Using AI to improve Scenario-Based Testing

S3 – Integrating classical and autonomous systems

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Introduction to AVL

Solutions
- Engineering
- Testing
- Simulation Technologies

Elements
- Combustion Engine
- Transmission
- Control Unit
- E-Motor
- Energy Storage, FC
- Vehicle

Industries
- Pass Car
- Racing
- 2-Wheelers
- On-/Offroad
- Rail
- Marine
- Aviation
- Defense
- Power Generation
AVL DRIVINGCUBE

Powertrain Test Bench

AVL DRIVINGCUBE™
Complex cyber-physical system

Chassis Dyno Test Bench

Virtual Environment
Cooperation TNO and AVL

Road
Traffic
Environment
Scenario Database

Test Case Planning with realistic and relevant parameter ranges

AVL Test Case Generator

Execute Simulation

Testcases

Identify critical situations

Identify appropriate criticality parameters:
Time-to-Collision, Time-Headway, etc.

Real Road Statistics
Unmanned Utility Vehicles

Past  Current  Future

Powertrain  Automated Driving  Technical Supervision
Research Project „ASIMOV“

- [www.asimov-project.eu](http://www.asimov-project.eu)
- **AI** training using **Simulated** Instruments for **Machine** Optimization and **Verification**

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**Typical System**

**Modeling**

**Digital Twin**

- state
- reward
- action

**Optimization-AI**

- control
- measure

**Actual Systems**

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ASIMOV Solution Strategy

1. Vehicle System
2. Digital Twin
3. AI-based Optimization
4. Actual System

Modeling

Training AI with digital twin

System optimization with AI

Vehicle System

Test System

Vehicle System

Digital Twin

AI-based Optimization

Actual System

Vehicle System

Digital Twin

AI-based Optimization

Actual System
Research Project „ASIMOV“

Simulation
- Vehicle
  - AD-Functions for Track & Follow
    - ACC
    - AEB
    - LKA
  - Campus Environment

Automatic Scenario Variation
- Data Evaluation
- RL Agent
- Scenario
Research Project „ASIMOV“
Research Project „ASIMOV“

Scenario Engine
Research Project „ASIMOV“

Sensor Engine
Thank you

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