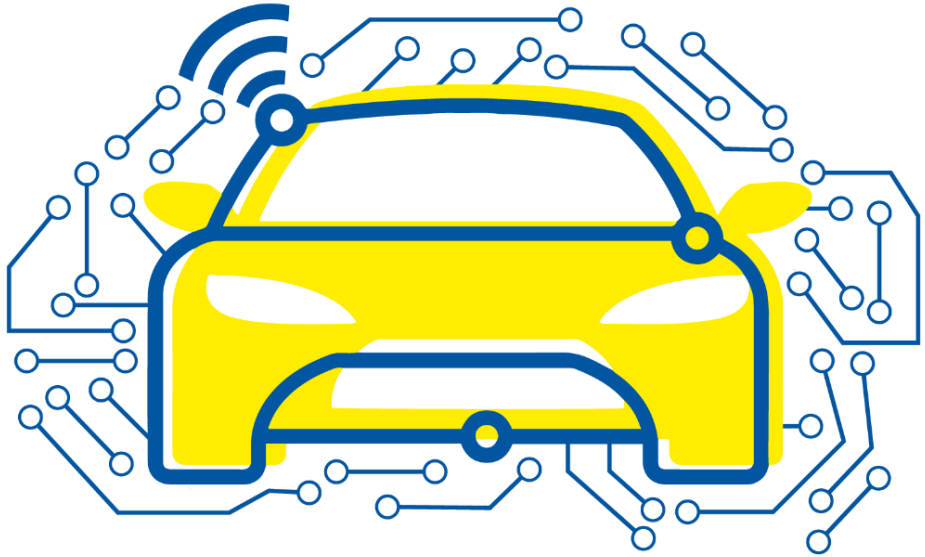
Automated and Connected Driving Challenges

Section 4 – Vehicle Guidance

Introduction

Tasks in Section 4



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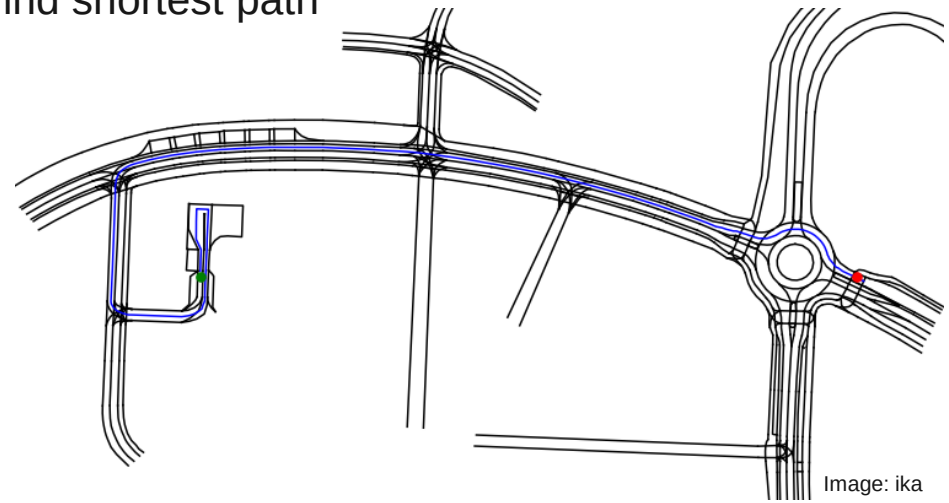
Introduction – Tasks in Section 4

Navigation

Subdivided into three Subsections:

Implement a module to plan a route on a given map using Lanelet2

- **Examine** *osm* map format
- Using **projection methods** for coordinate transformation
- **Initializing** a **routing graph**
- **Performing graph-search** to find shortest path
- **Post-processing** of the route



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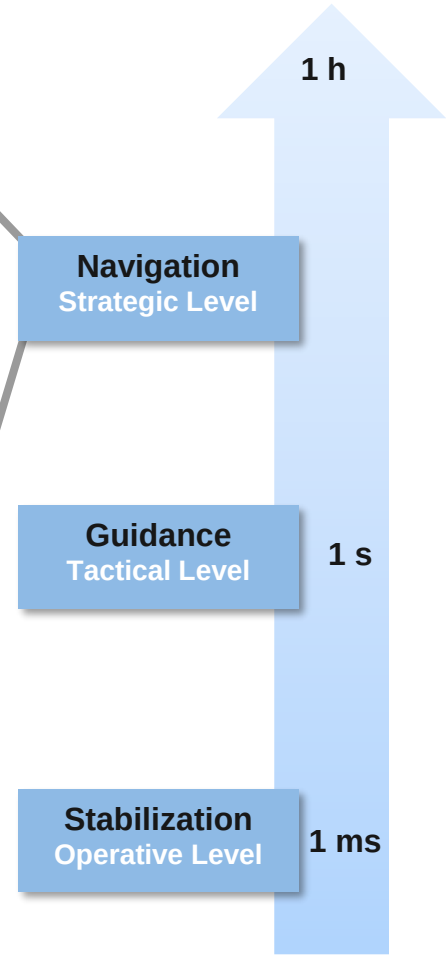
Time Horizon



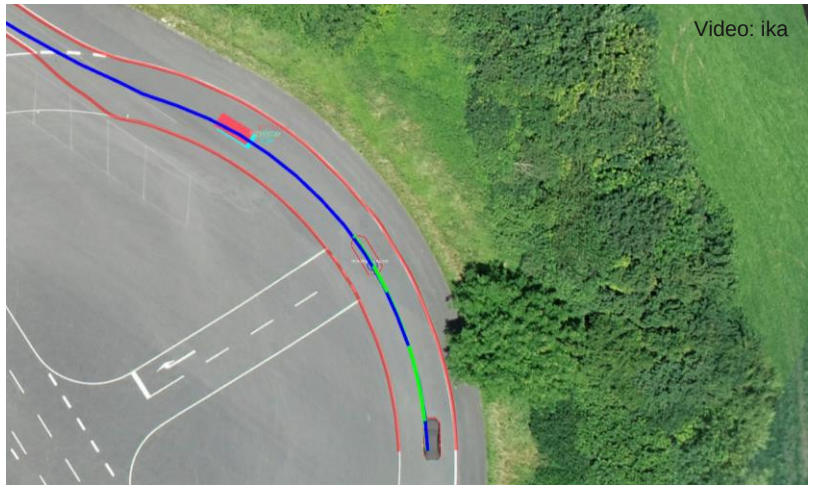
Introduction – Tasks in Section 4

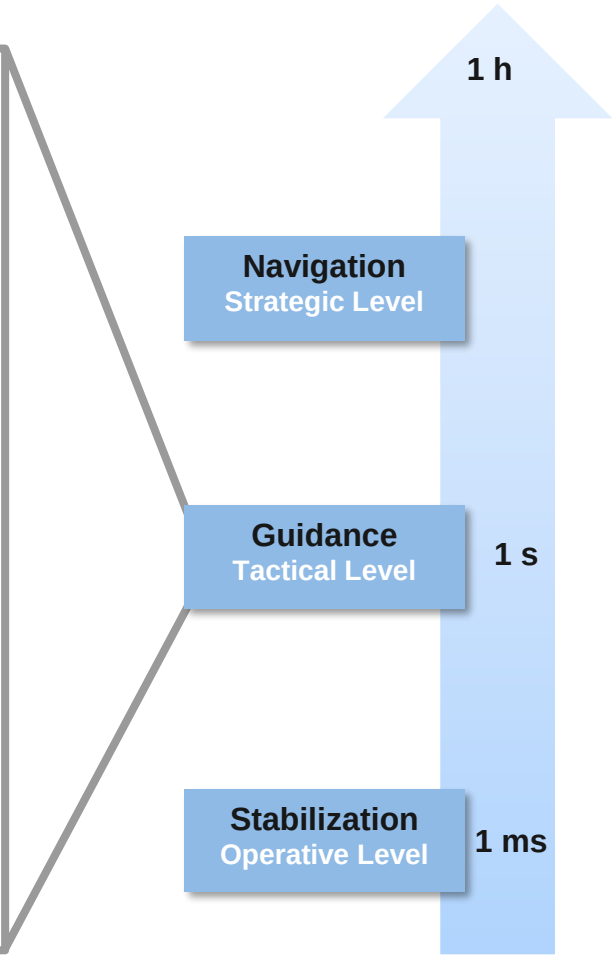
Guidance

Subdivided into three Subsections:

Trajectory-Planning using a direct multiple shooting approach

- **Implement** the system dynamics model
- **Integrate** different cost terms regarding:
  - Lateral and longitudinal jerk
  - Steering rate
  - Velocity deviation
  - Dynamic objects
- **Using** a Closed-Loop-Simulation within the **ROS-Framework**





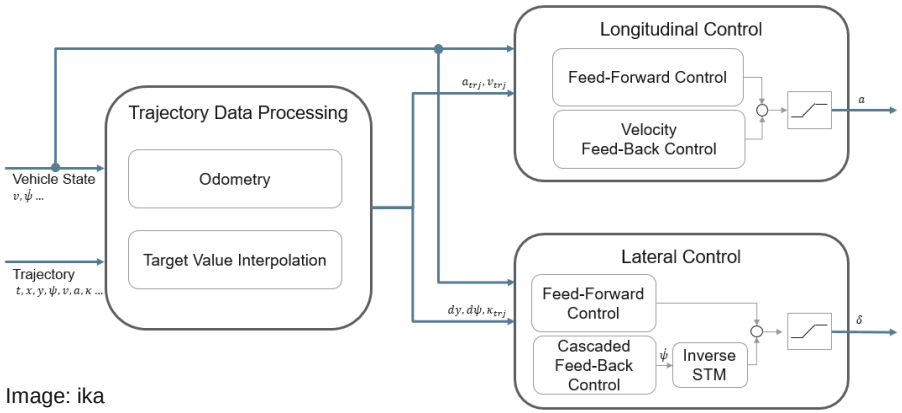
Introduction – Tasks in Section 4

Stabilization

Subdivided into three Subsections:

Trajectory-Control using Feedback-PID-Controllers

- **Based on** the previously implemented trajectory-planning approach
- **Derive** odometry equations
- **Calculate** control variables
- **Implement** the output equation of a **PID-Controller**
- **Integrate** a longitudinal and a lateral controller
- **Using** an inverse single-track model



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Time Horizon