



# 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.



VRXPERIENCE Driving Simulator powered by SCANeR incorporates:

- 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.

### **Advanced Scenarios**

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.

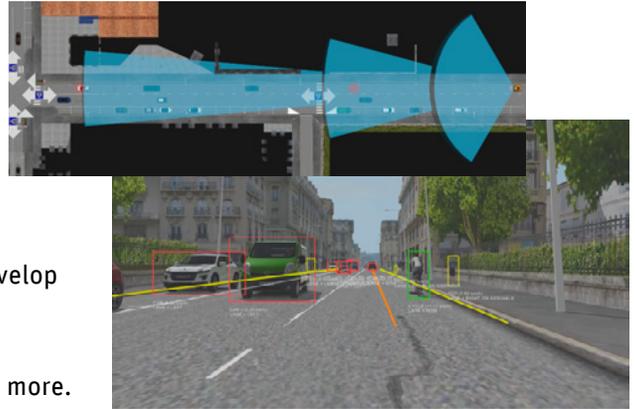
The software has 180 vehicle models: cars, trucks, bicycles and more. It also includes approximately 300 other types of objects found in driving environments, including road signs, traffic signals and buildings. The models facilitate the creation of ultrarealistic simulations.



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.

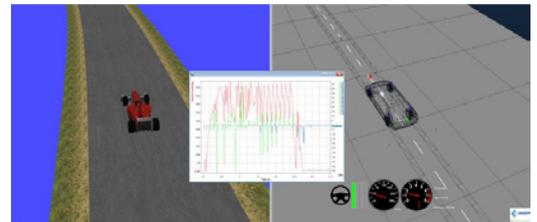


**Editor** — edit vehicle dynamics parameters to simulate a specific car, truck or off-road vehicle.

**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:

- Lap precomputation — a fast steady-state simulation that estimates the lap time of a given vehicle on a given race track by computing its performance envelope and applying it.
- Dynamic lap computation — a fully dynamic simulation that computes the lap time of a given vehicle on a given race track.



Driving is optimized by re-computing sections of the lap where the vehicle crashes or exits the track.

- Importation of data — feature that validates the CALLAS model against the actual race car.

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.

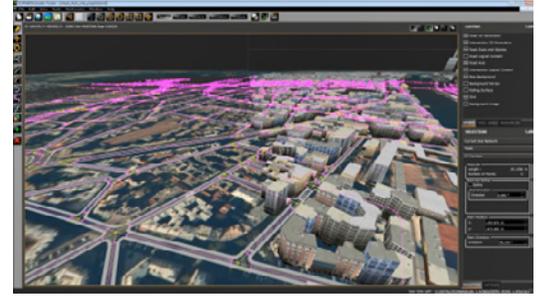
**Two methods are available:**

- 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)

## Road Network and 3D World Editor

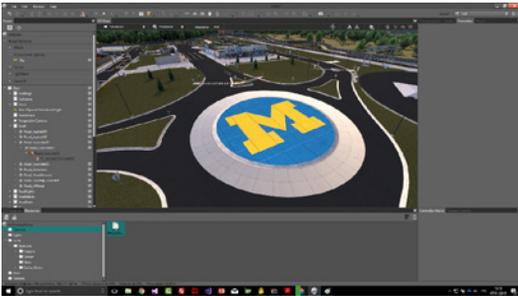
With VRXPERIENCE Driving Simulator powered by SCANer, you can edit road logic and 3D environments.

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.



## Video

With this module, you can record video streams from cameras monitoring the driving simulator. These recordings are synchronized with all simulation data. The module natively supports different types of video streams, including DirectX, HTTP and/or RTSP, Blackmagic and screen and audio captures. It enables:

- Monitoring — display real-time surveillance of driver and simulator (using camera or near-infrared camera)
- Recording — record movie in separated and synchronized stream
- Analyzing — play back video recordings

## Eye Tracker

This feature synchronizes an eye tracker system within a driving simulation environment.

- During the simulation, trigger events based on driver gaze information and an object observed by the driver (computed information can be retrieved into records)
- With posttreatment, obtain the tracker system outputs that are synchronized with all simulation recorded data

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 re-computes the point of view based on tracked position and orientation. It takes advantage of a dedicated interface within the head tracking hardware.

Head tracker supports hardware including, Polhemus, InterSense InertiaCube™ 2, laserBIRD, ART, eMagin Z800, TrackIR, Oculus and OptiTrack.

## Warping and Blending

Manage cylindrical or spherical projection systems with this warping and blending plug-in. Perform warping to distort an image to fit on curved screens.

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 rendering. A pair of stereo cameras mounted on a binocular head-mounted display (HMD) displays live images from the real world combined with the 3D visual rendering.

## Cockpit Interface

VRXPERIENCE Driving Simulator powered by SCANeR can be connected to live cockpits:

- Steering wheel and pedals with force feedback – interfaces with SENSODRIVE hardware
- Compact backup to real cockpit – compliant with various hardware; interfaces through SDK



With this module, you can control professional haptic steering wheels and pedal force feedback hardware. From the GUI, you can easily parametrize the steering wheel and pedal controls (stiffness, damping, maximal torque, friction, etc.), as well as additional vibration (depending on road type).

| 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 Sensors
- VRXPERIENCE Headlamp
- VRXPERIENCE HMI
- VRXPERIENCE MRO
- VRXPERIENCE Perceived Quality
- VRXPERIENCE Sound



ANSYS, Inc.

www.ansys.com

ansysinfo@ansys.com

866.267.9724

© 2019 ANSYS, Inc. All Rights Reserved.