

Extended Reality Experience for Healthcare

Creating an engaging experience with XR
for the Healthcare industry



Immersive technologies deliver meaningful experiences for the future of patient care.

Over the years, Extended Reality (XR) has created breakthroughs for business uses and emerged as one of the most popular technologies among companies across the globe. XR continues to be a key enabler in the digital transformation of the healthcare industry.

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Introduction

The advancement of technology in recent times has brought many notable changes in our day-to-day life. One of the most recent developments in the healthcare space is using extended reality (AR, VR, or MR). While these technologies are widely in different industries, but in healthcare, it is still in the infancy to adopt this technology.



What are XR technologies?

XR is a combination of technologies such as virtual reality (VR), augmented reality (AR), and mixed reality (MR) which creates an immersive experience by simulating physical systems and environments. This helps the enterprises' workforce collaborate from remote locations enabling a 'Work from Anywhere' culture. XR delivers real-time experiences with a combination of audio, visual and physical and creates more personalized and better contextual experiences.

Virtual Reality (VR)

Virtual Reality brings a comprehensive digitally immersive experience that makes the users believe that they're in a different world.

According to Merriam-Webster's dictionary, "an artificial environment which is experienced through sensory stimuli (such as sights and sounds) provided by a computer and in which one's actions partially determine what happens in the environment". Some of the applications of VR are:

- Training simulations at any places, situations, and environments
- Games
- Treating anxiety, phobias, and depressions
- 360-degree experience in shopping, etc.

Augmented Reality (AR)

In Augmented reality, the information is overlaid onto the physical environment. According to Merriam-Webster's dictionary, "augmented reality is an enhanced version of reality created by the use of technology to overlay digital information on an image of something being viewed through a device (such as a smartphone camera)." Some of the AR solutions include:

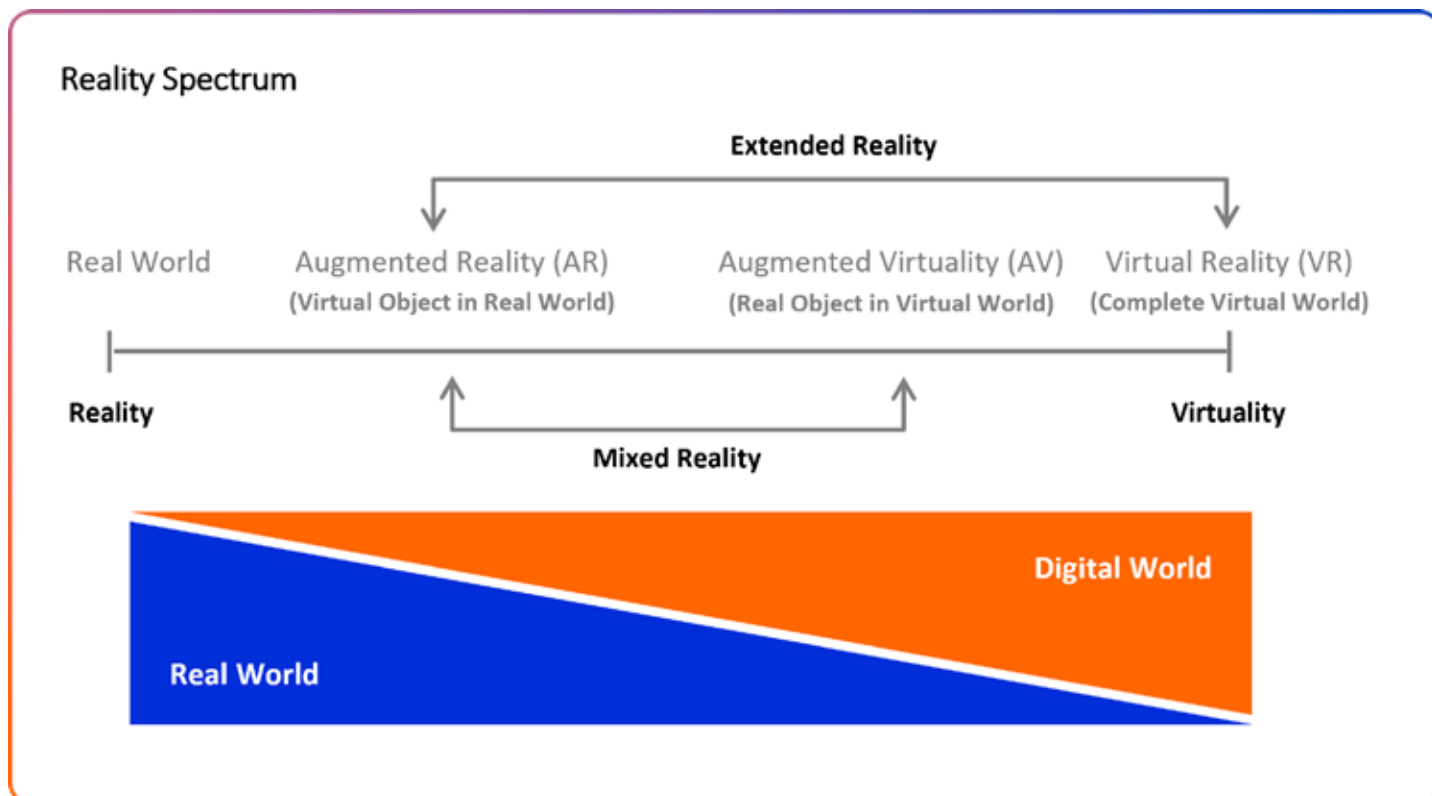
- Wayfinding - Overlay directions to a location
- Viewing Product Breakdown
- Viewing 3D floor plans
- Remote collaboration, etc.

Mixed Reality (MR)

Mixed reality is a mixture of physical and digital worlds, where the movement in the physical world is charted upon digital reality. Mixed reality is the upcoming wave in computing where the experience is beyond the screen bounded devices. Some of the applications of the MR are:

- Immersive Movies
- Educational Classes
- Corporate Meetings
- Surgical Applications, etc.

MR applications can run on Standalone devices and headsets with socket mobile.



Virtual Reality (VR) in Healthcare

Virtual Reality is a virtual space experienced using a gadget, mostly a headgear that can be worn like glasses but covering the entire field of view. It gives the user a virtual perspective, making them feel completely immersed in their surroundings. Earlier, it was more of a dream to develop a device capable of creating a virtual world, but now it has become a reality. In the early '90s, when VR was first developed and introduced in the market, it did not reach the intended audience due to various reasons such as cost, accessibility, the computing power of the systems. But with a tremendous spike in the interest and investments, it saw a significant rise in the early 2010s, and this technology can now simulate a fully immersive experience.

VR is on an upward spiral. Not just in the gaming and entertainment industry, but in healthcare as well. It has gained momentum with recent progress and through many initiatives undertaken by the government to take this to the right people. Partnerships are considered pivotal to the future of this technology. The industry includes developers, tech companies, manufacturers, and in healthcare, it includes medical providers and institutions as well. VR technology in healthcare is a promising use case.

It helps educate patients, assists medical students with anatomy, surgery, rehabilitation from certain chronic conditions and much more. Presently, IT companies utilize VR to assist individuals with autism spectrum disease and cerebral palsy to develop social skills, help people with Alzheimer's and educate the caregivers on the patient's condition.

According to the recent market study by **Technavio**, the Augmented Reality and Virtual Reality Market Share in Information Technology Industry is expected to increase by **USD 162.71 billion** from 2020 to 2025, with an accelerated **CAGR of 46%**.

Nowadays, medical schools teach students about the anatomy and functioning of body parts by incorporating virtual reality. They also prepare them for surgeries by simulating various procedures without operating on live patients. Surgeons use VR technology to walk-through surgeries, show 3D models instead of X-rays and demonstrate the live process and the results.

Patient education is a promising area where we can put virtual reality to good use. Autistic children will receive a simulation of real-time scenarios, unlike the real world, where they have many distractions and hearing troubles. The simulation offers a calmer situation, where they interact with people, law enforcement officers or at a shopping mall. One can use VR technology to educate people who help patients on what they experience due to a medical condition. You can generate simulations on conditions such as macular degeneration, where patients have trouble hearing and seeing. The caregivers will have a first-hand

experience, and it will help them understand the hardships patients go through. The VR simulations have a calming effect on people with PTSD and anxiety disorders. The simulations make them feel relaxed and help them cope with the problems. VR plays a vital role in physical therapy and rehabilitation. A game-like simulation exclusively developed for physical therapy, where the patients guide a bird or a vehicle to train their muscles and increase their range of motion.

VR is used to treat chronic pain and behavioural disorders. Virtual reality helps people determine vision impairment by having applications and programs track eyeball movement, response to light, and find hidden objects. VR technology gives doctors access to medical records and helps check appointments. Presently, VR has become irreplaceable in the healthcare industry. It also helps health providers with tools to foster powerful connections.



Just Getting Started

As admirable as it may seem, virtual reality is one of the fastest-growing technologies. Every year, we see incredible progress in this technology with developments such as innovative VR headsets, advanced programming, and there will be many dazzling developments shortly. We have just utilized only 10% of the VR technology. But, this is due to several reasons such as the costs, computing constraints, high-tech VR headsets, adaptability.

VR headsets are not cost-efficient. They come at a price and is not accessible or affordable to everyone. Even hospitals need a considerable investment to incorporate VR in their setting. The same applies to medical schools as well. But at these places, reusability would be an option if the headset hygiene practices are well-maintained.

Certain healthcare providers are still hesitant to apply this technology, as they feel they might have difficulties using the latest technology in their daily routine with the patients. It might not be so true as it was the case when they moved to electronic medical records. As time progresses, they will feel comfortable and the results it produces. The future of healthcare is heavily dependent on these technologies as they bring sophisticated options for both patients and providers.

However, the collaboration of AI with VR will bring tremendous change in treating different health conditions. At present, we may only relate it with a movie or a game, but it is only science, science that transfers knowledge and impacts behavioural change.



A key part of that journey is making an open platform where any developer can create anything they want.”

— *Mark Zuckerberg*



USE CASES – Augmented Reality in Healthcare

Surgery virtualization on dangerously complicated procedures helps to provide digital models for planning and detailing of operations and opting for various scenarios.

Patient rehabilitation – AR and VR can help in providing guidance and support to patients recovering from the surgery or post-traumatic stress disorder or anxiety.

Virtualized training – Interactive learning experiences of human anatomy and body mechanics will make it easier to prepare medical practitioners and providers deeper insights into the details of the body functions

Augmented Reality (AR) in Healthcare

Augmented Reality in healthcare helps educate students on surgical procedures, displays information, assists in understanding complex surgical procedures, and also experience them in real-time how an organ functions. It also lays out intricate details about various nerves and tissues that are not easily identifiable in real patients. AR immensely helps improve the learning experiences of students and build self-confidence.

With the substantial increase in the usage of connected devices, computing capabilities, and AI, AR technology helps redefine the healthcare space. Also, the interactions between the real-world and virtual objects are driven by wearables and head-mounted displays that transform the way healthcare is delivered.

Surgeons can deliver care with precision by wearing AR-enabled headsets that display the patient's vitals without looking elsewhere to collect data. AR helps in the rehabilitation process for patients suffering from anxiety, PTSD and recovering from surgery. It also helps educate patients to understand the procedure, see how the medication works, and the postoperative care.

Also, AR technology shows patients how the procedure is performed on their bodies by creating virtual images and information in their field of view.

The pandemic has created fear amongst the general public to come out of their homes. Nowadays, most patients prefer the home environment for medical treatment instead of visiting a hospital. Telehealth has seen a significant rise during the Covid period, and AR helps providers serve the patients remotely without them needing to visit hospitals. Moreover, old patients can stay home and connect with their providers to get the necessary care, and this also extends to emergency care services. Specialists can inspect patients remotely and prescribe medications instantly by visualizing vitals and other important factors.

According to tech market research firm IDC, In 2025, the AR/VR industry value will escalate to **\$36.11 billion**, representing a compound annual growth rate (CAGR) of **68.4 percent**.

The use of AR in the health and wellness industry is a significant boost for instructors. It offers users first-hand experience of using equipment and helps overlook training regimes. It controls eating habits by providing nutritional facts and helps motivate users to follow a balanced diet. AR assists coaches to evaluate patients anywhere and at any time. In turn, this enhances the lifestyle and performance of individuals.

Augmented reality produces immersive and interactive simulations / environments that inspire users to follow their physical therapy. AR also helps technicians handling medical devices be cognitive of the device functionalities and help with troubleshooting techniques during an emergency.

The payers use this technology to help members understand the plan by creating interactive and informational simulations. They also explain the benefits, thus reducing the number of requests they receive due to misunderstanding these plans.

Augmented reality opens new avenues to reach potential members, and with deeper penetration of AR-enabled devices, they can create awareness about the treatment plans. From showing the availability of defibrillators to educating young mothers on breastfeeding, there is growing acceptance for AR technology. Also, many pharma companies producing life-saving drugs use AR to explain the side effects.





Easily Accessible Patient Data

Currently, doctors carry the EHR print-outs, hand-written notes, or a mobile application with detailed patient information. With the help of smart glasses, doctors can quickly get information like the latest clinical records, vitals, and the latest lab results displayed on the screen and with multi-experience interaction such as voice and gestures. The experience will transform doctors to communicate and examine their patients more effectively.

Conclusion




The market for virtual and augmented reality in healthcare is expected to reach \$2.4 billion by 2026, according to Allied Market Research, as use cases expand to include pain management, memory care and medical training, among other things. VR and AR have great potential and are applicable in various use cases. The technology enhances the way care is delivered with quality and precision. With further scientific advancements, AR and VR technology will pave the way to treat many health conditions. It will be a game-changer w.r.t on how a healthcare setting should operate. We can easily ensure that there will be a significant transformation.

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