ANSYS

SYSTEMS

VRXPERIENCE HMI

Prepare and Appraise CAD-Based Virtual Prototypes of a Cockpit HMI in a Real-Time, Immersive VR Environment

ANSYS® VRXPERIENCE HMI is part of the ANSYS VRXPERIENCE product family. It provides real-time physics-based lighting simulation in a virtual reality (VR) environment.

Visual experience in virtual reality

VRXPERIENCE — Edit, display and deploy a scenario in a real-time, interactive, immersive environment to experience your virtual prototype on a 1:1 scale. Visualize 360° ANSYS SPEOS results using immersive devices, such as CAVE and consumer-grade HMDs (e.g., Oculus Rift® and HTC Vive®. Access all the essential features to perform data import, data preparation, rendering and VR deployment capabilities.

Visual Experience — Visualize your virtual prototype in a real-time, physics-based simulation. Apply optical properties and lighting to your prototype. Thanks to the physics-based results of VRXPERIENCE, you will be able to perform accurate design reviews and lighting studies and to make reliable decisions. Additional dedicated tools, such as ambient occlusion generation or post-processing effects, enable you to increase the realism of the scene, maintaining high performance for real-time and virtual reality reviews. Thanks to easy-to-use configuration and timeline features, you can mimic real-life product components behavior such as door opening, light dimming, advanced interior lighting scenarios, etc.

Advanced ray-traced lighting

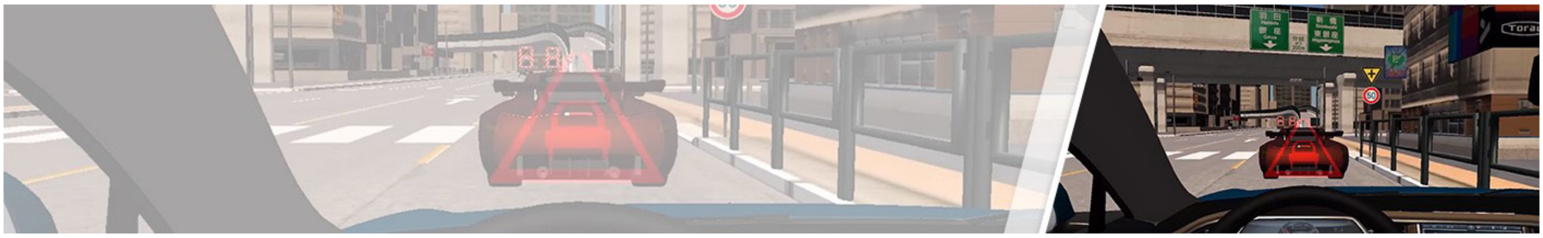
Deterministic, real-time ray-tracing is the computation of light rays' propagation through hits and bounces, considering the material's surface and volume optical properties. This optical simulation is not subject to simulation noise and is thus compatible with display-based virtual reality (Powerwall or CAVE). Deterministic ray-traced lighting simulation is especially suited for mirror simulation, windshield reflections appraisal and optical simulation of head up display systems.

Rear vision — Perform accurate visibility and rear vision studies based on the exact result of a light reflection on a flat or curved surface. Explore and modify rear-view mirror position and orientation, and compare several mirror shapes in real time. Experience several driver percentile's points of view. Assess the visibility performance of your prototype in several environments and contexts (car in the blind spot, car following the driver, car overtaking the driver, etc.). Capture an immersed user's point of view and track a driving buck (an automotive simulator) to improve user immersion.

Windshield reflection — Perform windshield or glass-house reflection studies based on physically correct reflection simulation. Compare several dashboard material layouts, varying colors and trims, and assessing their impact on the driver's visual comfort. Identify and optimize the source of disturbing reflections. Modify lighting conditions in real-time thanks to a calibrated sky and sun model. Save hours of time focusing on critical conditions with ANSYS SPEOS simulations.

Head up display simulation

Import head up display (HUD) systems designed in ANSYS SPEOS and perform optical simulation of the HUD optical system or a calibrated real-time content assessment while driving.



Specify and improve the quality of the displayed content, such as driver assistance systems, by experiencing a variety of driving scenarios, especially emergency situations. Based on a real-time virtual image, you can:

- Specify the HUD virtual image position and size early in the process, including augmented reality head up displays (AR-HUDs), according to the targeted driver assistance system (adaptive cruise control, forward collision warning, line departure warning, traffic signal recognition, etc.)
- Determine the maximum sensor latency and fusion algorithm latency
- Define and validate the content of the HUD experience in a custom driving scenario
- Assess the perceived quality for all percentiles of drivers
- Ease the internal and external communication and decision making

Take advantage of an accurate, real-time, ray-traced-based computation of the resulting virtual image, compatible with virtual reality and stereoscopy, to experience and optimize the optical performance of your HUD components. In quick iteration loops, you can evaluate optical effects such as:

- Distortion influencing the perceived quality of the final image
- Ghost image blurring that will impair the readability of the final image
- Disparity between left and right eye perception, which affects comfort
- Overlap between the objects from the real world and the ones from the virtual image

Additional features, such as configuration management, enable you to dynamically switch between several driver percentiles, several design options and several head up display systems. Or you can switch between specified virtual images and the actual virtual image resulting from the optical system, enabling easy comparisons which are impossible to predict.

Virtual interactions

Within an immersive environment, you can efficiently evaluate the pilot's or driver's responses to new intelligent systems or advanced proactive safety systems and ensure that important information will be instantaneously understood. You can naturally interact with the HMI of your future cockpit and accurately test user interactions in a variety of scenarios, without endangering lives or damaging expensive equipment.

Thanks to finger tracking, you can get an accurate representation of the user's real hands and gestures in the virtual environment. The accurate ART® finger tracking device or the markerless Leap Motion® device are supported. Using natural interactions, navigate your tactile displays thanks to dynamic content (based on HTML5, CSS and js), easily compare several user workflow propositions for look and feel. Interact with virtual actuators to push or rotate a joystick. Test your full cockpit user experience thanks to the easy-to-use publish/subscribe bus, which enables you to circulate events or data between display content, actuators and the virtual prototype of the device under test.

Additional features, such as configuration management, enable you to dynamically switch between several cockpit architectures, several HMI software prototypes or several user workflow propositions.

Full body tracking — Envision your user in the virtual simulation thanks to the body visualization feature. Using full body tracking, perform cockpit reachability and accessibility studies. Full body reconstruction requires a minimum of 6 tracking targets (also compatible with HTC Vive trackers) and is based on the H-Anim LOA2 norm.

Advanced VR capabilities — ANSYS VRXPERIENCE can support all types of VR deployment configurations. Each VR setup is composed of one or several nodes consisting of displays or viewports on a display. Each license package is delivered with a given number of nodes. Only one node is required for consumer grade HMDs. You can request additional nodes to adapt to your VR setup.

The VR setups are defined by "deploy platforms." Each platform contains the system topology description (number of nodes, screen size, resolution, etc.) and the tracking information (including body tracking).

Collaboration between reviewers is enhanced using side display platforms. This specific platform displays the point of view of the immersed user, or another point of view on the scene being experienced. The immersed user is provided with a user-friendly immersive menu and has access to VR-review dedicated tools (navigation, configuration control, cut plane, etc.)

Physics Engine — An accurate physics engine is provided to simulate rigid bodies or complex mechanisms to complete the cockpit experience. Physical objects can be manipulated directly by the immersed user.

Embedded software-in-the-loop

Eliminate the need for a physical prototype in your system design process by running the embedded software inside your physical prototype.

Run and interact with your embedded software in VR thanks to out-of-the-box compatibility with SCADE and SCADE Display embedded software. An open API is also available to connect any custom embedded HMI or control software. In addition to ANSYS solutions driving simulation, cosimulation with flight simulators such as Prepar3D® is also available. Feed all HMI output content with software-in-the-loop (displays, head up displays, AR head up displays), and feed virtual sensor and simulation data to the embedded software. Control any part of the virtual prototype or scenery through the open API.

Assess the usability and workflows of your final software in specific flight/driving conditions. Safely test emergency situations with full cockpit interactivity. Validate the HMI from the driver's/pilot's perspective and gather user feedback early in the design process.

VRX | DRIVING EXPERIENCE PLATFORM

COTS OR IN-HOUSE SOFTWARE

	PRO	PREMIUM	ENTERPRISE
Real-time physics-based lighting	●	●	●
HMD	●	●	●
Advanced ray-traced lighting		●	●
Finger tracking		●	●
Virtual interactions		●	●
Embedded software-in-the-loop		●	●
HUD simulation		●	●
CAVE			●
Number of deployment nodes	1	2	10

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