

# XR TECHNOLOGY & TRANSPORTATION



## WHAT IS THE XR ASSOCIATION?

The XR Association promotes the dynamic growth of the XR industry. We convene and educate policymakers, thought leaders, researchers, developers, civil society, and the public on XR's infinite potential and we serve as the premiere resource for anyone interested in learning about the applications of immersive technologies. Our member companies are united in our mission to champion the responsible development and thoughtful advancement of XR solutions that foster positive societal outcomes. Let us help you explore the endless potential of XR.

## WHAT IS XR TECHNOLOGY?

XR (extended reality) technology encompasses spatial and immersive computing such as virtual, augmented, and mixed reality.



### Virtual Reality (VR)

VR replaces or occludes a user's reality with a new virtual environment like a factory floor or replication of the solar system.



### Augmented Reality (AR)

AR layers digital content onto a user's view of the real world, thus providing a composite view.



### Mixed Reality (MR)

MR allows users to experience simulated content within their physical worlds and to manipulate and interact with virtual elements in real time.

XR is changing the way we learn, do business, and provide essential human services. By delivering efficiencies in manufacturing, enhancing workplace safety, accelerating learning and job training, providing risk-free first responder training, improving healthcare and medical services, and providing rich experiences to individuals living with disabilities, XR is poised to become a part of daily life for users across the globe. XR is the technology of the future—today.

## XR IS MAKING THE TRANSPORTATION SECTOR MORE EFFICIENT

XR has already begun to transform how we interact with transportation, from vehicles to infrastructure to training. Augmented reality displays inside vehicles are becoming a common example of consumer-facing XR used in daily life, while VR-driven simulation platforms streamline transit engineering, accelerate workforce development, and enhance road safety. By pairing spatial computing with public infrastructure and commercial transit, XR reduces operational downtime, mitigates risk in high-stakes training, and supports a safer, more resilient national transportation ecosystem.

## AUTOMOTIVE INDUSTRY

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### Heads Up Displays (HUDs)

Drivers can keep their eyes focused on the road thanks to HUDs integrating into the mainstream. The 2024 Ford F-150 has a HUD that superimposes driving speed, local speed limits, and navigation directly into the driver's field of view without obscuring the road. Without the distraction of searching for information across various screens and instrument clusters, drivers run a significantly lesser risk of missing vital signs on the road. While this AR technology is still most prominent in high-end makes such as Audi, Lexus, and Chevrolet, the market has opened as of 2025 to include models from Volkswagen, Honda, and Toyota, moving XR away from being a luxury and closer to a mainstream tech appliance.



### Driver Training

XR provides a low-stakes environment for students learning how to drive for the first time. Students can learn the rules of the road and safe driving practices off the road before ever getting behind the wheel. ClassVR, in partnership with local authorities, is leveraging virtual reality to simulate high-impact road accidents. Additionally, the Boys & Girls Clubs of America is incorporating HTC Vive 3 Focus headsets into their UPS Road Code program, which is offered to teens 13-18 to demonstrate road safety. The immersive environment provided by VR allows students to experience the consequences of irresponsible driving and accidents firsthand.



### Automotive Design and Engineering

XR allows traditional training simulations for manufacturers to hold up over time by eliminating the use of physical objects, such as elastic parts, clips, and wiring harnesses, which degrade over time and can affect training accuracy. While Offline Finite Element Method (FEM) simulations are context-agnostic, costly, and expert-dependent, XR applications such as IC.IDO's Elastic Part Simulation enables workers to experience full-scale digital prototypes that are not affected by equipment malfunctions or physical limitations.

## TRANSIT INFRASTRUCTURE & DIDACTICS

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### Environmental Simulations

The immersive capabilities of VR allow for immersive previews of large-scale construction projects. In Norway, a VR theater was used to visualize an upcoming rail project to project members and the public two years before the first ground was broken for the project. Such simulations also provide the opportunity for engineers to stake out potential landscape challenges before beginning construction.



### Rail Training and Safety

XR enhances training in the rail industry from locomotive engineer to the yard worker. XR technology affords safer, less costly, and more effective training by reinforcing on-site learning. BNSF Railway guides trainees through a highly detailed VR training program that aids with material retention and ensures that information is delivered uniformly across departments. MTA Metro-North Railroad uses VR to teach employees critical safety procedures, deescalation skills, and high-risk operations across eight training centers. Such training programs have been proven to reduce near miss worker accidents and the need to take trains offline to upskill workers.