Eclipse Foundation & openADx
Automotive Tools & Infrastructure

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The Eclipse Foundation

350+ Projects

275+ Corporate Members

1500+ Committers

30 Professional Staff
Trust Across the Lifecycle

- Software provenance
  - What is actually running on your device
- Software safety
  - Knowing what the software will do
- Data provenance
  - We use data to teach our machine learning systems
  - Data poisoning
OpenADx

Focus: AD Toolchain

Architectur e definition, Ingest/ store, Deep learning, Simulation and test, Integrat e, Build, Simulation-based validation, Test drive, Connectivity-based validation

GOAL

› Industry-wide accepted definition of the AD toolchain
› Foundation for reference architecture
› Key to ensure efficient implementation and interoperability
Eclipse openPASS – an open source approach to safety impact assessment via simulation

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ESV Conference, Detroit, 08.06.2017
What is openPASS?

„open Platform for the Assessment of Safety Systems“

“The openPASS Working group wants to foster and support an open and innovative eco-system providing tools, systems, and adapters for standardized, openly-available and vendor-neutral platform for simulation of traffic scenarios.”
Prospective evaluation of safety systems

Goal of prospective evaluation of safety systems – independent of methods, data and tools:

What are the effects of safety systems and automated driving functions with regard to safety?

− „True positives“: reduction of conflicts and accidents, reduction of accident severity
− „False negatives“: which accidents cannot be addressed / detected early enough?
− „False positives / true negatives“: how to achieve high specificity e. g. by avoiding false positives?

openPASS aims to unify various virtual assessment approaches on one platform:

- Accident re-simulation
  + only relevant situations
  + fewer models needed
  - missing information

- Traffic simulation
  + full scope of scenario
  + arbitrary variation/runs
  - traffic model validation

- Scenario variation
  + controllable variation
  + combine various models
  - harmonization efforts
Eclipse SUMO – what is it?

• DLR’s open source microscopic transportation system simulation software
• Current version 0.30.0
• Under development since 2001, with the explicit goal to simulate even large cities / areas in real-time
• Current limitation: the city of Berlin
• SUMO comes with a full-fledged suite of helper programs that do setting up, running, and controlling such a simulation
• Most important of those tools is TraCI which allows to control a running SUMO simulation from outside via programs in various languages
• Active community with roughly 30,000 downloads annually, and about 1,000 requests on the mailing list.
Eclipse SUMO – components

- SUMO: Simulation without graphical Interface
- SUMO-GUI: Simulation with graphical Interface
- NETCONVERT: Importer for road networks
- OD2TRIPS: Importer for O/D matrices
- JTRROUTER: Router based on junction turning percentages
- DUAROUTER: Router based on dynamic user assignment
Eclipse Kuksa
Open Source Connected Car Platform

- Establishment of **standardized vehicle IoT and Cloud interfaces** to and from the vehicle
- Eclipse-Che-based **App IDE** to simplify & speed-up development activities
  - Use & enhance Automotive Grade Linux (AGL) App development SDK
  - Full-blown IDE for **Kuksa-AGL App & Springboot Cloud App development**
  - Simplify the usage of automotive APIs integrated through IDE support
- Service enablers for **car-to-cloud connectivity**
  - Network infrastructure considerations
  - Next generation mobile networks
- Open source **in-vehicle platform**
  - Safe and secure gateway to the cloud
  - In-vehicle data access mechanism and application platform

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OpenADx – Open Automated Driving Accelerator

Xcelerate your AD development
Automated driving is a complex challenge

› AD requires a multifaceted development process incorporating a variety of software tools

› But none of these tools were ever designed to work together

› This costs us all time and money

› We oppose this by creating the leading automated driving ecosystem ➤ OpenADx

› Thereby, we leverage open collaboration and open source to
  • Accelerate time to market
  • Increase efficiency
  • Focus on customers
OpenADx
Beneficial for OEMs, Tier 1s and technology providers
The AD tool chain: Seamless integration and increased development efficiency

Integrate
Integration of existing tools (OSS and proprietary)

Participate
Adjust existing OSS and proprietary tools to your needs

Initiate
Develop additional OSS tools

- OEMs
- Automotive Tier 1
- IT/ttech. companies
- Semi-conductors
- Engineering service providers
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Focus: AD Toolchain

GOAL

› Industry-wide accepted definition of the AD toolchain
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From testbed to open source and standardization

Testbeds
› Validation of solution blueprint, often combination of exiting products/technologies
› Small, loosely coupled ecosystem of partners who play well together
› Usually strong Go-To-Market focus (example: IIC Track & Trace, first customer in <12 months)

Open Source Project
› Result of a testbed can be a joint open source project
› Sometimes new solutions
› Sometimes the “glue” required to tie together existing solutions

Standardization
› Often focusing on the APIs developed in the OSS project
› Usually slower moving
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Testbed/incubator portfolio

1. Focus on simulation

2. Focus on data capturing and management
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Timeline

Architecture definition → Ingest/store → Deep learning → Simulation and test → Integrate → Build → Simulation-based validation → Test drive → Connectivity-based validation

Partner acquisition

Testbed

Results

Q2 ‘17 Q3 Q4 Q1 ‘18 Q2 Q3 Q4

OpenADx in action at Bosch Connected Experience

Demonstrator: DDS based simulation tool connector

IAA
Thank-you!
Thank you!

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Find out more and join us
https://wiki.eclipse.org/OpenADx
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Focus: AD Toolchain Framework

GOAL

Ensure interoperability and openness along the AD toolchain

AD toolchain

Tool landscape

Data and process map

Interface map

Testbeds  Open Source

Leveraging open collaboration and open source to accelerate development of Automated Driving
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Focus: Tool Landscape

Architectural definition → Ingest/store → Deep learning → Simulation and test → Integrate → Build → Simulation-based validation → Test drive → Connectivity-based validation

Many vendors, many specialized tools!

GOAL

› Ensure transparency and make complex tool landscape more easily accessible for enterprise users
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Focus: Data and Process Map

Architectural definition → Ingest/store → Deep learning → Simulation and test → Integrate → Build → Simulation-based validation → Test drive → Connectivity-based validation

GOAL

› Prepare for easy data exchange and process interoperability between different tools

Required: Suite of reference data
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Focus: Interface Map

- Architectural definition
- Ingest/store
- Deep learning
- Simulation and test
- Integrate
- Build
- Simulation-based validation
- Test drive
- Connectivity-based validation

Required: Interfaces & common formats for data exchange

GOAL

› Enable easy data exchange and process interoperability between different tools
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Summary

From testbeds to Open Source projects

- Create transparency and common understanding
- Interoperability through interface harmonization
- Validation and open community