

Automated and Connected Driving Challenges

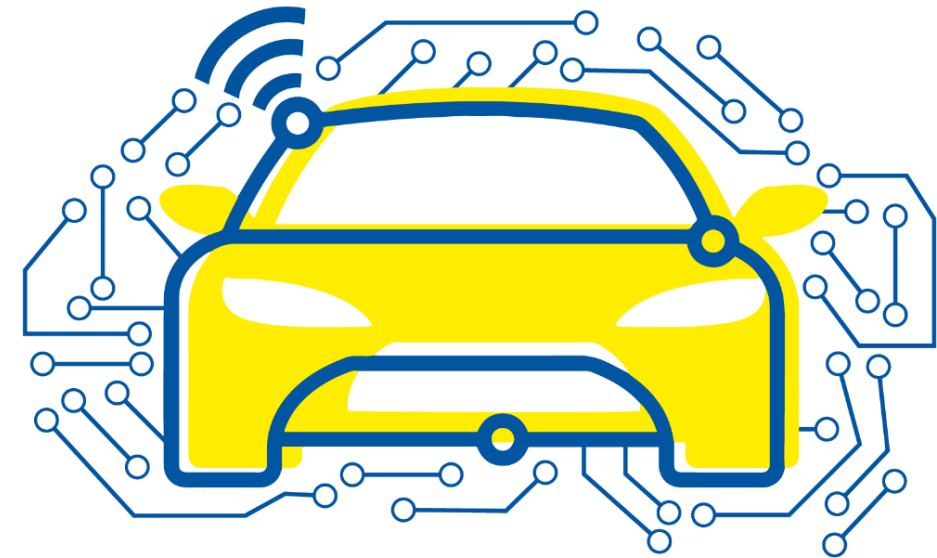
Section 1 – Introduction & Tools

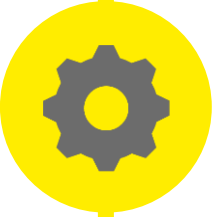
Robot Operating System

Introduction

Bastian Lampe

Institute for Automotive Engineering

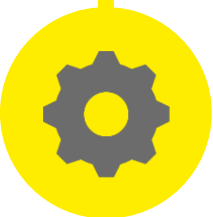




Robot Operating System – Introduction

What is ROS?

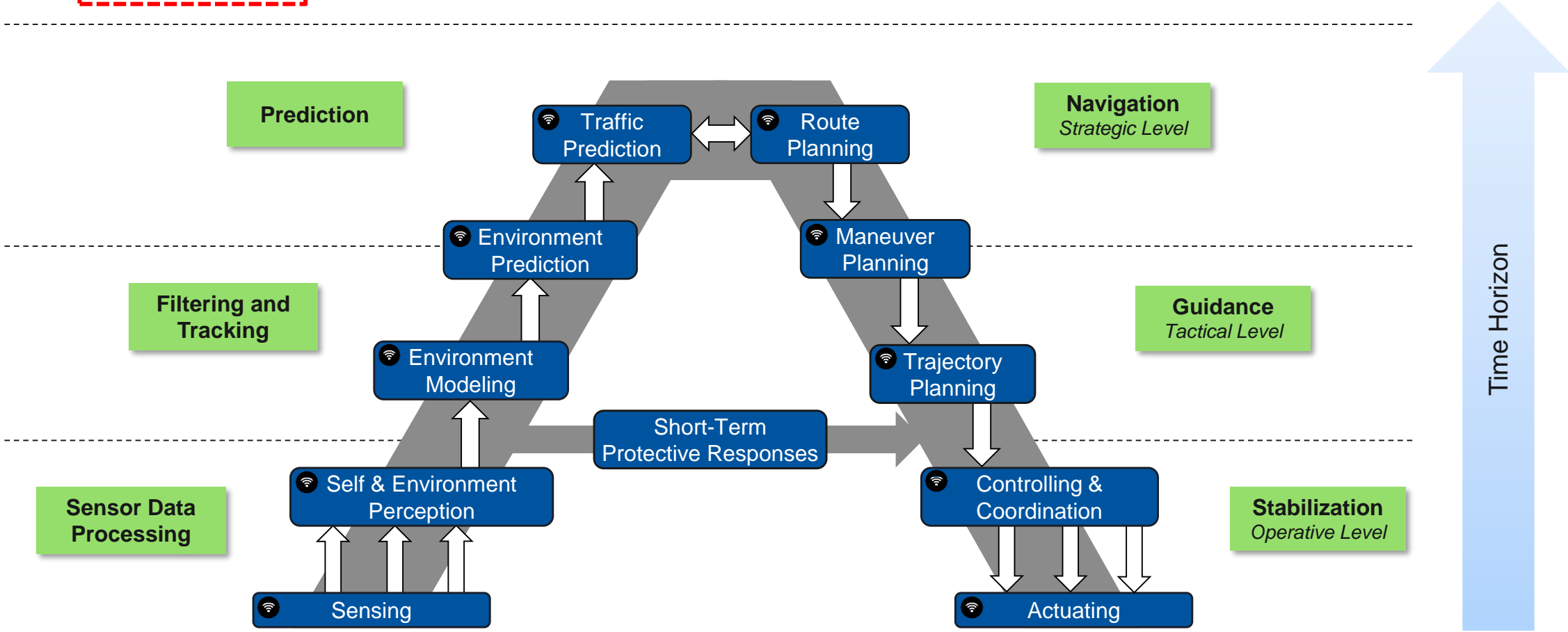




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ROS in the A-Model

A Section 1



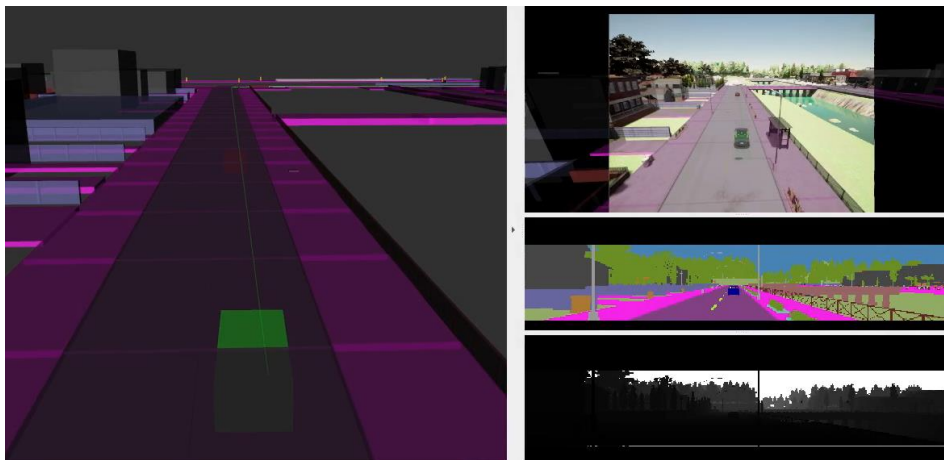


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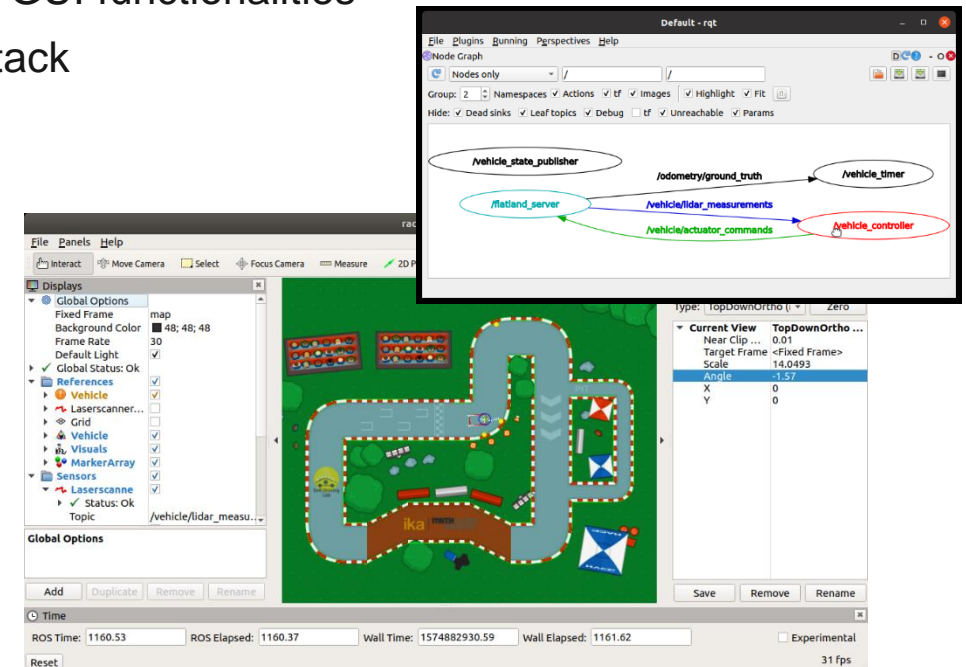
ROS Fundamentals

ROS

- Learn fundamentals about the Robot Operating System
- Explore communication strategies within the ROS framework
- Visualize data and results together with the provided ROS GUI functionalities
- Integrate a simple vehicle controller into an AD software stack



Video: ika



Images: ika



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The ROS Ecosystem

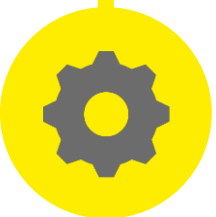


ROS: Robot Operating System

Image: [ros](#)

Open-source **collection of software frameworks** that provide **building blocks for developing robotics applications**

- **Plumbing:** Message passing system between ROS Nodes
- **Tools:** command line and graphical tools for configuration, visualization, simulation, debugging, logging, ...
- **Capabilities:** available software libraries for perception, mapping, planning, control etc.
- **Community:** Large number of developers who can work together to advance the ROS ecosystem



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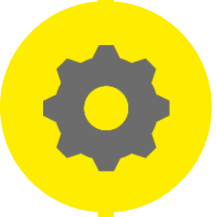
Philosophy

- **Open source:** Official ROS functionalities are free and open source
- **Multi-domain:** provides generic tools that work across many domains
- **Multi-platform:** can be run on a variety of platforms like Linux and Windows
- **Distributed:** Allows to run applications across multiple devices
- **Light-weight:** Middleware adds little compute overhead
- **Ecosystem:** Large community provides lots of additional tools and functions

Source: [ros](#)



Image: [ros](#)

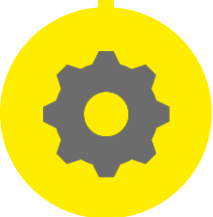


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Community & Additional Information

- **Community**
 - [Discussion forum](#)
 - [ROS Answers](#)
 - [ROSCon](#) annual ROS developers conference
- **Contributing**
 - [ROS Wiki edits](#)
 - [ROS Tutorial writing](#)
 - [ROS best practices](#)
- **Additional Information & Links**
 - [ROS website](#)
 - [ROS wiki](#)
 - [ROS tutorials](#)
 - [ROS courses](#)

 **ROS.org**



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ROS vs ROS 2



Image: [ros](#)

ROS
Noetic Ninjemys

EOL May 2025



Image: [ros](#)

ROS 2
Humble Hawksbill

EOL May 2027

Current ROS distributions

- In **ACDC**, you will use both **ROS** and **ROS 2**, but mainly ROS
- A lot of **ROS 2** features and tools supported by ROS are **still under development**
- **ROS 2** will bring many updates that allow **new use cases**