

“Reality vs illusion” Real-time Ray Tracing

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We will discuss how we achieved the goals for the production of Unity's "Reality vs illusion" demo, as well as give an overview of using real-time ray tracing technology in a games production pipeline. Our system is built on the insights learned by extending the engine architecture to support real-time ray tracing APIs and incorporating the power of real-time ray tracing to increase realism for resulting renders at interactive 30 fps rendering on high-end consumer hardware. Rendered in real-time, this demo spotlights one real car and another powered by Unity's rendering technology. A real-world car (2019 BMW 8 Series Coupe) was filmed, and then the scene was recreated using the exact camera / lighting conditions in CG. Then we transition the shots from a real-world car to the ray traced car. This shows off some of the effect that we will cover – global reflections, multi-layer transparency with refraction, area lights, shadows, ambient occlusion and more. We will share state-of-the-art techniques developed for achieving high-visual quality in real-time rendering with our hybrid ray tracing / rasterization render pipeline, built on top of Unity's high definition rendering pipeline. The presentation will demonstrate the technology developed to extend the original rasterization-based pipeline to provide higher-fidelity rendering through the efficient usage of real-time ray tracing, for example, by rendering primary ray visibility for higher-fidelity materials including multi-layer smooth transparency, describe advanced approaches for shadowed textured real-time area lights, support of dynamic indirect diffuse and specular lighting as well as other global effects, such as ambient occlusion, reflections, and others, taking advantage of ray tracing algorithms and touch on runtime performance, including runtime BVH update.