From Concept to Production to Sales, See How NVIDIA AI and Omniverse Enable Automakers to Transform Their Entire Workflow

NVIDIA showcases how digitalization can deliver greater efficiency, safety and customer enjoyment.

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The automotive industry is undergoing a digital revolution, driven by breakthroughs in accelerated computing, AI and the industrial metaverse .

See how automakers are digitalizing every phase of the product lifecycle — including concept and styling, design and engineering, software and electronics, smart factories, autonomous driving and retail — using the NVIDIA Omniverse platform and AI.

Based on the Universal Scene Description (USD) framework, Omniverse transforms complex 3D workflows, allowing teams to connect and customize 3D pipelines and simulate large-scale, physically accurate virtual worlds. By taking the automotive product workflow into the virtual world, automakers can bypass traditional bottlenecks to save critical time and reduce cost.

Designing new vehicle models — and refreshing current ones — is a collaborative process that requires review and alignment of even the tiniest details.

By refining concepts in Omniverse, designers can visualize every facet of a car's interior and exterior in the full context of the broader vehicle. Global teams can iterate quickly with real-time, physically based, photorealistic rendering.

With NVIDIA Omniverse, designers, sculptors and artists can collaborate seamlessly and efficiently — from anywhere around the globe.

With the ability to use 3D software applications of their choice, these companies can bring their visions to life with physically accurate, photorealistic renderings that show exactly how the vehicle will look, inside and out.

DRIVE Sim IX, built on Omniverse, also enables designers to flexibly lay out the cabin and cockpit onscreen user experience along with the vehicle's physical interior to ensure a harmonious look and feel.

With this next-generation design process, automakers can catch flaws early and make real-time improvements, reducing the number of physical prototypes to test and validate.

Once the design is complete, developers can use Omniverse to kick the tires on their new concepts.

Perfecting the interior is necessary for customer experience as well as safety.

Developers can take these in-cabin designs for a spin in the virtual world, collaborating and sharing designs for efficient refinement and validation.

Digitalization is also transforming the way automakers approach vehicle engineering. Teams can test different materials and components in a virtual environment to further reduce physical prototyping.

Automotive engineers, for example, can integrate Omniverse and broaden access to computational fluid dynamics data, which can be visualized in high fidelity, with physical accuracy, and in the context of design data. This ultimately speeds design reviews, saves costs and improves decisions related to vehicle aerodynamics and energy efficiency.

The coming generation of vehicles are highly advanced computers on wheels, packed with complex, centralized electronic systems and software for enhanced safety, intelligence and security.

Typically, vehicle functions are controlled by dozens of electronic control units distributed throughout a vehicle. By centralizing computing into core domains, automakers can replace many components and simplify what has been an incredibly complex supply chain.

With a digital representation of this entire architecture, automakers can simulate and test the vehicle software, and then provide over-the-air updates for continuous improvement throughout the car's lifespan — from remote diagnostics to autonomous-driving capabilities to subscriptions for entertainment and other services.

Vehicle production is a colossal undertaking that requires thousands of parts and workers moving in sync. Any supply chain or production issues can lead to costly delays.

With Omniverse, automakers can develop and operate complex, AI-enabled virtual environments, or digital twins , for factory and warehouse design. These virtual replicas facilitate real-time collaboration among teams and are the key to unleashing operational efficiencies with predictive analysis and process automation. BMW and Mercedes-Benz are early adopters of this digital-first approach in their respective factories of the future.

Factory planners can access the digital twin of the factory to review and improve the plant as needed. Every change can be quickly evaluated and validated in the virtual world, then implemented in the real world to ensure maximum efficiency and optimal ergonomics for factory workers.

Additionally, automakers can synchronize plant locations anywhere in the world for scalable design and iteration.

On top of enhancing traditional product development and manufacturing, Omniverse offers a complete toolchain for developing and validating automated and autonomous-driving systems.

NVIDIA DRIVE Sim is an end-to-end simulation platform, built on NVIDIA Omniverse, designed to accelerate autonomous-vehicle development. It is time-accurate, physically based and supports the complete development toolchain, so developers can run simulation at the component level or for the entire system.

With DRIVE Sim, developers can repeatedly simulate routine driving scenarios, as well as rare and hazardous conditions that are too risky to test in the real world. Additionally, Omniverse's generative AI reconstructs real sensor data into a reactive simulation environment.

Automakers can also fine-tune their advanced driver-assistance and autonomous-vehicle systems for New Car Assessment Program (NCAP) regulations in simulation. NCAP tests evaluate the safety performance of new cars based on several crash tests and safety features.

The DRIVE Sim NCAP tool provides high-fidelity test protocols, so automakers can efficiently perform dedicated development and validation at scale.

The ability to drive in physically based virtual environments can significantly accelerate the autonomous-vehicle development process, overcoming real-world data collection and scenario diversity challenges.

NVIDIA AI and Omniverse are also helping automakers, like Rimac , enhance the customer experience.

Immersive technologies in Omniverse — including 3D visualization, augmented reality (AR) and virtual reality (VR) streamed using NVIDIA CloudXR — deliver consumers a more engaging experience, allowing them to explore features before making a purchase.

Prospective buyers can customize their vehicle in a car configurator — choosing colors, interior materials, trim levels and more — without being limited by the physical inventory of a dealership. They

can then check out the car from every angle using 3D visualization. And with AR and VR, they can view and virtually test drive a car from anywhere.

NVIDIA AI is also helping companies like ProovStation , which is developing automated bays designed for vehicle inspection. This allows for generation of repair estimates with lightning-fast speed and improved accuracy — ultimately, reducing costs and increasing productivity.

In all, NVIDIA AI and Omniverse are the go-to solutions for automakers looking to digitalize every aspect of the vehicle lifecycle — delivering game-changing benefits that unleash creativity, enhance efficiencies, improve safety and deliver greater consumer satisfaction.

And the benefits of digitalization extend beyond the automotive industry. With NVIDIA Omniverse and AI, any enterprise can reimagine its workflows to increase efficiency, productivity and speed, revolutionizing the way it does business. Omniverse is the digital-to-physical operating system to realize industrial digitalization.

Automakers cna use generative AI to develop complete advertising campaigns that deliver personalized and captivating content to their specific audience. With this technology, they can create visually impressive and immersive experiences that deeply connect with consumers, enhancing brand awareness and ultimately boosting sales.

A recent partnership between NVIDIA and WPP , the world’s largest marketing services organization, aims to realize this potential. By combining NVIDIA’s AI technology with WPP’s exceptional creative capabilities, the collaboration paves the way for innovative and data-driven advertising campaigns within the automotive industry.

Learn more about the latest in AI and the metaverse by watching NVIDIA founder and CEO Jensen Huang’s GTC keynote address:

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