

# VRXPERIENCE SENSORS

## High-Fidelity Physics-Based Camera and Lidar Sensor Simulation with Ground Truth Information

ANSYS VRXPERIENCE Sensors is part of the ANSYS VRXPERIENCE product family.

### Driving scenario

Using driving scenarios, you can create and simulate simple driving situations that can include several vehicles. With the sensor testing scenarios, several cars can be added to the simulation to create more complex environments, such as following a car and monitoring the path of a crossing car simultaneously. Each vehicle in a scenario can be static or automatic:

- Static mode enables you to perform static evaluation at a specific point of interest.
- Automatic mode enables you to drive along a predefined trajectory while the operator stays focused on the headlamp-lighted pathway.

Ego-vehicles can be added to a basic vehicle dynamic simulation to test simple driving situations using either a keyboard or a Logitech® steering wheel. More advanced scenarios and vehicle dynamics can be addressed in cosimulation with ANSYS VRXPERIENCE Driving Simulator powered by SCANeR™.

### Ray-casting ideal sensors

ANSYS VRXPERIENCE Sensors has ideal models of ultrasonic, camera, radar, flashing lidar and rotating lidar sensors. The ray-cast output of these sensors can be used in ANSYS® SCADE®, MATLAB® Simulink® or a C++ plugin.

With the ideal sensor feature, you can define a sensor's specifications or develop new ADAS features. Sensor data output (lightning strike hit point, material properties) and vehicle parameter input/output (position, orientation, speed, steering wheel angle, etc.) are available in the interface. This feature also provides ground-truth data.

Thanks to the consistent combination of data from multiple sensors, the simulation enables you to validate the model of a smart sensor's behavior or its fusion algorithms.

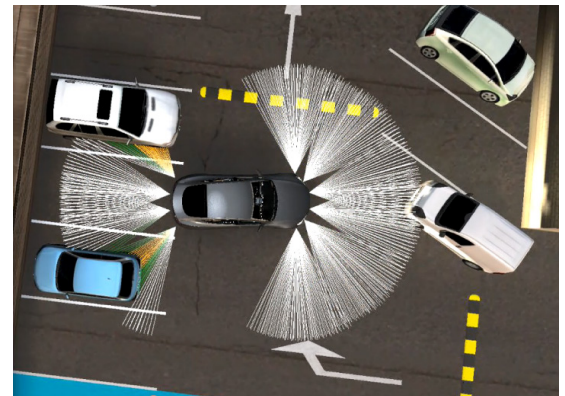
Deterministic and real-time modes are both supported. VRXPERIENCE and ANSYS SCADE, MATLAB Simulink or C++ plugin synchronization produce repeatable results.

### Camera sensor

ANSYS VRXPERIENCE Sensors includes a high-fidelity, real-time, physics-based simulation of cameras. The software contains a parametric model of camera, which enables you to simulate every actual camera model. This model simulates all components such as the lens system, imager and pre-processor. For automotive front-facing cameras, the windshield can also be considered in simulation.

The simulation considers the optical properties of the environment in visible range, along with the optical properties of the lens system (distortion, chromatic aberration, etc.) and the optoelectronic properties of the imager (color filter array, dark current noise, etc.). With the addition of plugins, the simulation can manage dynamic adaptation (autoexposure, white balance, thermal incidence, etc.).

The camera simulation creates raw images, which are used to test and validate perception algorithms either as models (model-in-the-loop) or software (software-in-the-loop).

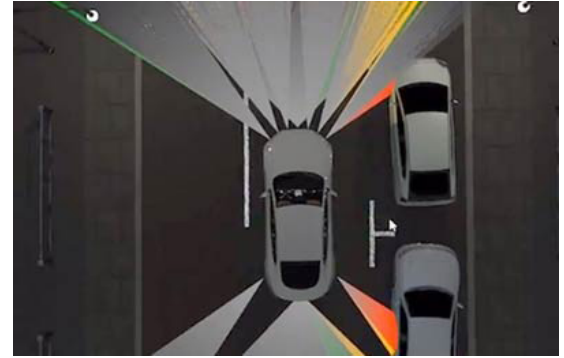


## Lidar Sensor

ANSYS VRXPERIENCE Sensors integrates the simulation of ground-truth sensors for the lidar model. The physics-based lidar model is designed to accurately reproduce the behavior of the IR emitter and sensor. All types of lidar technology (scanning, solid-state, flash, etc.) can be parameterized in the software.

Powerful graphical visualization capabilities enable you to assess your complex ADAS systems and autonomous vehicles virtually, by connecting optical and functional operations in a single driving simulator.

You will benefit from powerful ray-tracing capabilities to recreate sensor behavior and be able to easily retrieve sensor results through a dedicated interface. This solution provides a unique way to collect virtual sensor information during real-time drives and use the information to develop autopilot code.



## Hardware-in-the-loop (HIL) connectivity

ANSYS VRXPERIENCE Sensors uses raw sensor output to feed actual smart sensors being tested on a hardware-in-the-loop (HIL) test bench. It connects to the image injection box, which replaces the actual imager (inter-integrated circuit, or I2C) with the virtual image. The injection box also manages high-speed connections between the imager and the car-to-infrastructure (C2I) processing chip.

	PRO	PREMIUM
Basic Driving Scenario	●	●
Ground-truth Sensor	●	●
Camera Sensor	●	●
Lidar Sensor	●	●
HIL Connectivity		●

## ANSYS VRXPERIENCE Product Line

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

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