The Wheel Deal: ‘Racer RTX’ Demo Revs to Photorealistic Life, Built on NVIDIA Omniverse

30+ NVIDIA artists across time zones created the fully playable, simulated demo using nearly a dozen content-creation apps, all in just three months.

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NVIDIA artists ran their engines at full throttle for the stunning Racer RTX demo , which debuted at last week’s GTC keynote , showcasing the power of NVIDIA Omniverse and the new GeForce RTX 4090 GPU .

“Our goal was to create something that had never been done before,” said Gabriele Leone, creative director at NVIDIA, who led a team of over 30 artists working around the globe with nearly a dozen design tools to complete the project in just three months.

That something is a fully simulated, real-time playable environment — inspired by the team’s shared favorite childhood game, Re-Volt . In Racer RTX, radio-controlled cars zoom through Los Angeles streets, a desert and a chic loft bedroom.

The demo consists entirely of simulation, rather than animation. This means that its 1,800+ hand-modeled and textured 3D models — whether the radio-controlled cars or the dominos they knock over while racing — didn’t require traditional 3D design tasks like baking or pre-compute, which is the presetting of lighting for environments and other properties for assets.

Instead, the assets react to the changing virtual environment in real time while obeying the laws of physics. This is enabled by the real-time, advanced physics simulation engine, PhysX , which is built into NVIDIA Omniverse, a platform for connecting and building custom 3D pipelines and metaverse applications.

Dust trails are left behind by the cars depending on the turbulence from passing vehicles. And sand deforms under racers’ wheels according to how the tires drift.

And with the Omniverse RTX Renderer, lighting can be physically simulated with a click, changing throughout the environment and across surfaces based on whether it’s dawn, day or dusk in the scenes, which are set in Los Angeles’ buzzing beach town of Venice.

Racer RTX was created to test the limits of the new NVIDIA Ada Lovelace architecture — and steer creators and developers toward a new future of their work.

“We wanted to demonstrate the next generation of content creation, where worlds will no longer be prebaked, but physically accurate, full simulations,” Leone said.

The result showcases high-fidelity, hyper-realistic physics and real-time ray tracing enabled by Omniverse — in 4K resolution at 60 frames per second, running with Ada and the new DLSS 3 technology .

“Our globally spread team used nearly a dozen different design and content-creation tools — bringing everything together in Omniverse using the ground-truth, extensible Universal Scene Description framework,” Leone added.

The NVIDIA artists began the project by sketching initial concept art and taking a slew of reference photos in the westside of LA. Next, they turned to software like Autodesk 3ds Max , Autodesk Maya , Blender , Cinema4D and many more to create the 3D assets, the vast majority of which were modeled by hand.

To add texture to the props, the artists used Adobe Substance 3D Designer and Adobe Substance 3D Painter . They then exported the files from these apps using the USD open 3D framework — and brought them into Omniverse Create for real-time collaboration in the virtual world.

The RC cars in Racer RTX are each modeled with up to 70 individual pieces, including joints and suspensions, all with physics properties.

“Each car, each domino, every object in the demo has a different center of mass and weight depending on real-world parameters, so they act differently according to the laws of physics,” Leone said. “We can change the material of the floors, too, from sand to wood to ice — and use Omniverse’s native PhysX feature to make the vehicles drift along the surface with physically accurate friction.”

And to make the dust kick up behind the cars as they would in the real world, the artists used the NVIDIA Flow application for smoke, fluid and fire simulation.

In addition, the team created their own tools for the project-specific workflow, including Omniverse extensions — core building blocks that enable anyone to create and extend functionalities of Omniverse apps with just a few lines of Python code — to randomize and align objects in the scene.

The extensions, 3D assets and environments for the Racer RTX demo will be packaged together and available for download in the coming months, so owners of the GeForce RTX 4090 GPU can gear up to explore the environment.

Dive deeper into the making of Racer RTX in an on-demand NVIDIA GTC session — where Leone is joined by Andrew Averkin, senior art manager; Chase Telegin, technical director of software; and Nikolay Usov, senior environment artist at NVIDIA, to discuss how they built the large-scale, photorealistic virtual world.

Creators and developers across the world can download NVIDIA Omniverse for free , and enterprise teams can use the platform for their 3D projects.

Check out artwork from other “Omnivores” and submit projects in the gallery . Connect your workflows to Omniverse with software from Adobe, Autodesk, Epic Games, Maxon, Reallusion and more .

Follow NVIDIA Omniverse on Instagram , Twitter , YouTube and Medium for additional resources and inspiration. Check out the Omniverse forums , and join our Discord server and Twitch channel to chat with the community.

Watch NVIDIA founder and CEO Jensen Huang’s GTC keynote in replay: