- ☒ Development
- ☒ Implementation
- ☐ Signal analysis
- ☒ Modelling

### Start

From April

### Links

[Research project](#)  
[Employees](#)

### Contact person

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