# Simulation-based Development and Testing of Automated Driving

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# Integration and Control of Agent Models

SET Level

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### Agenda



- Osi Sensor Model Packaging for Agents (OSMP) Daniel Becker
- ika-Driver

Daniel Becker

- BMW-Pedestrian Thomas Bleher
- Abstract Behavior of Traffic Agents Heinz Sachsenweger

# **OSI Sensor Model Packaging**

General

- Name origins from sensor model development
- Goal: Generate FMU with OSI interfaces
- Adapted from ASAM OSI GitHub project
- Concept for extension for agent models in SET Level
- Proof of concept in MS1
- Contribute result to ASAM OSI project





Image sources: https://www.asam.net/ https://github.com/

# **OSI Sensor Model Packaging**

OSMP for Traffic Agents





Agenda



# Integration of ika Driver Model

Osi Interface Internal Interface

### ika Driver Model

Integration (1)





# ika Driver Model

#### Integration (2)



Consider speed limits + comfortable curve speed 

### ika Driver Model

Capabilities

Longitudinal



Source: J. Klimke, D. Becker and L. Eckstein, "System Design of an Agent Model for the Closed-Loop Simulation of Relevant Scenarios in the Development of ADS," Aachen Colloquium Sustainable Mobility, 2020



Lateral

# ika Driver Model

#### Demo Video





Agenda



# Integration of BMW Pedestrian Model

# Goal – what are we aiming for?



#### Simulate human behaviour



#### and vehicle interaction



#### for different types of simulation



#### using standard interfaces



# ASAM OSI®

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### **Current state**





# Challenges



Торіс	Status
Representing the walkable space	Open: probably ASAM OpenDRIVE 2.0
Efficiently handling the map for realtime simulation	Partially solved: introduction of OSMP GroundTruthInit. Further improvements needed: e.g. FlatBuffer instead of ProtoBuf.
Representation of junctions	In Progress: either OSI 3.4 or OSI 4.0
Representation of sidewalks	Solved in OSI 3.3
Pedestrian movement (head movement, gestures, etc.)	In Progress: either OSI 3.4 or OSI 4.0

### Demo Time 🙂





Agenda



# Abstract Behavior of Traffic Agents

## **Motivations and Goals**



- Decentralizing of agent functionality and intelligent behavior:
  - Abstract agent behavior can be formulated and passed as command to agent
  - Decentralization of intelligent behavior
- Proposal for OpenSCENARIO or/and Open Simulation Interface (OSI)

## **Simulation Environment**





# **Proof of Concept**





# **Simulation Video**

Ignore\_AllTrafficParticipants = false





## **Simulation Video**

Ignore\_AllTrafficParticipants = true





### Discussion



# Thank you!

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