Virtual Reality

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What is Virtual Reality (VR)

Definition: A simulated experience that can mimic or differ from the real world

Types

Non-Immersive: Typically accessed through a computer or a screen, using a controller or mouse and keyboard, examples include playing video games, or watching a 3D movie on a monitor.

Semi-Immersive: More immersive than a videogame, it often involves multiple monitors, larger screens, or even a full room setup, you may use VR glasses or headsets, but the experience is still connected to the physical world.

Fully-Immersive: these often use VR headsets, motion sensors, and other accessories to fully immerse the user. It often involves haptic feedback, like pressures or vibrations to simulate what's going on in the VR.

Not just a headset- VR is a new way of experiencing and interacting with the digital world, allowing users to step inside, not just operate from outside.

Applications of VR

Gaming- Gaming most well known, in games like beatsaber it creates a first person experience where people use their bodies to interact with the virtual world. Provides a more active and immersive way of entertainment that normal video games do not offer.

Education- Changing how we teach, Medical students use it to perform surgeries in a risk free 3d environment. Pilots train with flight simulators that replicate real-world cockpit scenarios.

Because VR allows you to practice without real-world consequences, it’s perfect for mastering complex or dangerous tasks.

Healthcare- PTSD, therapy can involve using VR to help in a safe setting, patients in chronic pain often use VR to take away pain, It can also be used in physical therapy to help individuals rebuild basic motor skills.

Tourism- VR allows people to explore distant places around the world and almost experience it firsthand, useful for schools, elderly, and people with disabilities.

Architects and designers can walk clients through a building before it's even constructed, making design changes in real time and reducing expensive errors.

VR and Computer Science

Languages- c++ is widely used in games like Unreal Engine and Unity, the two main vr developers. Python is often used for prototyping, machine learning integration, and scripting tools for developing,

These languages control everything from how the vr world is built, to how users interact with it, and how it responds while it's being used.

Algorithms- Rendering algorithms create the 3D graphics you see inside the headset. They must be extremely fast to avoid lag, which can cause motion sickness.

Real-time feedback allows the virtual environment to respond instantly to your movements, so when you turn your head or press a button, the virtual world reacts without delay.

AI enhancement- In VR games, AI controls NPCs (non-player characters), allowing them to respond to your presence, make decisions, and create more immersive storytelling.

AI can also adapt VR experiences based on user behavior—like adjusting difficulty levels, guiding attention, or customizing learning paths in educational VR.

Challenges and Limitations

Motion Sickness- Your brain can get conflicting signals, which can lead to dizziness, nausea, and headaches. Even without motion sickness, users can experience VR fatigue after long sessions, due to eye strain from being in an intense, immersive environment.

High Cost- VR technology is still expensive, plus the powerful computers needed to run them, can cost hundreds or even thousands of dollars.

This creates an access gap, where only people or institutions with money can afford it. That limits who gets to benefit from VR's educational or healthcare applications.

Privacy Concerns- eye movement, hand gestures, can all be tracked and stored for VR purposes, when tech companies or advertisers collect and store this data without clear consent. As VR platforms become more social (like in the Metaverse), questions about surveillance and data protection are only growing.

Ethics- Because VR feels so real, it can blur the line between virtual and actual experiences, Some users become addicted, spending hours in virtual spaces and ignoring real-world responsibilities.

Should everything be allowed in VR? How do we protect vulnerable users? What responsibilities do developers and platforms have?

Future of Virtual Reality

Realistic experiences- There working on making facial recognition so avatars are able to make real facial expressions and emotions.

There also starting to use Haptic feedback suits which are full body suits that give a holistic sensory experience possibly adding different senses into it.

Expansion of VR- Virtual Reality is working on making it possible to visit historical places or events like concert through the VR.

VR is also working to make it possible to have virtual offices and collaborative work spaces, which can expand work from home like never before

AI combined with VR- VR is trying to start making it so it acts like a virtual companion, such as an assistant or teacher that powered by Ai which will allow VR to be more interactive.

Virtual Reality Education and Training

Professional Training- VR is able to set up practice for medical training for emergency responses, and simulate surgeries for different procedures.

VR also can set up safety training for jobs like military or police force and can bring another level of skill development to the workforce.

Benefits of VR Training- Being able to do training on the VR allows for cheaper training and a lower risk of injuries that could happen during in person training.

Education- Students are able to visit historical landmarks and other places they may be learning about in class.

Students can also to class activities for there subject through the VR that brings more of an exciting aspect to the classroom.

With more advancements these will be applicable in many schools in the future.

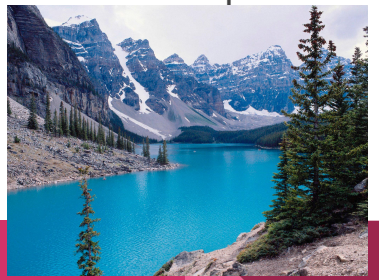
Psychological Effects of VR

Improved learning/Memory- VR can help out with a deeper aspect of learning especially for people that are visual learners.

LIke the education part when students learn in fun environments they tend to get a better grasp of the material.

Mindfulness and stress- There are calming environments on VR that can help users relax and can help reduce their anxiety in situations, which can make therapy a more appealing option.

Some setting like a beach or mountains can be used in VR that help calm people down.



Ethical Concerns of VR

Privacy- There could be deep personal data that could be wrongly used by corruption of the government.

A Lot of times people will put their information when asked for it and we do not know where or who it's going to.

Addiction- The VR could become as or more addict then say your phone and can also lead to neglect of real world responsibilities or isolation for social interaction.

Manipulation- Some people when using VR may not realize that some things you see on the VR are not always as they are in the real world.

Apple Vision Pro- The apple vision pro has been raising some ethical questions, for example wearing them while driving. With it being a newer innovation, there are not any good laws surrounding it.

Apple vision pro

I thought the apple vision pro is a great representation on what VR is able to do in today world. The Apple vision pro allows for you to do everything you could do from a laptop such as websites, documents and virtual desktops. This shows how VR can be put into the everyday life situations.

Sources

https://www.primebook.in/blog/what-are-the-different-types-of-virtual-reality

https://www.vationventures.com/glossary/virtual-reality-definition-explanation-and-use-cases#:~:text=Types%20of%20Virtual%20Reality,them%20into%20the%20virtual%20environment.

https://www.inna3d.com/post/the-top-10-applications-and-use-cases-of-virtual-reality#:~:text=Here%20are%20the%20use%20cases%20of%20VR,Marketing%20and%20Advertising:%20*%20Art%20and%20Creativity:

https://skywell.software/blog/top-6-ar-vr-programming-languages/

https://community.nasscom.in/communities/emerging-tech/ai-powered-vr-how-machine-learning-enhancing-virtual-reality-experience#:~:text=Object%20Recognition:%20ML%20algorithms%20are,and%20information%20about%20the%20environment.

Apple Vision Pro: Is Apple's Recent Flop Actually the Future?

Industry Training: Virtual Reality, Augmented Reality, and Digital Twins -- ANS / Conferences / Conference on Nuclear Training and Education: A Biennial International Forum (CONTE 2025) / Technical Sessions

Is virtual reality bad for our mental health? - Tech Monitor

The main problem with virtual reality? It’s almost as humdrum as real life