IRAY RENDERING FEATURES

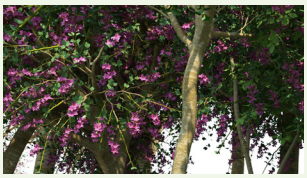
ADVANCED

Decals

Place multiple double sided Stickers on objects.

Hair/Fur

Realistic rendering of hair/fur/ fiber like geometry with look definition described in MDL.

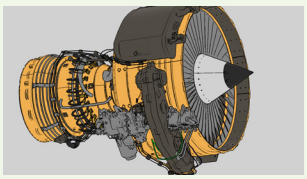


Instancing

Memory savings, and immediate updates of animated objects.

Rounded corners

Show highlights even if chamfers or filets are not explicitly modelled.



Toon/Line

Toon/line output of rendered geometry

CAMERA

Depth Of Field

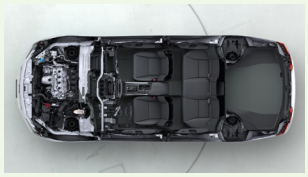
Efficient implementation of depth-of-field, optimized for each rendering mode.

Motion Blur

Provides an idea of motion in still images, and of fluidity in rendered animations.

Panoramic Snapshots

Render out cylindrical or spherical maps.



Section Planes

Multiple cross section planes, optionally closed with caps.

Stereo Viewing

Separate camera settings for right and left eye to achieve a 3D stereo output.

COMPOSITING

AOV Output

Support for the output of buffers which store various additional image information.

Matte Objects

Matte objects can be defined as stand-ins for already existing elements in the environment or backplate.

LIGHTING & LIGHTS

Caustics

Rendering algorithms which can simulate very complex light paths, such as those which create caustics.

Image Credit: Daniel Simon

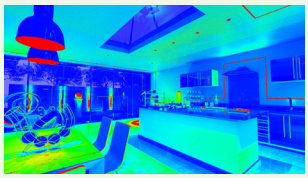
Emissive Geometry

Realistic, physically-based lighting model which produces desirable effects, such as soft shadows; simple and natural to set up.

Light path expressions

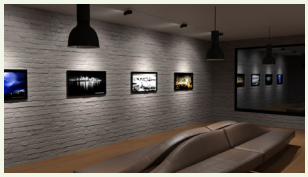
Separation of different types of light paths into different frame buffers.

LIGHTING & LIGHTS CONT.



Luminance Distribution

Render color coded image to determine luminance



Photometric Lights

Realistic lighting based on measured data.

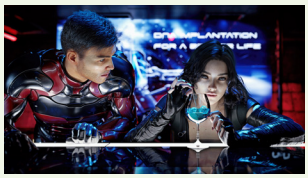
Sun/Sky

Interactive sun & sky system based on physical models.

MATERIALS

Measured Materials

Easy drop in usage of measured materials via MDL.



Subsurface Scattering

Simulate light interaction below the surface.

Volume Rendering

Simulation of interactions that occur within a volume.

Iray Rendering Related Features

FEATURE	DESCRIPTION	BENEFIT
RTX Support	Support of NVIDIA RTX technology.	Significant speed-up of the rendering time by using RT Cores / ray tracing hardware.
AI Denoising	AI based denoiser making use of NVIDIA Tensor Cores.	Noise free images within seconds instead of minutes.
Leading Edge algorithms	Industry leading, efficient use of quasi-Monte Carlo light transport algorithms.	Fast and accurate results in short time.
Physical Sun & Sky System	Interactive sun & sky system based on physical models.	A simple way to add realistic daylight to exterior and interior scenes. Allows interactive studies on the effect of daytime, orientation, and location on the illumination of a scene.
Image Based Lighting	High-dynamic-range images participate in lighting the scene.	Simple lighting setup based on real-world environment captures.
Conventional Light Types	Support for conventional light types: • point light • spot light • directional light • area lights	While emitting geometry produce a more realistic result, conventional light types can still be used to map lighting situations delivered by the DCC application.
Global Illumination	Full global simulation of direct and indirect lighting.	Easy to accomplish photo-real and natural-looking images without tuning dozens of knobs.
Light Profiles	Support of manufacturer-provided photometric data, such as .ies files, even on area lights.	Realistic lighting based on measured data.
Emissive Geometry	Define 2D surfaces or arbitrary 3D objects that contribute to the lighting of the scene. Full MDL support for textured emission included.	Realistic, physically-based lighting model which produces desirable effects, such as soft shadows; simple and natural to set up.
Hair/Fur rendering	Render spline based fur/hair geometry with MDL based material decription	Realistic rendering of curve based geometry like hair, fur, fiber
Light Probes	Sample Light intensities.	Detect light intensity at any point within the scene.
Spectral Rendering	Optional spectral rendering, including spectral texture support.	Reliable simulation and material behavior under varying light conditions can be achieved with a full spectral pipeline.
Line/Toon renderer	Render any scene in a toon and/or hidden line style	Non-photorealistic look for documentation and story telling
Large Number of Light Sources	Efficient sampling of 100.000s of light sources (incl. textured geometry lights).	Fast and accurate lighting with real lights, at large scale scenes (e.g. stadium or even cities).
Integrated Exposure Control	Several built-in exposure control algorithms, including photographic.	Efficient, internally optimized tone mapping, which can be adjusted interactively without re-starting the render.
Luminance	Render color coded image to determine luminance	Determine the luminance value for any point in your scene
Caustics	Rendering algorithms which can simulate very complex light paths, such as those which create caustics.	Sharp caustics as well as subtle details in the indirect lighting contribute tremendously to the photorealism of a rendered image.
Depth-of-Field	Efficient implementation of depth-of-field, optimized for each rendering mode.	Depth-of-Field is crucial in mimicking the behavior of a real-world camera.
Glare/Bloom	Post process to add bloom.	More natural look if using non-HDR capable outputs.
Matte fog	depth based coloring	achieve a more realistic look by tinting objects in the distance
Direct Buffer Access	Read/write directly from/to the buffers on the GPU	Change the render output by executing individual code
Rounded Corners	Adjustable normal tweaking and softening on sharp edges.	Show highlights even if chamfers or filets are not explicitly modelled.
Primvars	Read information from MDL Primvars	Additional information/definition for the renderer (vertex color, etc.)
Motion blur	Simulation of the blur caused by objects moving while the camera shutter is open.	Provides an idea of motion in still images, and of fluidity in rendered animations.
2D Backplates	Select an image as background image.	While a spherical HDR image is used to illuminate the scene, a different (high quality) photograph can be used as the rendered image's background, along with matching reflection and refraction effects.
Decals	Place multiple double sided stickers on surfaces.	Layered sticker system even across objects with multiple projection modes.
3D Backplates	Define any geometry as background environment.	Non distorted background when lighting with IBL spheres and matching parallax effects when moving the camera.

Subsurface Scattering	Simulation of material interactions that occur below the surface.	Sub-surface scattering is essential to the realistic rendering of certain types of material, such as wax, skin, and translucent plastics.
Volume Rendering	Simulation of interactions that occur within a volume.	Volume rendering is essential to realistically rendering of certain types of materials, such as fog, liquids or smoke.
Dome and Ground Plane	The environment map will be projected automatically onto a procedural dome and/or ground plane. • sphere • infinite sphere • half dome • box	Display the HDR image as part of the environment, with the flexibility to move the camera and change the point of view, along with perfectly matching IBLighting.
Light Portals	User-provided hints for the location of windows and openings.	Optimize render time for some difficult interior scenes by defining entry points for environment lighting.
Instancing	Various instancing modes to control the efficiency and build performance of the ray tracing acceleration structures.	Memory savings, and immediate updates of animated objects.
No Shadow Terminator	Normal handling for low-res geometry and/or bump and normal mapping.	Automatically removes lighting artefacts for low tessellated geometry or extreme bump maps.
Stereo Support	Simultaneous rendering of the left and right camera setup (i.e. eyes).	Separate camera settings for right and left eye to achieve a 3D stereo output.
Spherical or Cylindrical stereo support	Render out cylindrical or spherical maps.	Stereo output for low cost viewing devices like Google cardboard
Lens Distortion	Support more than a simple lens.	Support different lens setups to better match real cameras.
Light Path Expressions	Separation of different types of light paths into different frame buffers.	Allows different types of light contribution (e.g. specular, diffuse, indirect) to be manipulated independently in post. Also allows to separate contributions from different lights or even objects into multiple buffers.
Multiple Image Formats	Support for the most commonly used image formats for input and output.	Simply use the most common image file formats without explicit conversion. Custom extensions possible via plugins.
Automatic Error/ Quality Detection	Automatic estimate to stop rendering once a certain quality is achieved.	Prevents unnecessary render time spent on already resolved images so that no maximum sample number or other knobs need to be tweaked.
Render/AOV Buffer Support	Support for the output of buffers which store various additional image information: • beauty • alpha • depth • normal • texture coordinates • material id • object id • irradiance (and many more like diffuse, specular or glossy via Light Path Expressions)	Provides more flexibility to manipulate the rendered image in post.
Matte Objects	Matte objects can be defined as stand-ins for already existing elements in the environment or backplate.	Enables the renderer to simulate interactions between synthetic objects and the elements visible in the environment or backplate, leading to seamless interactions, incl. global illumination, of both worlds.
Blend Mode	Blend from one render mode (Interactive) into another (Photoreal).	Use the Interactive render mode for pre-lighting and material assignment and see the result in perfect quality in Photoreal.
Section Planes	Multiple cross section planes, optionally closed with caps.	Define multiple cross section planes (opt. with capped geometry) to investigate lighting effects or to enhance story telling.
MDL support	Support of the NVIDIA Material Definition Language in all render modes.	A very elegant way to have the same look in both in Iray Interactive and Iray Photoreal.
AxF Support	Support for the X-Rite material format.	Easy drop in usage of measured materials via MDL.
Hogel Rendering	Hogel rendering is the process of rendering a synthetic radiance image/dataset	Create input for light-field displays.

Beyond Rendering

FEATURE	DESCRIPTION	BENEFIT
C++ API	Modern C++ object oriented, component based, and extensible API.	Allows full control over all aspects of configuration, scene graph management and rendering.
Easy plugin architecture	Allows programmers to extend the Iray system using the C++ API.	Offers a very comfortable way to add plug-ins in order to extend existing functionality e.g. adding new image formats.
Shared Scene graph	Shared scene graph information in all rendering modes.	Integrate once and run the suitable renderer in your applications.
Mixed Mode	Render with GPU and CPU in parallel.	Pixel identical results on all supported hardware.
NVLink Support	Sharing huge texture data amongst supported GPUs.	Double the texture memory by coupling the memory of two graphic cards.
Multi-GPU	Automatic detection and usage of all NVIDIA GPUs in the system.	Speed up rendering by adding more GPU power.
Multi-Host	API functions to discover and add additional render nodes in the network.	Quickly form a render cluster, based on different criteria.
Self-Forming Clusters	Data is stored in a distributed system, which can be scaled to a high number of nodes.	High fault tolerance within the cluster.
Master-Less architecture	All nodes can function as master nodes.	High fault tolerance within the cluster.
Elastic Scaling	Seamless adding and removal of machines or even GPUs.	High fault tolerance within the cluster.
Distributed Database	NVIDIA Iray has a built-in distributed database that transparently handles the data distribution to all nodes in a cluster.	High fault tolerance within the cluster.
Automatic Load Balancing	Built-in scheduling algorithms are available for automatic load balancing.	Balance the workload across all available computing resources in a cluster.
Support for multi-user operation	Support of multiple simultaneous operations, so that mixed long- and short-running operations can occur on the same cluster.	This offers the ability to make the rendering output accessible to multiple users and establish collaboration workflows, at low memory overhead.

NVIDIA