

Developers Look to OpenUSD in Era of AI and Industrial Digitalization

A new paradigm for data modeling and interchange is unlocking possibilities for 3D workflows and virtual worlds.

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From smart factories to next-generation railway systems, developers and enterprises across the world are racing to fuel industrial digitalization opportunities at every scale.

Key to this is the open-source Universal Scene Description (USD) framework, or OpenUSD, along with metaverse applications powered by AI.

OpenUSD, originally developed by Pixar for large-scale feature film pipelines for animation and visual effects, offers a powerful engine for high-fidelity 3D worlds, as well as an expansive ecosystem for the era of AI and the metaverse. Across automotive, healthcare, manufacturing and other industries, businesses are adopting OpenUSD for various applications.

Developers can use the extensibility of OpenUSD to integrate the latest AI tools, as well as top digital content-creation solutions, into their custom 3D workflows and applications.

At enterprises like BMW Group, in-house developers are building custom applications to optimize and interact with their digital twin use cases. The automaker developed an application that allows factory planners to collaborate in real time on virtual factories using NVIDIA Omniverse, an OpenUSD development platform for building and connecting 3D tools.

Startups like Move.ai, SmartCow and SyncTwin are also developing groundbreaking metaverse technologies with OpenUSD. Using USD in Omniverse's modular development platform allows startups and small businesses to easily launch new tools in the metaverse for larger enterprises to use.

In addition, leading 3D modeling and visualization solution providers, including Esri, Bentley Systems and Vectorworks, are connecting their technologies with OpenUSD to enable new capabilities in the metaverse and reach more customers. Building on OpenUSD ensures their applications can be continuously expanded to meet the industrial metaverse's evolving needs.

"USD helps us provide customers with even more flexibility in the 3D design process," said Dave Donley, senior director of rendering and research at Vectorworks. "By embracing USD, Vectorworks and its users are poised to lead the charge toward a more collaborative and innovative future in industries such as architecture, landscape design and entertainment."

Linear and siloed workflows used to be the norm in 3D content creation. Today, enterprises must integrate their diverse, distributed, highly skilled teams and expand their offerings to remain competitive — most notably in generative AI.

Fluid design collaboration is critical for this, as is the ability for developers to work in open, modular and extensible frameworks. As the pace of AI and metaverse innovation increases, businesses attempting to build new features and capabilities in closed environments are likely to lag behind.

The 3D worlds of the metaverse — which are ushering in a new era of design, simulation and AI advancements — require a common framework to enable scalability and interconnection. As with the 2D web, the success of the metaverse will depend on its interoperability as governed by open standards and protocols.

OpenUSD is well-suited for diverse metaverse applications due to its extensibility and ability to support a wide variety of properties for defining and rendering objects. More than just a file format, the

interchange framework connects a robust ecosystem of creative and developer tools.

Cesium , a platform for 3D geospatial workflows, uses USD to enable enterprises building industrial metaverse applications in construction, robotics, simulation and digital twins for climate change.

“Leveraging the interoperability of USD with 3D Tiles and glTF, we create additional workflows, like importing content from Bentley LumenRT, Trimble Sketchup, Autodesk Revit, Autodesk 3ds Max and Esri ArcGIS CityEngine into NVIDIA Omniverse in precise 3D geospatial context,” said Shehzan Mohammed, director of 3D engineering and ecosystems at Cesium.

3D tools interoperate seamlessly with OpenUSD, allowing users to work efficiently across various tools and pipelines. USD’s efficient referencing and layering allows teams to non-destructively edit projects in real time and preserve all source content, enabling iterative, collaborative workflows. Designed to handle large-scale scenes with millions of assets and complex datasets, OpenUSD is ideal for developers building applications to support virtual worlds.

Learn more about the unique capabilities of USD in the video below, as well as in the article, “ What You Need to Know About Universal Scene Description .”

NVIDIA Omniverse interconnects diverse 3D tools and datasets with OpenUSD to unlock new possibilities for large-scale, physically accurate virtual worlds and industrial digitalization applications.

Built for developers by developers, Omniverse is open and highly modular. Omniverse Code and Kit enable developers to build advanced, real-time simulation solutions for industrial digitalization and perception AI. They can use all of the platform’s key components, such as Omniverse Nucleus and RTX Renderer , and core technologies to develop solutions designed for their customer needs.

People of all experience levels can build with OpenUSD on Omniverse. Beginners can develop tools with little to no code using existing platform extensions. Experienced developers can use templates or build from scratch with Python or C++ to produce their own powerful apps and extensions — as well as combine them with existing ones to create tools customized for their needs. In addition, visual programming tools like OmniGraph make it easy to set up and perform advanced procedural tasks with just a few clicks.

For example, a warehouse simulation tool can be developed by combining extensions for building layout, warehouse objects, smart object placement and user interfaces that can be fine-tuned for specific needs.

Plus, Omniverse foundation applications like USD Composer and USD Presenter are modular, so users can work with just the functionality they need, and add their own code or extensions to customize apps for different workflows. Developers can easily access and tap into the Python source code of Omniverse extensions in Omniverse Kit.

Learn about the latest advancements in design, simulation and AI by joining NVIDIA at SIGGRAPH , a computer graphics conference running Aug. 6-10. NVIDIA founder and CEO Jensen Huang will deliver a keynote address on Tuesday, Aug. 8, at 8 a.m. PT.

Join NVIDIA for OpenUSD day at SIGGRAPH on Wednesday, Aug. 9, starting at 9 a.m. PT, for a full day of presentations about the framework’s latest developments. NVIDIA will also present award-winning research on rendering and generative AI, as well as host various sessions and hands-on labs for attendees to experience the latest developments in OpenUSD, graphics and more.

Get started with NVIDIA Omniverse by downloading the standard license free , or learn how Omniverse Enterprise can connect your team . Developers can check out these Omniverse resources to begin building on the platform.

Stay up to date on the platform by subscribing to the newsletter and following NVIDIA Omniverse on Instagram , LinkedIn , Medium , Threads and Twitter . For more, check out our forums , Discord server , Twitch and YouTube channels.

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