

ROS - ROBOT OPERATION SYSTEM

ASM Team Project 2025

Prof. Dr.-Ing. Ralf Schuler (✉ ralf.schuler@hs-esslingen.de)

Last edit March 9, 2025

In order to develop and test automated driving systems a traffic environment in the scale 1:14 is going to be established¹ in the CAST (Center for Automated Driving and Service Technology). All relevant aspects of automated driving can be validated and verified in such a miniaturized environment.

CONTENT

In this project a ROS2 environment shall be installed a Nvidia Jetson Orin Controller. ROS2 nodes have to implemented to read sensor signals (camera, Lidar), exchange information via a CAN-Bus with other controllers and process some data. Whenever possible Simulink and code generations shall be used for the implementation of the ROS nodes.

Step 1 [approx. 3 weeks]

Self-Training

- Introduction to ROS2
- Introduction to ROS2 in Simulink
- establishing a ROS2 test environment on PC

Step 2 [approx. 7 weeks]

Implementation of ROS2 Nodes

- ROS2 stereo camera node
- ROS2 LIDAR node
- ROS2 CAN-bridge node

Step 3 [approx. 3 weeks]

Realization of Show Cases

- Gathering camera data
- Gathering LIDAR data
- Reading and providing data via CAN

Step 4 [approx. 2 weeks]

Documentation

- System modeling with System Composer
- Scientific paper in \LaTeX (approx. 5-7 pages per student) published on OPUS
- File share on github / gitlab
- Tutorials and/or short videos for successors

¹Automated Driving in Miniaturized Traffic environments scale 1:14

Conditions:

This project is offered to ASM students at Esslingen University. The work continues predecessor projects and has interfaces to other project teams. Weekly regular meetings take place in presence. According to the module handbook the required workload corresponds to 240h per student.

TAGS

Automated driving

Stereo Camera

LIDAR

CAN

ROS

PREREQUISITES

Matlab/Simulink
Software Architecture
Programming
Modeling
Computer Vision
 \LaTeX



LINKS

- CAST
- System Composer
- ROS2 in Simulink
- Standalone ROS Nodes
- Manual Deployment of ROS Nodes