

Lenovo
ThinkReality

The Future of Medical Training and Education

**Smarter
technology
for all**

Lenovo

Transform learning
for clinicians and
medical students with
cutting-edge virtual
and augmented reality
solutions



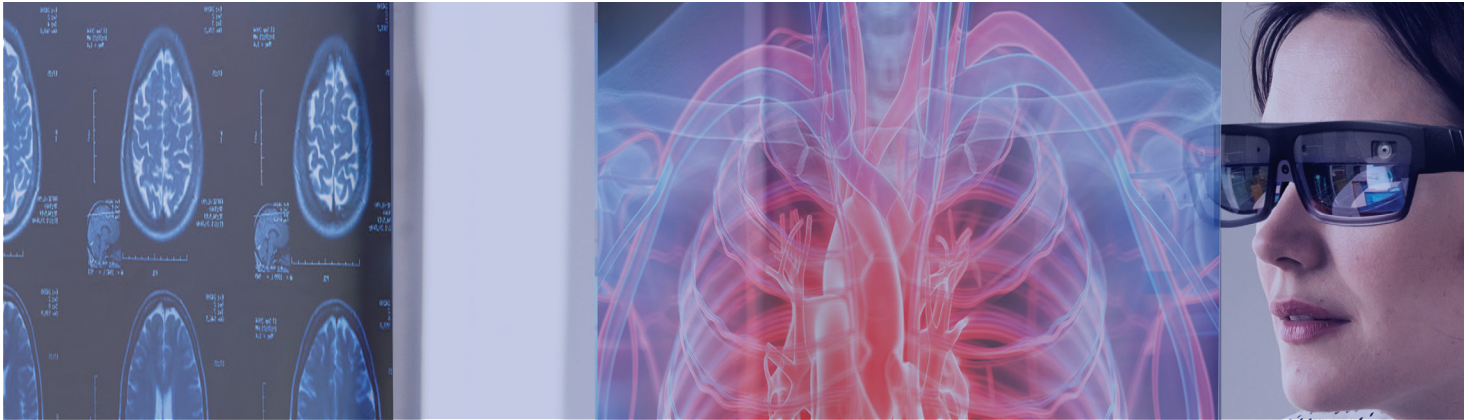
ThinkReality® VRX Headset



ThinkPad® P16 Mobile Workstation

Connect to an Intel
vPro®-powered device
for a world-class
healthcare solution





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A rapidly growing market

Valued at \$2.5 billion globally in 2022, the AR and VR healthcare market is estimated to expand at a compound annual growth rate of **18.8%** between 2023 and 2030. The advances in technology are being propelled by a surge in demand for new, innovative solutions, including in medical training and surgical procedure optimization.²

Discovering new learning possibilities with immersive experiences

Emerging technology is transforming the future of education across all sectors. Cutting-edge solutions such as mixed reality deliver digital curriculum anywhere experienced and aspiring professionals want it, unlocking new possibilities for how learning takes place. Many healthcare organizations are embracing this future today — ushering in a new era of clinical education and training along with the evolution of patient care delivery.

Innovative technology plays a crucial role in this journey, starting with a processing platform you can trust. Intel vPro[®] provides everything you need in one validated solution — preparing your organization for what's next while empowering clinicians and medical students with unrivalled performance power.

Immersive solutions and 3D visualization are at the forefront of transforming healthcare education and training. These portable tools are part of an expansive, end-to-end ecosystem of digital devices, tools, and services. This groundbreaking technology enriches the experience for learners and instructors alike — enhancing education and training outcomes in the service of better patient care.

From revolutionizing surgery training to modernizing anatomy labs, augmented reality (AR) and virtual reality (VR) are breaking the barriers of the conventional classroom. With practical use and more than 2,200 clinical studies globally¹, AR and VR provide a broad range of benefits in medical education and training — bringing tomorrow's knowledge to today's clinicians.

The mission of Lenovo Health is to power the future of healthcare and life sciences to transform the experience of patients who receive care and the providers who deliver it. We provide people-first technology for patient-first organizations that strive to get ahead of the evolving and complex challenges in healthcare. Our immersive healthcare solutions are designed to support universal goals in healthcare, including improving patient and caregiver experiences, decreasing costs, and increasing access to care.



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Lenovo ThinkReality: the smarter path to modern clinical training

Healthcare education is no longer confined within the walls of the traditional classroom. High-quality, engaging experiences can enhance professional development and training for clinicians and future care providers without the bounds of place and time.

Lenovo ThinkReality extended reality solutions deliver on this promise. With Lenovo ThinkReality VRX all-in-one headset and ThinkReality A3 smart glasses, your organization gains measurable benefits for student and provider training — saving costs and achieving a positive return on investment.

ThinkReality VRX and ThinkReality A3 are versatile, practical, reliable solutions that help healthcare professionals and students embrace immersive experiences. You can tether these devices to Intel vPro® powered technology such as Lenovo ThinkPad® devices to create an end-to-end, world-class solution. The Intel vPro® platform combines immersive experiences with trusted PC processing power, bringing modern management options to your entire organization — along with unparalleled performance, hardware-based security, simplified support, and improved user experience.

These are just some of the ways that healthcare organizations can benefit from immersive technology:

Expand access to learning opportunities: Students and practitioners can learn new skills and procedures remotely, in a risk-free environment accessible anywhere.

Decrease the cost of education and training: Anatomy labs can supplement cadaver-based instruction with virtual simulation sessions that significantly cut costs and extend active learning while deepening understanding of complex concepts.

Boost knowledge retention and learner satisfaction: Immersive education has shown to improve information retention, proficiency, and the overall curriculum enjoyment and satisfaction for medical students and clinicians.³

Provide an objective skills assessment: With data-driven, real-time assessment of their performance, students can receive immediate and accurate feedback to guide them through improving their skills.

Enhance the providers' work life: Clinicians can boost productivity by creating flexible, expanded personal spaces while gaining a full multimonitor experience anywhere — even in constrained areas.

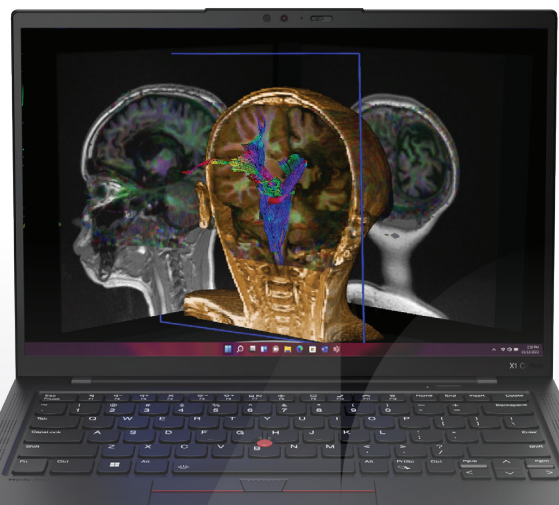
Improve patient outcomes: Surgeons and radiologists can plan and prepare for complex procedures by visualizing medical imaging datasets in a virtual environment.

Increase collaboration and access to care: Clinicians in areas with limited resources can collaborate remotely with colleagues and specialists with augmented reality video conferencing.



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ThinkPad® X1 Carbon





Revolutionize student and professional education and training

No longer a technology designed primarily for gaming and entertainment, extended reality transforms healthcare education and training by:

- **Delivering a completely immersive experience** to the classroom through virtual reality technology — from simple, 360-degree videos of real-time settings to adaptive, virtual environments
- **Using augmented reality** to blend the real world with computer-generated elements, or creating an immersive virtual experience overlaid on the surrounding environment

With these digital environments, learning can take place when and where it's convenient — giving participants flexibility while removing barriers such as access to a physical classroom.

Through extended reality (XR), clinicians and students can:

- **Overlay anatomical markers** on physical anatomy
- **Receive remote mentoring** or virtual proctoring for tailored guidance during medical procedures
- **Visualize organs in various stages** of disease or trauma and collaborate with other medical professionals to consult
- **Familiarize themselves** with various tools and equipment by using interactive 3D models anywhere
- **Attend live operations** remotely with a full 360-degree view
- **Learn about anatomy up close** and personal through interactive, high-fidelity virtual images
- **Improve mastery of complex medical concepts** through standardized, repeatable, on-demand training
- **Visualize and train for situations** they typically have limited clinical exposure to, such as genetic disorders or rare cases that require high-risk procedures
- **Enhance imaging via three-dimensional objects** in a two-dimensional space by clicking on the axis plane to review 3D organs
- **Experience haptic feedback and tactile sensing** for a more natural human-computer interaction compared to traditional PCs
- **Participate in a risk-free virtual lab** anytime, anywhere

Replicating emergency situations

such as car accidents and active shooter scenarios — in an extended reality environment allows first responders and medical personnel to practice working together under pressure and improve joint response.



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The benefits of immersive education and training

Enhance effectiveness: With highly detailed scans, students can mark up, highlight, guide, and consult with peers and other professionals in real-time — giving them the confidence of practicing new skills before applying them on the job.

Improve clinical outcomes: Whether it's radiology images or the operating room, visualizing the scene and data allows students to prepare for complex procedures collaboratively or explore multiple scenarios — all while building muscle memory for real-world applications.

Boost retention: Practicing simulation-based applications or using 3D models created from patient MRI scans helps reduce procedural errors — allowing surgeons and aspiring surgeons to try out their skills independently and repeatedly.

Increase accessibility and flexibility: Removing the limits of geography or scheduling restrictions allows continuous access to the curriculum while making it easy for instructors to quickly scale the training environment.

Teach soft skills: Immersive VR environments and scenarios can help students improve their confidence and proficiency of teamwork, communication, conflict resolution, and other soft skills that are essential to successful care delivery.

Why immersive technology⁴

4x faster training than a traditional classroom

275% greater confidence to apply skills learned after training

25% better knowledge retention after four months than e-learning

52% improved cost effectiveness at scale compared to classroom learning



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Spotlight on: virtual anatomy training

Traditional gross anatomy curriculum relies heavily on cadavers, but medical schools have steadily decreased anatomy lab contact hours in the past two decades. While textbook lessons and cadaver dissection have been considered the gold standard for teaching human anatomy, emerging technology provides an alternative option for students to master this key component.

New technology-driven modalities — such as XR anatomy visualizations and VR anatomy labs — allow you to supplement physical cadavers with virtual ones to complement existing training while reducing costs. Students also benefit by being able to observe and learn the complex 3D spatial relationships between organs and structures virtually — from anywhere.

VR and AR complement traditional anatomy instruction while solving several challenges of cadaver-based training, including:

- **Costs:** Cadavers have limited use and can range in price as high as \$3,000-\$10,000 each⁵ — and AR/VR solutions provide a cost-effective alternative.
- **Availability:** The scientific community faces a shortage of human cadavers⁶ while virtual cadavers are readily available and have unlimited “reuse.”
- **Safety:** Unlike traditional labs, virtual anatomy labs do not require extensive ventilation equipment and monitoring and do not create the risk of chemical exposure or accidental injuries from sharp instruments.

For students, XR enhances the experience by:

- Allowing them to view anatomy from any angle and zoom in for more detailed renderings
- Creating immersive, dynamic, interactive worlds that can adapt to their learning needs
- Enabling them to easily undo dissection errors
- Providing standardized, consistent instruction on demand

Advantages of XR over mannequin-based simulation:

- Does not have geographic constraints
- Allows for both synchronous and asynchronous learning
- Does not require dedicated space to run
- Takes less infrastructure and human resources to use
- Can replicate a variety of environments



Spotlight on: surgical and procedural skill training and planning

Traditional surgical training is limited to observation and practice on live patients. VR provides low-cost, accessible, realistic training alternatives for surgeries and medical procedures. Students can practice complex techniques individually and in teams in a low-risk environment — without affecting patient safety. With immediate, objective feedback, learners can assess their progress and identify areas for improvement faster, accelerating their learning.

3D visualizations and virtual models offer surgeons the opportunity to prepare for operations by using population and patient-specific data to explore a variety of scenarios, as well as predict risks and select treatment plans. Surgeons can also rehearse for complicated patient surgeries using patient data such as MRIs and CT angiograms.

Studies have shown that:

- Students trained with immersive VR perform medical procedures 18%-43% faster and show greater accuracy⁷
- VR simulators are effective for teaching a variety of procedural skills, such as endoscopy and operating room preparation⁸
- Students report gaining a deeper understanding and higher competency in areas such as neurosurgery with VR-based learning tools⁹

Proven efficiency

In a University of California, Los Angeles study, orthopedic surgery students trained through VR completed procedures **20% faster and completed 38 more steps** correctly compared to those using standard training tools.¹⁰



Embrace immersive healthcare training with Lenovo ThinkReality solutions

AR and VR fundamentally change the clinician experience with revolutionary possibilities. Together with Lenovo ThinkPad devices powered by Intel vPro®, ThinkReality solutions create boundless new opportunities for forward-thinking healthcare organizations that aim to modernize training for seasoned professionals and future care providers alike.



ThinkReality® VRX: virtual reality and mixed reality headset

Lenovo ThinkReality VRX is a versatile, high-resolution, full-color VR/MR headset that empowers healthcare organizations to modernize and future-proof student training and professional development experiences.



Purpose-built for enterprise-level functionality, the all-in-one ThinkReality VRX:

- Gives clinicians the freedom to move and manipulate virtual objects for training and practicing scenarios
- Supports enterprise-grade security practices with a secure supply chain and manufacturing process
- Provides a comfortable, well-balanced design for extended use sessions anywhere medical training, team collaboration, and procedure planning take place

Key Features:

- Snapdragon® XR2+ Gen 1 processor with Android 12 OS
- 12 GB RAM and 128 GB of storage
- Pancake lens with 95-degree field of view
- 2280 x 2280 resolution per eye
- 70/90Hz refresh rate
- 2-camera full color HD pass-through
- 4-camera 6DoF optical tracking
- Integrated speakers, dual microphone, 3.5mm jack
- 6DoF controllers, hand tracking, headset buttons
- 6900 mAh USB-C charging, rear placement
- Wi-Fi streaming/wired connection via USB-C streaming
- Fully wipeable surfaces



Connect to an Intel vPro®-powered device for a world-class healthcare solution

ThinkReality® A3 smart glasses

Lenovo ThinkReality A3 smart glasses advance what's possible in healthcare by empowering clinicians with a flexible, expanded workspace that fits in the palm of their hand. Similar in size with a pair of sunglasses, ThinkReality A3 integrates advanced optics technology while providing complete privacy to the wearer.

These AR smart glasses:

- Boost productivity with a multiscreen functionality that gives healthcare professionals a multimonitor experience anywhere
- Deliver private access to patient records while powering seamless collaboration at the office, at home, or on the go
- Provide 3D visualization and high-quality visuals in an ultra-portable form factor that creates immersive AR experiences without isolation

Advanced, versatile, convenient

ThinkReality A3 is one of the most advanced and versatile enterprise smart glasses solutions on the market. Comfortable thanks to an ergonomic fit kit, the smart glasses are easy to wear and fold for convenient portability.



Key Features

- Qualcomm® XR-1
- Dual 1080p AR displays
- Integrated speakers and microphone
- Dual fisheye cameras
- 8MP RGB camera
- USB-C connection to PC
- Lightweight (4.6 oz./130 gm)
- Ergonomic fit kit
- IP54 rating
- Lenovo Virtual Display Manager software
- Works with Windows 11 systems



Connect to an Intel vPro®-powered device for a world-class healthcare solution

Connect to one of these Lenovo ThinkPad laptops for a smarter healthcare solution

Connect the A3 smart glasses to portable, powerful, versatile solutions that are performance-engineered for patient care and support a variety of healthcare workflows with high-performance functionality — powered by the built-for-business Intel platform.



ThinkPad® X1 Carbon

- Power and portability in a premium package that delivers an impressive combination of performance, responsiveness, and battery life
- Powered by Intel vPro®, An Intel® Evo™ Design — built for what IT needs and users want
- Includes A3 smart glasses support
- Running Windows 11 Pro
- Ultra-thin and ultra-light redesigned chassis
- Impressive 16:10 display
- Wider TouchPad
- Larger battery for more time unplugged



ThinkPad® X1 Nano

- Our lightest laptop ever at just 2 lbs. (1 kg) with Wi-Fi 6 for fast access to crowded public platforms and optional 4G/5G capabilities for secure access to corporate networks
- Powered by Intel vPro®, An Intel® Evo™ Design — built for what IT needs and users want
- Includes A3 smart glasses support
- Running Windows 11 Pro
- Heavyweight performer with a 13-inch display
- Always-on responsiveness
- Speedy Thunderbolt™ 4
- Rapid charge technology
- 16:10 aspect ratio for more screen



ThinkPad® P16 Mobile Workstation

- Next-level performance and productivity with up to 8TB of super-fast SSD storage and 128GB of DDR5 memory
- Tether the A3 to this workstation* and revolutionize how teams use 3D models. With the additional graphics horsepower, users can access up to six screens with integrated GPU and up to eight screens with discreet GPU.*separate application required
- Powered by all-new Intel vPro® Enterprise with the latest Intel® Core™ i9 HX Series processor
- Able to support VRX
- Running Windows 11 Pro
- Up to NVIDIA RTX A5500 16GB VRAM or NVIDIA GeForce RTX 3070 Ti/3080 Ti 8GB/16GB VRAM
- All-new 16-inch display
- ISV-certified for professional applications like Creo® and SOLIDWORKS®



Lenovo ThinkPad laptops come with **Lenovo ThinkShield**, a converged Zero Trust, end-to-end security portfolio encompassing hardware-embedded features, software, and services, as well as Intel vPro® built-in security.



A complete healthcare solution

Designed to give healthcare organizations a boost right out of the box, Intel vPro® empowers you with end-to-end capabilities that include:

- **Platform security:** Intel vPro® and the exclusive Intel® Hardware Shield provide multilayer security that helps reduce the attack surface of a PC and assists in active monitoring against attacks without bogging down productivity due to lost performance.
- **Enhanced productivity:** Revolutionary architecture intelligently allocates workloads to the right thread on the right core based on real-time analysis, providing optimized enterprise performance every day.
- **Modern manageability:** IT can keep the modern workforce patched and protected, while stability features allow for consistent rollouts and reliable lifecycle management.

The Lenovo ThinkReality platform offers cloud- and device-agnostic solutions for healthcare deployments — providing a proven, scalable, and streamlined path from proof of concept to productivity for AR/VR applications.

- Works across diverse hardware and software so you can build, deploy, and manage content and applications on a global scale
- Equips you with powerful development and management tools, cloud and device services, and MDM support
- Includes turnkey, certified solutions for a range of common AR and VR applications

Backed by Lenovo services, such as:

- Comprehensive support in multiple markets
- Extended reality strategic consulting and deployment
- Managed support option
- Roadmap and business case development
- Content creation



Connect to an Intel vPro®-powered device for a world-class healthcare solution

Experience the extended reality evolution with powerful technology that pushes the envelope — **empowering practiced and aspiring clinicians** to master skills and improve patient outcomes



ThinkReality® A3



ThinkReality® VRX

Ready to
transform clinical
education and
training?

Contact your Lenovo representative
or business partner today

Learn more at

techtoday.lenovo.com/ww/en/solutions/thinkreality
or techtoday.lenovo.com/ww/en/solutions/healthcare



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2 <https://www.grandviewresearch.com/industry-analysis/virtual-reality-vr-in-healthcare-market>
3 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10191923/>
4 <https://www.pwc.com/us/en/tech-effect/emerging-tech/virtual-reality-study.html>
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