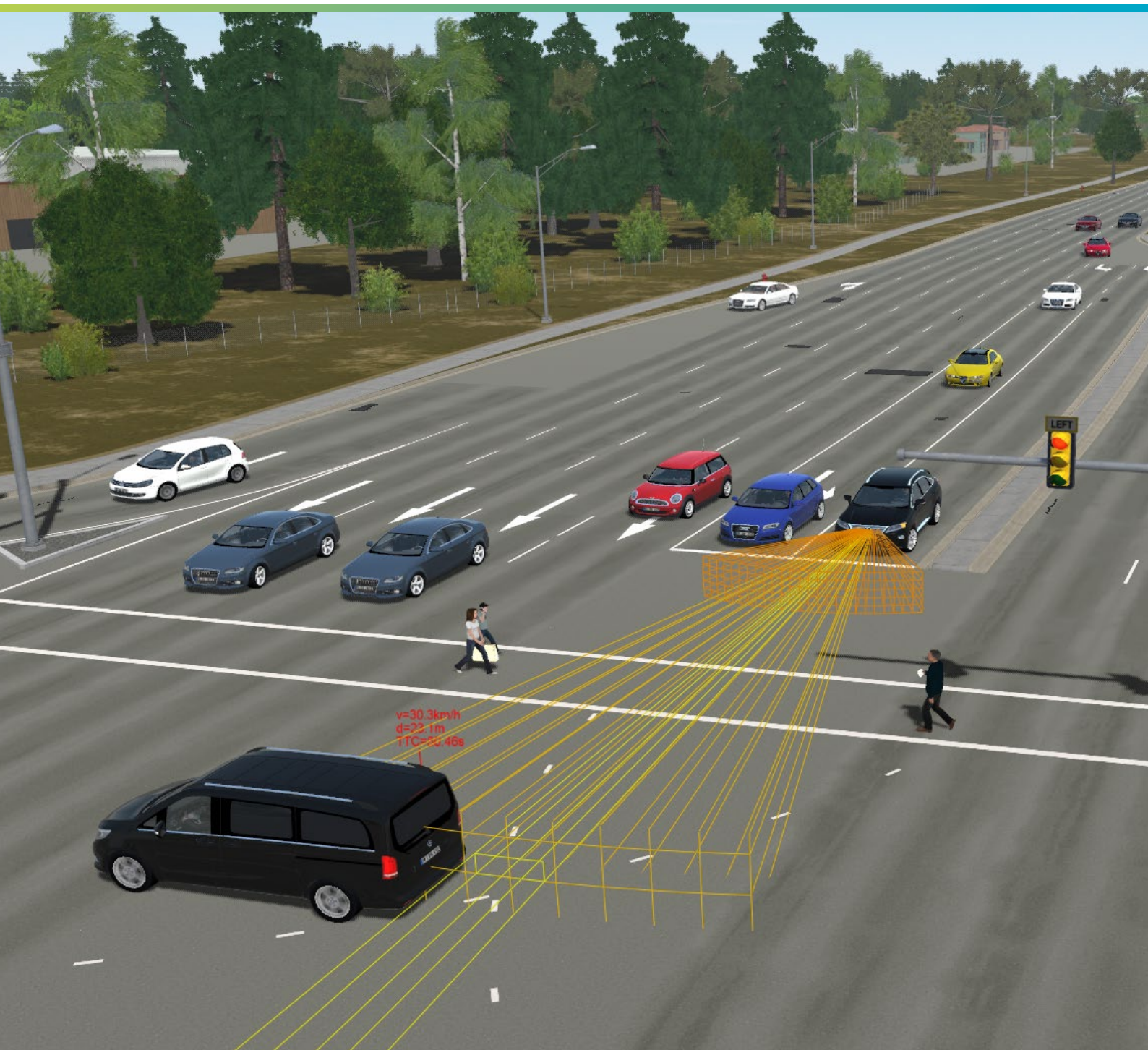


# VIRES Virtual Test Drive (VTD)

Complete tool-chain for driving simulation applications

VTD is the world's most widely used open platform for the creation, configuration, and animation of the virtual environments and scenarios for training, testing, and validation of ADAS and Autonomous Vehicles.

It provides a modular tool-set for road network creation, scenario definition, vehicle dynamics, traffic and sound simulation, simulation control, image generation, sensor perception, etc. to create a digital reality for complex driving scenarios.



# VIRES Virtual Test Drive (VTD)

VTD is a software package with over twenty years of existence in the market, and it is in service at numerous installations in the automotive, aerospace, and railroad industry worldwide, with applications in mining, and farming. It can be used in MiL, SiL, HiL, DiL, and ViL applications.

VTD's Road Designer (ROD) is an interactive road network editor, which is/can be used as the basis for 3D world creation. It consists of extensive libraries of 3D objects and textures representing different countries, for the creation of either complete databases or elemental building blocks (so-called 'tiles').

Recent advances in VTD have allowed it to do massive scaling of scenarios on the Cloud, thus helping in 'edge case' detection. This is done by analyzing millions of scenarios with thousands of parallel processes allowing for billions of virtual test miles to be done faster than real-time simulation, enabling an increased speed of deployment for ADAS and AD systems.

## VTD helped define and uses open standard files from OpenDRIVE, OpenCRG, and OpenSCENARIO:

- OpenDRIVE is the leading global open format and the de-facto standard for the description of road networks in driving simulation applications.
- OpenCRG is the leading open-source data format and tool-suite for the creation, management, and evaluation of detailed road surfaces.
- OpenSCENARIO is the state-of-the-art open format for the definition of dynamic behavior in simulated road networks

## Applications

### Vehicle Control

- VTD generates annotated object lists as input of your ADAS / AD control algorithms

### Perception

- VTD generates raw sensor data (Camera, LiDAR, RADAR, etc.), which is processed in the system under test

### Headlighting

- Simulation of the effects of intelligent headlights on the environment

### Driver Training

- Drivers are exposed to challenging driving situations or made familiar with the effects of ADAS on vehicle behavior

### Training Data Generation for AI System

- VTD generates raw sensor data (images, point clouds, etc.) and associated ground truth information and records both in data sets

### Vehicle Test Benches

- VTD is used in co-simulation with the HiL system and provides the sensor inputs from the virtual environment

## Capabilities

### Sensors

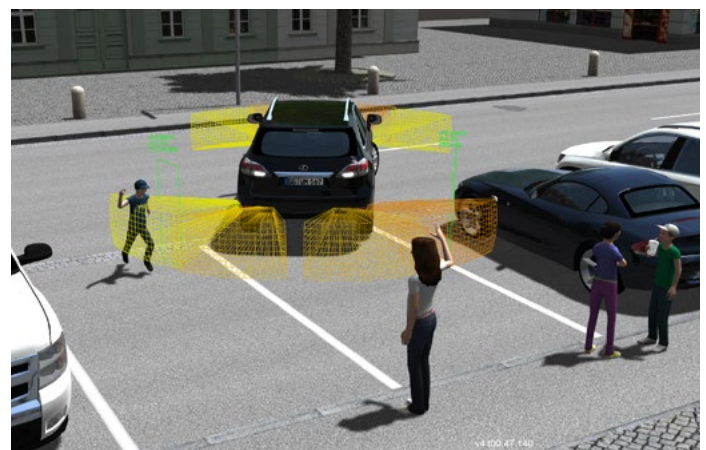
- Simplified perfect sensors that provide object list while high fidelity sensors provide raw data like images and point clouds
- SDK for customization of sensor models

### Pedestrian

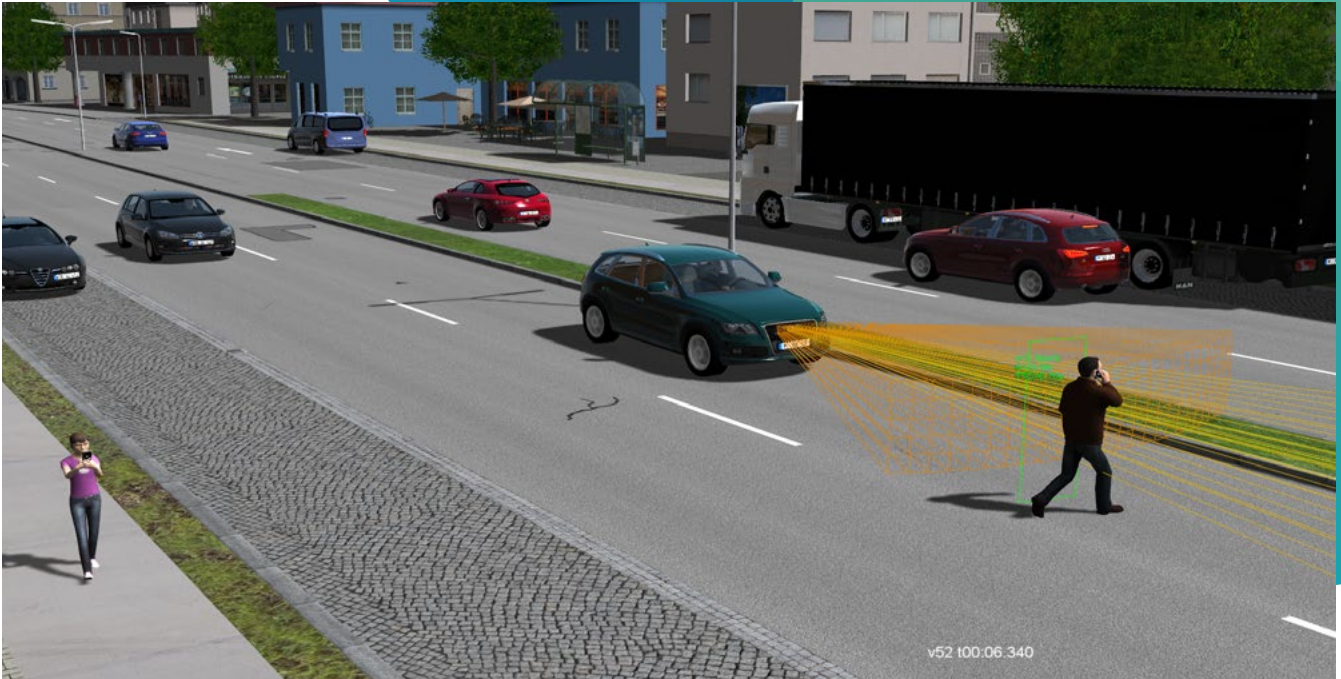
- The capability of deterministic behavior of pedestrians on a defined path
- Pedestrians moving in more significant numbers autonomously in the road network while interacting and avoiding collision with other pedestrians and obstacles
- Possibility to edit the gesture and gaze of pedestrians

### Scenarios

- Simulations from simple maneuvers to complex urban situations with 200+ participants







#### VIRES Virtual Test Drive

- Scenarios may be retrieved from real-world measurements or are completely artificial
- Simple user interface for scenario creation with VTD's Scenario Editor

#### Vehicle Model

- Model development with “to the scale” with a precision of millimeters deflections for all modes of transport ranging from Scooters to trains and helicopters
- Capabilities to build the models from a photograph with a minor offset

#### Vehicle Dynamics

- Different level of vehicle dynamics fidelity within VTD like bicycle model, 5 Mass Model and co-simulation with multi-physics vehicle dynamics model like Adams
- Possibility to connect with external vehicle dynamics

#### Weather

- Variations of time-of-day, clouds, visibility, precipitation

#### Traffic Model

- Simulation of independent, intelligent agents that each can act either autonomously or in deterministic mode

#### Massive Scaling

- Analysis of thousands of scenarios in parallel to detect edge cases

#### Benefits of VTD

- Native support for OpenDRIVE®, OpenCRG®, and OpenSCENARIO®.
- Extremely modular and scalable via its network interfaces
- Can be integrated on any platforms (MiL, SiL, DiL, ViL, HiL)
- Contains accurate sensor models (object-list based and physics-based); customizable via SDK
- Generates high-quality images (PBR technology); customizable via SDK
- Contains various libraries of 3D models and country-specific signs/signals databases
- Enables the simulation of complex traffic situations
- Easy data monitoring and injection in real-time through GUI or command lines
- Operable from a single computer up to a full-scale HPC environment
- Couple to other Hexagon AB solutions like Adams Real Time for accurate sensor modeling in vehicle dynamics
- Takes data from Hexagon's Leica Geosystems LiDAR
- Edge case detection among a thousand scenarios and Cloud base support



Hexagon is a global leader in sensor, software and autonomous solutions. We are putting data to work to boost efficiency, productivity, and quality across industrial, manufacturing, infrastructure, safety, and mobility applications.

Our technologies are shaping urban and production ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

VIRES, part of Hexagon's Manufacturing Intelligence division, provides industry-leading simulation platforms and services that enable the research, development and validation of advanced driver-assistance systems (ADAS), active safety systems and autonomous mobility technologies. Learn more at [vires.com](https://vires.com). Hexagon's Manufacturing Intelligence division provides solutions that utilise data from design and engineering, production and metrology to make manufacturing smarter.

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