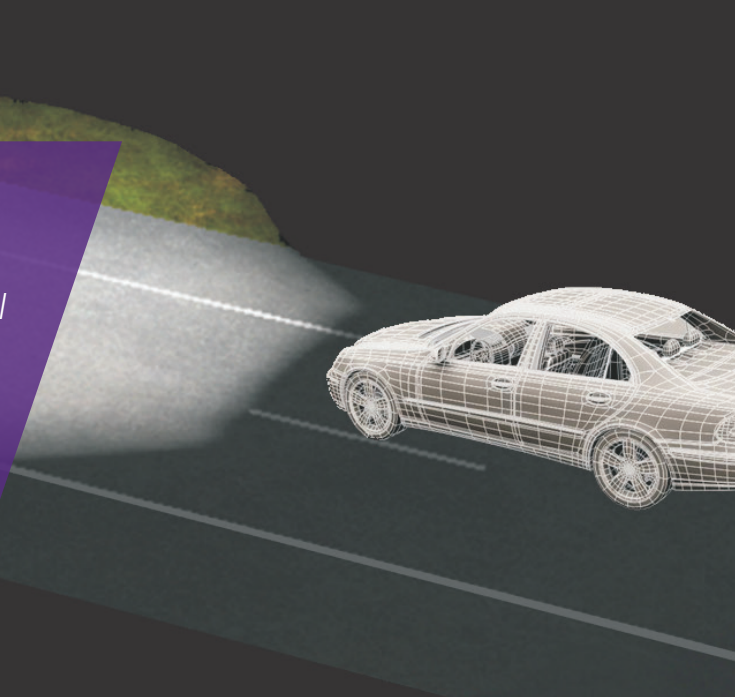# LucidDrive

Night Driving Simulation

Overview

LucidDrive is a standalone night driving simulation tool for evaluating beam patterns of vehicle headlamps under conditions as realistic as possible.

Using the latest modern graphics hardware technology, LucidDrive shows near-photorealistic lighting scenes in real time, making it the ideal tool for providing a virtual test drive prior to expensive fabrication and testing.

Beam Pattern Analysis

To verify the differences in resulting beam patterns, you can switch between various sets of headlamps. For example, you can combine left- and right-aimed low-beam lamps, and any number of headlamps with different aiming positions can be combined and mounted on the car. Distance marker lines on the road are included to provide visibility targets for benchmarking. Figure 1 shows the aiming wall with ECE-Markers, which can be displayed at any time during the drive.
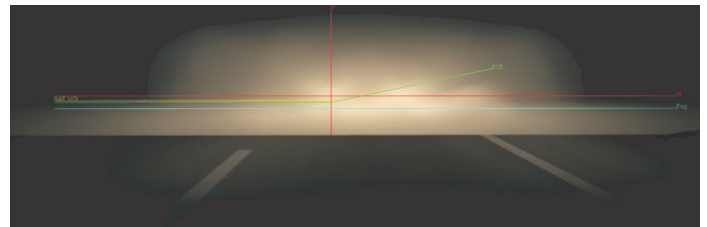
MultiView

LucidDrive provides multi-view drive capability for comparing and troubleshooting the resulting beam patterns. For example, as shown in Figure 2, you can easily achieve direct comparison between Halogen and Xenon headlamps with different color temperatures. When the Luminous Intensity Distribution (LID) is rendered spectrally by LucidShape, even color borders of dispersions by lenses can be seen on the street.
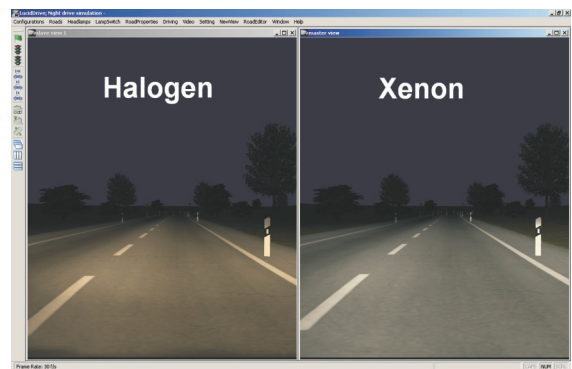

Figure 1: Aiming wall with ECE-Markers

Figure 2: Halogen vs. Xenon headlamp simulation
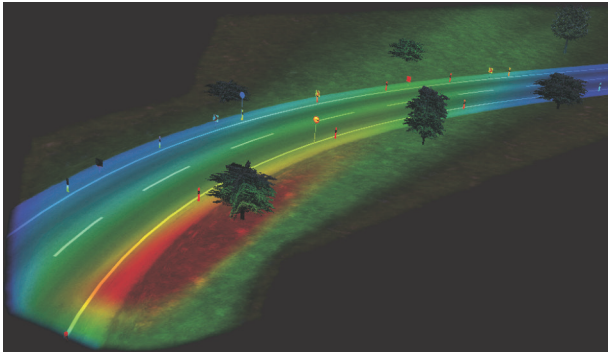
synopsys.com/optical-solutions

Figure 3: AFS simulation with false color representation

AFS—Adaptive Front Lighting System

One of the most challenging innovations in automotive lighting are AFS headlamps. Because several approaches are being developed to accomplish the specifications, LucidDrive can simulate AFSs in different ways—up to 126 light distributions simultaneously, depending on your computer hardware. Further developments in graphics cards may make even more possible. Other modern lighting models, such as daytime running lights, can be simulated as well.

Real Time Feedback

LucidDrive runs in an automatic driving mode. You can switch quickly between different lamps, viewing positions, road types and scenes during a simulation, and receive interactive feedback immediately. With the optional Wheels and Pedals add-on, you can add a steering wheel and gas pedal able to control the vehicle's movements (see Figure 4).

Figure 4: The Wheels and Pedals add-on enables a near-realistic driving experience

Custom Roads

LucidDrive comes with a large selection of road scenes. You can also create new courses with the Road Editor tool (see Figure 5). Select a polygonal sequence and additional road information (e.g., "four-lane highway" or "countryside road") from a broad variety of road types, and LucidDrive creates a continuous, curved road with curves that adhere to the mathematical form of a clothoid curve (e.g., easement curves). You can add overhead signs, roadside signs, trees, poles and other objects to enhance the road.
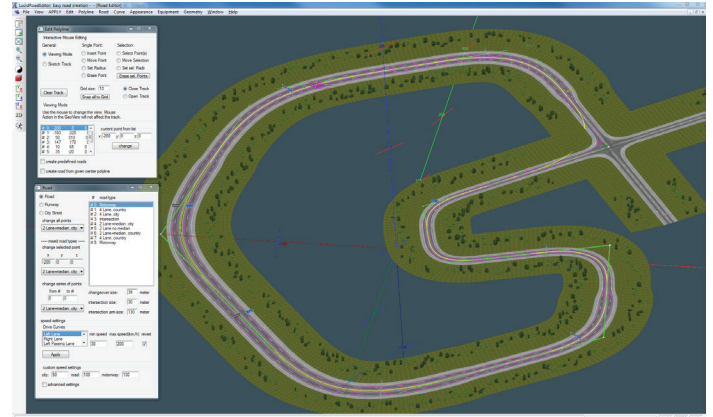

Figure 5: The Road Editor allows you to customize the test track

Video Export

During the drive simulation, all video frames can be automatically exported as bitmaps. You can merge the bitmaps into a movie that can be played in real time on any computer, to show your customers the advantages of your products. (LucidDrive does not have to be installed for video replay.)

Advanced Graphics

LucidDrive features photorealistic and texture-based graphics. It uses a complex mathematical model to convert realistic physical models into graphics. The LucidDrive model takes into account surface properties, such as reflectivity of the street pavement and the scenery (trees, roadside markers and traffic signs). The photorealistic appearance is accomplished with textures and the latest hardware shading technology. LucidDrive is optimized to run best with NVIDIA graphics cards.
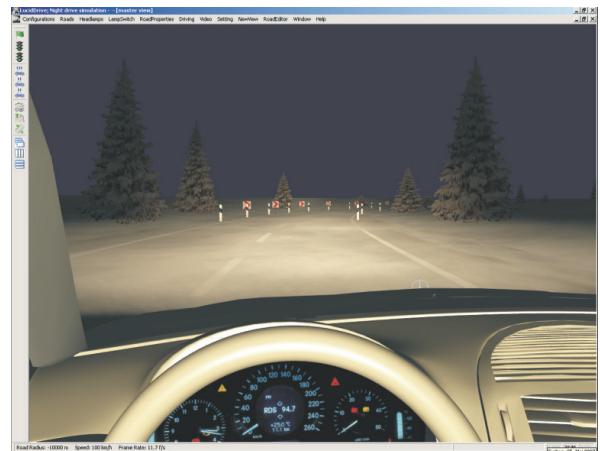

Figure 6: Exported movies can be played on any computer without LucidDrive installed

Figure 7: Build a near-photorealistic night driving simulator with LucidDrive

Driving Simulator

You can build a custom driving simulator system based on LucidDrive using several computers connected by an Ethernet network (see Figure 7). With this calculation power, you can run a multi-monitor setup with a surrounding view to give you a highly immersive, real-time driving experience. Additionally, with the Wheels and Pedals add-on, you can attach a steering wheel and gas pedals for a realistic night driving simulator to create the best platform for decision making and comparison of different solutions under digital test-drive conditions.

To Learn More

For more information on LucidDrive and to request a demo, please contact Synopsys' Optical Solutions Group at (626) 795-9101 between 8:00am-5:00pm PST, visit https://www.synopsys.com/optical-solutions.html, or send an email to LucidDriveinfo@synopsys.com.

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