

ANSYS VRXPERIENCE

DRIVING SIMULATOR POWERED BY SCANeR

Perform closed-loop simulations — driving through real-time scenarios on virtual roads — to assess performance

Ansys VRXPERIENCE Driving Simulator powered by SCANeR™ provides a comprehensive, open and scalable platform for testing advanced driver-assistance systems (ADAS) and autonomous vehicles (AVs) against safety requirements. Using model-in-the-loop (MIL), software in-the-loop (SIL) and hardware-in-the-loop (HIL) testing, you can virtually log millions of miles per day on high performance driving simulators, navigating through physics based virtual reality environments. In addition, thanks to driver-in-the-loop (DIL) capabilities, you can connect real drivers with your virtual vehicle to test and validate human assessment and acceptance against specific driving scenarios in safe conditions.



VRXPERIENCE Driving Simulator powered by SCANeR incorporates:

- Terrain
- Real-time 3D scenarios
- Traffic, pedestrian and weather conditions
- Car vehicle dynamics
- Sensor and light models



Quickly create virtual worlds from high-definition maps and simulated traffic flows. Model realistic and custom virtual road environments and testing scenarios that account for variable conditions.

VRXPERIENCE Driving Simulator powered by SCANeR supports industry standards and systems development workflows in a seamless simulation process. It also interfaces with other vehicle dynamics programs and the complete driver hardware simulator (steering wheel, pedals, etc.) for the most immersive driving experience.

/ Scenario

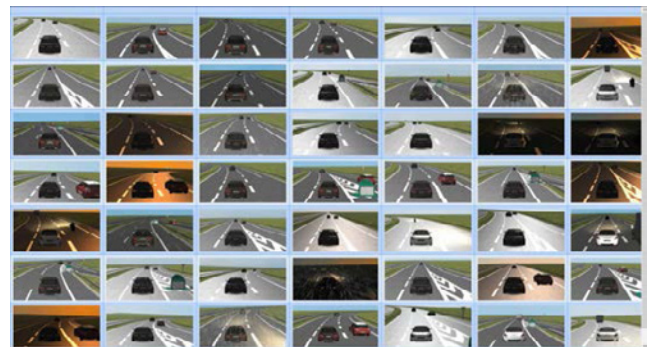
With VRXPERIENCE Driving Simulator powered by SCANeR, you can prepare dynamic driving scenarios and run simulations with events, surrounding traffic and vehicle dynamics included. The software contains complete and accurate multibody vehicle dynamics models for a wide range of vehicle types, including subcompact and midsize cars, sedans and sport utility vehicles. Scenario creation and editing functions are accessed through the software's graphical user interface and/or the Python™ programming script. Unlimited scenarios can be created using the extensive content library, which includes human avatars for more realistic simulations.

/ Vehicle and Pedestrian Traffic

VRXPERIENCE Driving Simulator powered by SCANeR places a vehicle into a complex traffic simulation. Models, based on artificial intelligence (AI), are used to account for a number of variables, including the movement of other vehicles and actions taken by their drivers, traffic signals, lane variations, etc.

The software has 180 vehicle models: cars, trucks, bicycles and more. It also includes approximately 300 other types of objects found in driving environments, including road signs, traffic signals and buildings. The models facilitate the creation of ultrarealistic simulations.

VRXPERIENCE Driving Simulator powered by SCANeR also automates scenario variability creation for massive simulation.



/ Sensors

VRXPERIENCE Driving Simulator Powered by SCANeR includes ideal geometrical models of camera, radar, lidar and ultrasonic sensors for the preparation of ADAS and AV simulations. Smart sensor outputs, such as target vehicle, infrastructure object, lanes, etc., are made available via a software development kit (SDK) that is open simulation interface (OSI)-compliant. You can model the behavior of sensors with or without defects, and develop and test planning and control algorithms isolated from perceptions. Additionally, you can test the robustness of ADAS features, including automotive night vision, automatic parking, glare-free high beams and more.

/ Vehicle Dynamics

With VRXPERIENCE Driving Simulator powered by SCANeR, you can choose various vehicle types to create a complete and accurate multibody vehicle dynamics model (CALLAS). This dynamic simulation considers different engine types, tire and road friction variations and the impact of wind on the vehicle. It enables accurate MIL vehicle dynamics testing and driver-in-the-loop (DIL) dynamics simulation.

Editor — edit vehicle dynamics parameters to simulate a specific car, truck or off-road vehicle.

Third-party model — connect any custom submodel or vehicle model using C/C++, Ansys Twin Builder or Simulink.

Motor sports (lap time simulation) — optimize the setup of a race vehicle with a variety of tools.

The model contains parameters that could be fine-tuned to fit real measured data. The virtual dynamics measurements can then be aligned with the real measurements.

/ Parametric Exploration

Parametric exploration allows you to study vehicle performance while varying one or several parameters involved in the vehicle dynamics. It assesses the impact of variations on the same situation to obtain data necessary in making the right choices.

Two methods are available:

- Modulation of a CALLAS vehicle parameter while observing its impact on vehicle behavior during a simulation (e.g., aerodynamic notch variations on the same circuit lap)
- Modulation of a scenario parameter while observing its impact on the same vehicle (e.g., speed variations when taking a corner)

/ Terrain

With VRXPERIENCE Driving Simulator powered by SCANeR, you can edit road logic and 3D environments. The software supports processes capable of translating the real world into a simulated world. It incorporates very high-fidelity road database and photorealism. It is OpenDrive-compliant and can import a variety of map data, including OpenStreetMap, HERE, HD Mas, and more.

Among the available tracks is a useful laser-scanned version of Mcity at the University of Michigan, which enables ADAS testing — including corner case simulation — in a virtual environment. The scanned tracks increase the coverage of virtual testing and benchmark real versus virtual test track performance.



/ Record and Analysis

To ease the analysis of your vehicle performance studies, Ansys VRXPERIENCE lets you record and replay any simulation you have previously performed. You can then easily explore recorded data synchronously with 3D views and videos, to select the optimal system configuration easily.

You can also export data to MS Excel or standard CSV files to perform extensive comparative studies.

/ Environment Libraries

Ansys VRXPERIENCE powered by SCANeR comes with a dedicated traffic and pedestrian library to easily include A.I. based traffic movements and actions within your VR environment. Based on this library, you can compute traffic vehicles and pedestrians' trajectories and behavior to recreate automated and realistic traffic conditions. The library lets you:

- Simulate swarm traffic.
- Create dynamic vehicles.
- Manage dynamic signs management as control traffic lights.
- Activate and deactivate lights.
- Script the behavior of the pedestrians and vehicles to:
 - Make a vehicle change lane
 - Make pedestrians cross the road outside of the crosswalk
 - Force the speed or acceleration
 - Respect/ don't respect road signs

You can also generate new vehicles during the simulation thanks to source and sink features:

- Source allows to automatically produce vehicles, defining a vehicle flow per hour.
- Sink allows deleting vehicles produced thanks to a source.

The library includes:

- Vehicles: cars, truck, buses, 2-wheels, trailers, bicycles, motorcycles, ...
- Alive beings as pedestrians and animals...
- Infrastructures: traffic lights, barriers, message board...

VRXPERIENCE allows to include up to 200 library items in your traffic simulation.



/ Immersive Driver-in-the-loop

VRXPERIENCE Driving Simulator powered by SCANeR can be connected to hardware:

- Steering wheel and pedals with force feedback — interfaces with SENSODRIVE hardware
- Compact backup to real cockpit — compliant with various hardware; interfaces through SDK
- **Warping and blending:** Manage cylindrical or spherical projection systems with this warping and blending plug-in. The module supports the following software: Scalable Display, domeprojection.com®, Amateras and Mersive.
- **Augmented Reality:** This module provides a full set of functions for augmented reality (AR) applications, from stereo camera calibration to final display renderings.
- **Video:** With this module, you can record video streams from cameras monitoring the driving simulator. These recordings are synchronized with all simulation data.
- **Eye Tracker:** This feature synchronizes an eye tracker system within a driving simulation environment.
- It supports a variety of hardware, including: SMARTEYE® PRO, faceLAB, SMI, Pertech and EyeLink®.
- **Head Tracker:** Bring the driver into an immersive virtual environment, such as a 3D CAVE, with the Head Tracker module. It supports hardware including, Polhemus, InterSense InertiaCube™ 2, laserBIRD, ART, eMagin Z800, TrackIR, Oculus and OptiTrack.

Ansys VRXPERIENCE Driving Simulator powered by SCANeR Features	PRO	PREMIUM	ENTERPRISE
Advanced Scenario	◆	◆	◆
Vehicle and pedestrian traffic	◆	◆	◆
Sensors	◆	◆	◆
Vehicle dynamics	◆	◆	◆
Road editor		◆	◆
Vehicle dynamics editor		◆	◆
Third- party vehicle dynamics		◆	◆
Motor sport (lap time simulation)		◆	◆
Parametric exploration		◆	◆
Simulator hardware interface			◆
Eye tracking			◆
Immersive environment			◆

Ansys VRXPERIENCE Product Line

- VRXPERIENCE Driving Simulator powered by SCANeR
- VRXPERIENCE Headlamp
- VRXPERIENCE Sound
- VRXPERIENCE MRO
- VRXPERIENCE Sensors
- VRXPERIENCE HMI
- VRXPERIENCE Perceived Quality

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