dSPACE HIL for Autonomous Driving

Real-Time Testing of High-Performance Computers

Highlights

- Comprehensive portfolio for closed-loop and open-loop testing of high-performance computers (HPCs) for autonomous driving
- Sensor-realistic models for camera, radar, lidar, and utrasonic sensors
- Comprehensive restbus simulation for Automotive Ethernet, CAN, LIN, and FlexRay

Application Areas

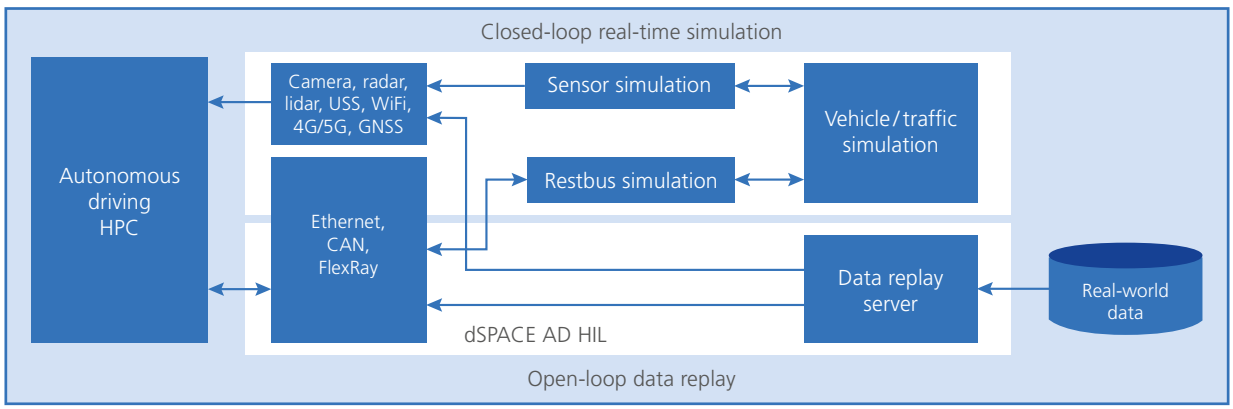
The dSPACE Hardware-in-the-Loop (HIL) test system based on dSPACE's SCALEXIO technology is a modular and powerful platform for testing autonomous driving HPCs in closed-loop and open-loop simulation. Closed-loop simulation is based on comprehensive models for vehicles, traffic, environment as well as different sensor models, such as camera, radar, lidar, and ultrasonic. Restbus models and interfaces for Automotive Ethernet, CAN, LIN, and FlexRay cover the communication part of the HPC. Failure modes and manipulation options allow for failsafe and security testing. All simulation components run time synchronized in real-time. Using the SCALEXIO platform for open-loop simulation allows to replay sensor and bus/network data captured during real test drives. Sensor fusion and perception algorithms can thus be tested with recorded real-world data.

Key Benefits

- Closed-loop and open-loop/data replay testing
- Pixel- and point-accurate raw data injection for camera, radar, lidar, and ultrasonic sensors
- Sophisticated vehicle, environment, and traffic models
- Highly precise real-time synchronization
- Efficient utilization of GPU and FPGA technology
- End2End testing through V2X simulation solutions for 4G/5G, WiFi, GNSS
- Scenario-based testing, ISO 26262- and SOTIF- compliant testing

Seamless Testing from SIL and Cloud to HIL

dSPACE tools and solutions for testing autonomous driving HPCs are embedded in an overall validation architecture that allows a maximum re-use of models and software tools between hardware-in-the-loop testing and software-in-the-loop testing as well as cloud-based simulation.



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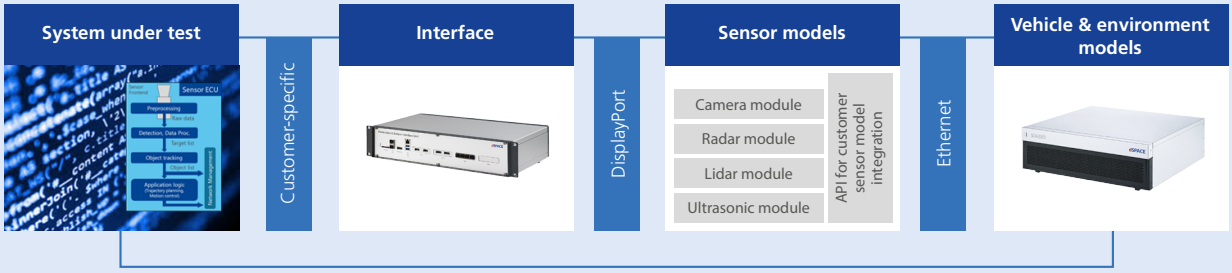
Sensor Simulation

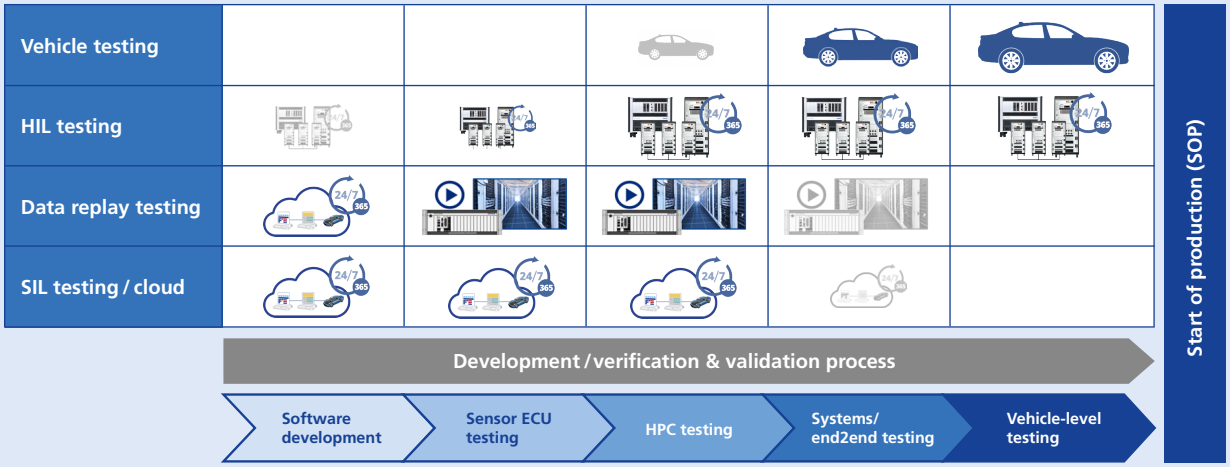


The dSPACE HIL for Autonomous Driving solution offers sensor-realistic simulation for all sensor types, from camera and radar to lidar and ultrasonic sensors. While the sensor models are physics-based, which means that they simulate the real physical effects such as reflective surfaces, the generated sensor raw data is very accurate with respect to simulated camera images or data or lidar point clouds. These sensor models are executed using GPU and FPGA technology, making it possible to run tests even under different weather conditions, such as fog, rain, and snowfall.

Key Benefits

- Physics-based, sensor-realistic models using using GPU and FPGA technology for highest processing power
- Open for customer specific sensor models through e.g. OSI interface
- Synchronous simulation of multiple sensors for complex AD sensor setups
- Support of multiple serialization/deserialization interfaces of up to 10 Gbit/s, enabled through a large partner network

Test Strategy



Seamless Testing from SIL and Cloud to HIL

Development of ADAS/AD systems is a multi-stage, iterative process. dSPACE HIL for Autonomous Driving is therefore part of an overall test strategy provided and supported by dSPACE. This test strategy is based on state-of-the-art test methods and provides an answer to the overall "Safety-first"-challenge for automated driving.

Key Benefits

- Overall test strategy, covering all relevant validation methods in ADAS/AD development
- Based on „Safety-first for automated driving" white paper of the automotive industry
- Allows an effective validation of ADAS/AD systems throughout all phases of development

Contact Information

Our technical sales staff will assist you in choosing your dSPACE system. They will also provide you with quotations and more detailed information about the dSPACE solution for PC- and cloud-based simulation and other dSPACE products. Please contact your local office:
www.dspace.com/go/locations