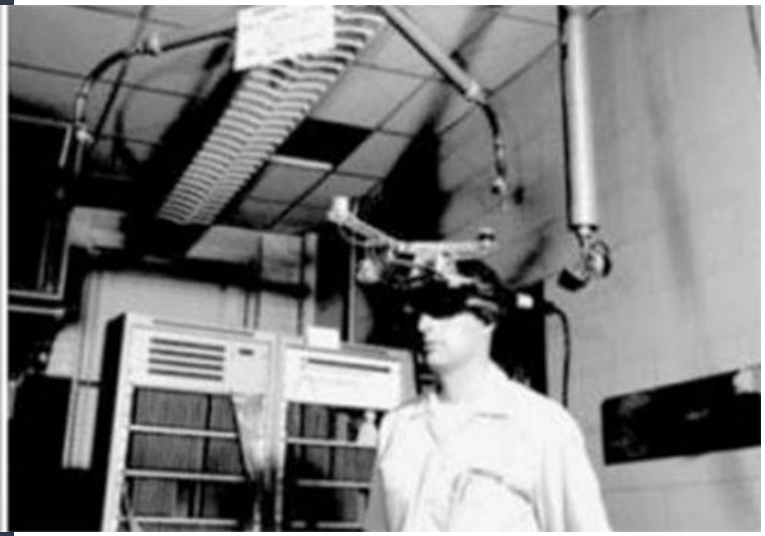
Intro to AVR Scripting

AVR Development

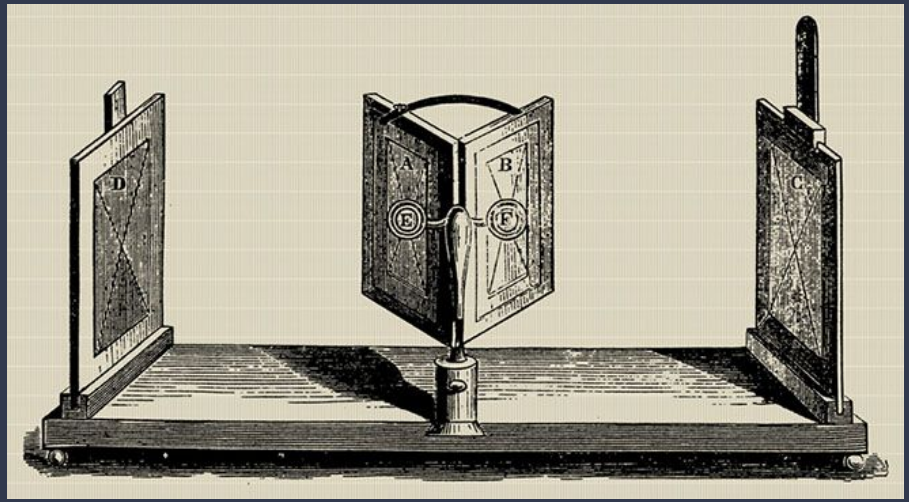
Virtual Reality Historical Background

History of VR - Timeline of Events and Tech Development



In 1935 Stanley Weinbaum released Pygmalion's Spectacles - a science fiction story. The story's main character wears a pair of goggles which transports him to a fictional world which stimulates his senses aptly and features holographic recordings. Some consider it to be the origin of the virtual reality (VR) concept as this story was a good prediction of the aims and achievements of the future.

However the first VR technical developments were in the 1830s, so this is where our timeline starts:



1838

Sir Charles Wheatstone was the first to describe stereopsis in 1838 and was awarded the Royal Medal of the Royal Society in 1840 for his explanation of binocular vision, a research which led him to construct the stereoscope.

The research demonstrated that the brain combines two photographs (one eye viewing each) of the same object taken from different points to make the image appear to have a sense of depth and immersion (3-dimensional).

This technology enabled Wheatstone to create the earliest type of stereoscope. It used a pair of mirrors at 45 degree angles to the user's eyes, each reflecting a picture located off to the side.

1935

In 1935 American science fiction writer Stanley Weinbaum presented a fictional model for VR in his short story Pygmalion's Spectacles. In the story, the main character meets a professor who invented a pair of goggles which enabled "a movie that gives one sight and sound [...] taste, smell, and touch. [...] You are in the story, you speak to the shadows (characters) and they reply [...] the story is all about you, and you are in it."

1956

Cinematographer Morton Heilig created Sensorama, the first VR machine (patented in 1962). It was a large booth that could fit up to four people at a time. It combined multiple technologies to stimulate all of the senses: there was a combined full colour 3D video, audio, vibrations, smell and atmospheric effects, such as wind.

This was done using scent producers, a vibrating chair, stereo speakers and a stereoscopic 3D screen. Heilig thought that the Sensorama was the "cinema of the future" and he wanted to fully immerse people in their films. Six short films were developed for it.

1961

Until Headsight was created by Comeau and Bryan, two Philco Corporation engineers. Headsight was the first motion tracking HMD. It had built-in video screens for each eye and a head-tracking system.

However, this wasn't used for virtual reality; it was developed for the military to allow them to remotely look at hazardous situations. A remote camera imitated the head movements so the user could look around the setting.

1965

Ivan Sutherland, a computer scientist, presented his vision of the Ultimate Display. The concept was of a virtual world viewed through an HMD which replicated reality so well that the user would not be able to differentiate from actual reality. This included the user being able to interact with objects. This concept featured computer hardware to form the virtual world and to keep it functioning in real-time. His paper is seen as the fundamental blueprint for VR.

“The ultimate display would, of course, be a room within which the computer can control the existence of matter. A chair displayed in such a room would be good enough to sit in. Handcuffs displayed in such a room would be confining, and a bullet displayed in such a room would be fatal. With appropriate programming such a display could literally be the Wonderland into which Alice walked.”

1966

Thomas Furness, a military engineer, created the first flight simulator for the Air Force. This assisted in the progression of VR because the military subsequently provided a lot of funding for producing better flight simulators.

1968

Sutherland, with his student Bob Sproull, created the first virtual reality HMD, named The Sword of Damocles. This head-mount connected to a computer rather than a camera and was quite primitive as it could only show simple virtual wire-frame shapes.

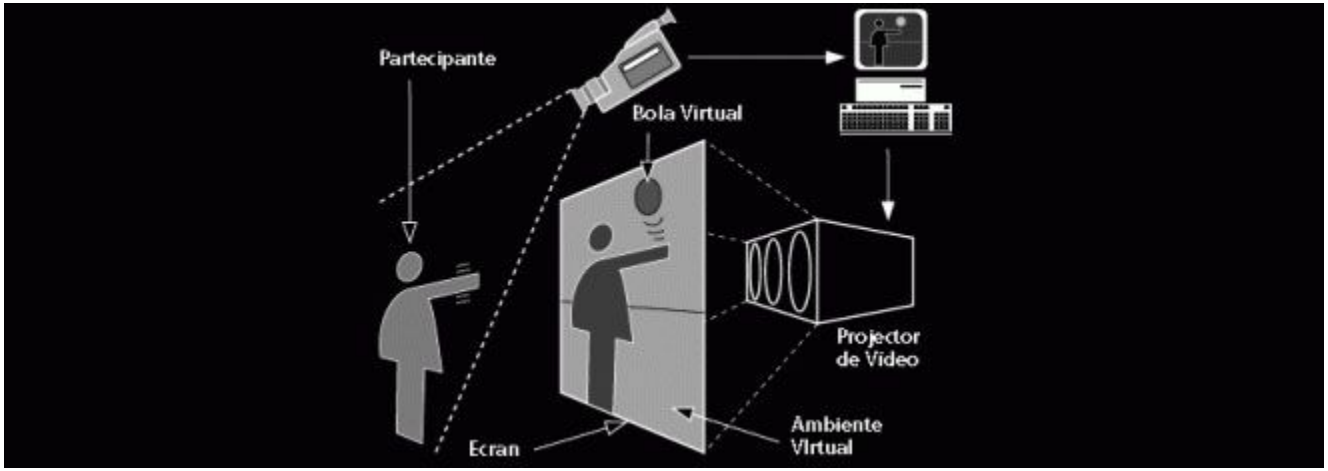
These 3D models changed perspective when the user moved their head due to the tracking system. It was never developed beyond a lab project because it was too heavy for users to comfortably wear; they had to be strapped in because it was suspended from the ceiling.

1969

Myron Krueger, a computer artist, developed a succession of "artificial reality" experiences using computers and video systems. He created computer-generated environments that responded to the people in it. These projects led to VIDEOPLACE technology which is mentioned later.

1972

General Electric Corporation built a computerised flight simulator which featured a 180-degree field of vision by using three screens surrounding the cockpit.



The users could see their computer-generated silhouettes imitating their own movements and actions - the users' movements were recorded on camera and transferred onto the silhouette. Also, users in different rooms could interact with other users' silhouettes in the same virtual world. This encouraged the idea that people could communicate within a virtual world even if they weren't physically close.

1985

Jaron Lanier and Thomas Zimmerman founded VPL Research, Inc. This company is known as the first company to sell VR goggles and gloves. They developed a range of VR equipment, such as, the DataGlove, EyePhone HMD and the Audio Sphere.

1989

Scott Foster founded Crystal River Engineering Inc after receiving a contract from NASA to develop the audio element of the Virtual Environment Workstation Project (VIEW) - a VR training simulator for astronauts. Through this company real-time binaural 3D audio processing was developed.

1991

Antonio Medina, a NASA scientist, designed a VR system to drive the Mars robot rovers from Earth in supposed real-time despite signal delays between the planets. This system is called "Computer Simulated Teleoperation".

The Virtuality Group launched Virtuality. These were VR arcade machines where gamers could play in a 3D gaming world. This was the first mass-produced VR entertainment system.

A Virtuality pod featured VR headsets and real-time immersive stereoscopic 3D images. Some of the machines could be networked together for multi-player games. Eventually some of the very popular arcade games, like Pac-Man, had VR versions.

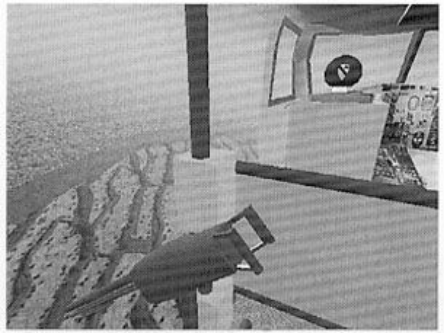


Figure 1 Helicopter Environment

Figure 2 Open Field Environment

1997

Georgia Tech and Emory University researchers used VR to create war zone scenarios for veterans receiving exposure therapy for PTSD. This was known-as Virtual Vietnam [link 1][link 2].

2001

SAS Cube was the first PC based cubic room. It led to Virtools VR Pack.

2007

Google introduced Street View.

Immersive Media was identified as the contractor that captured the imagery for four of the five cities initially mapped by Street View, using its patented dodecahedral camera array on a moving car.

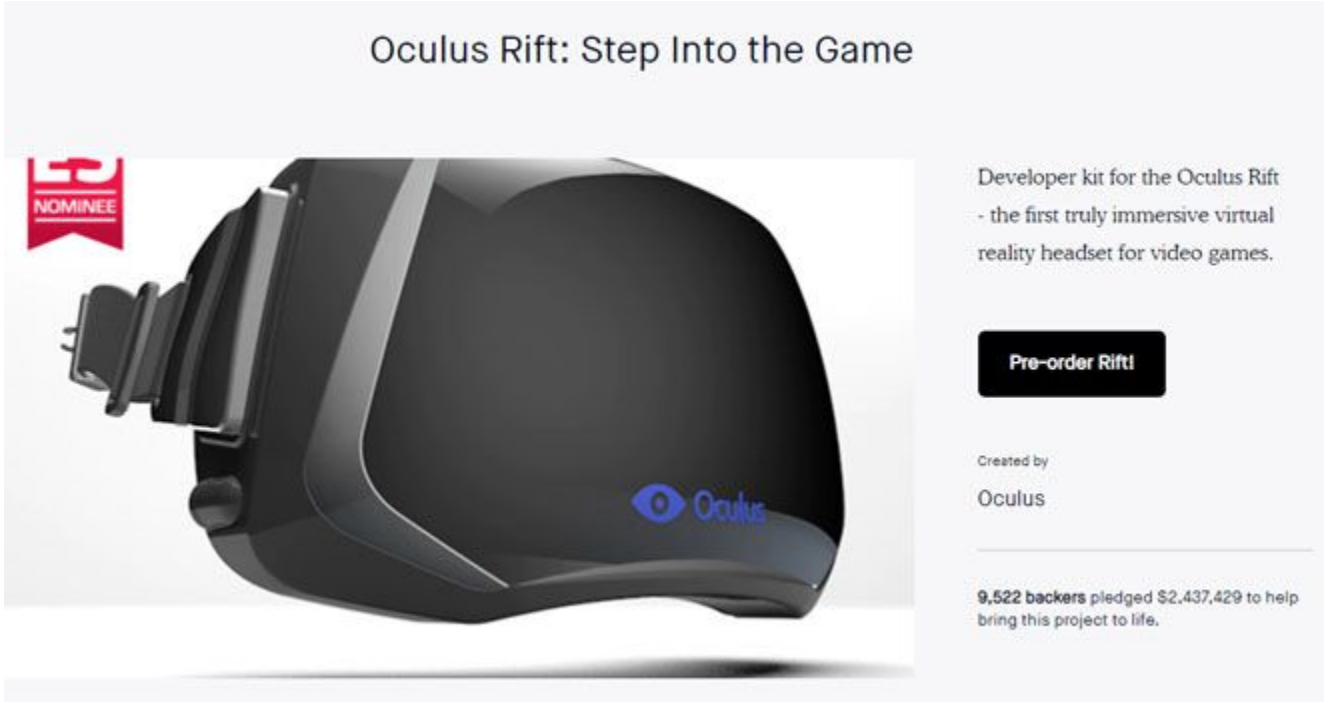
2010

Google introduced a stereoscopic 3D mode for Street View.

Palmer Luckey, an 18-year-old entrepreneur, created the first prototype of the Oculus Rift headset. It featured a 90-degree field of vision, which had never been seen before, and relied on a computer's processing power to deliver the images. This new development boosted and refreshed interest in VR.

2012

Luckey launched a Kickstarter campaign for the Oculus Rift which raised $2.4 million.



2014

Facebook bought the Oculus VR company for $2 billion. This was a defining moment in VR's history because VR gained momentum rapidly after this.

Sony announced that they were working on Project Morpheus, a VR headset for the PlayStation 4 (PS4).

Google released the Cardboard - a low-cost and do-it-yourself stereoscopic viewer for smartphones.

Samsung announced the Samsung Gear VR, a headset that uses a Samsung Galaxy smartphone as a viewer.

More people started exploring the possibilities of VR, including adding innovative accessories, for example Cratesmith, an independent developer, recreated a hoverboard scene from Back to the Future by pairing the Oculus Rift with a Wii's balance board.

2015

VR possibilities started becoming widely available to the general public, for example:

- The Wall Street Journal launched a VR roller coaster that followed the ups and downs of the Nasdaq Stock Market.
- The BBC created a 360-degree video where users view a Syrian migrant camp.
- The Washington Post released a VR experience of the Oval Office at the White House Correspondents' Association Dinner.
- RYOT, a media company, exhibited Confinement, a short VR film about solitary confinement in US prisons.
- Etc.

Gloveone was successful in its Kickstarter campaign. These gloves let users feel and interact with virtual objects.

2016

By 2016 hundreds of companies were developing VR products.

Most of the headsets had dynamic binaural audio.

Haptic interfaces were underdeveloped. Haptic interfaces are systems that allow humans to interact with a computer using their touch and movements - like the Gloveone gloves that were being developed. This meant that handsets were typically button-operated.

HTC released its HTC VIVE SteamVR headset. This was the first commercial release of a headset with sensor-based tracking which allowed users to move freely in a space.


VIVE
htc
htc
htc

2017

Many companies are developing their own VR headsets, including HTC, Google, Apple, Amazon, Microsoft Sony, Samsung etc.

Sony may be developing a similar location tracking tech to HTC's VIVE for the PlayStation 4.

2018

At Facebook F8, Oculus demonstrated a new headset prototype, the Half Dome. This is a varifocal headset with a 140 degrees field of vision.

Virtual reality has significantly progressed and is now being used in a variety of ways, from providing immersive gaming experiences, to helping treat psychological disorders, to teaching new skills and even taking terminally ill people on virtual journeys. VR has many applications and with the rise in smartphone technology VR will be even more accessible.

- See other applications of VR

2019

Forbes describes this as The Year Virtual Reality Gets Real. Oculus Quest, Facebook's standalone headset, created a lot of interest and momentum, selling out in many locations and generating $5 million worth of content sales.

The shift from tethered to standalone VR headsets represented a shift within the immersive ecosystem, as standalone headsets are much easier to use for the average consumer.

Road to VR reported that the monthly-connected VR headsets on Steam had surpassed 1 million for the first time.

Nintendo entered the VR market with the Labo: VR kit for Nintendo Switch on April 12.

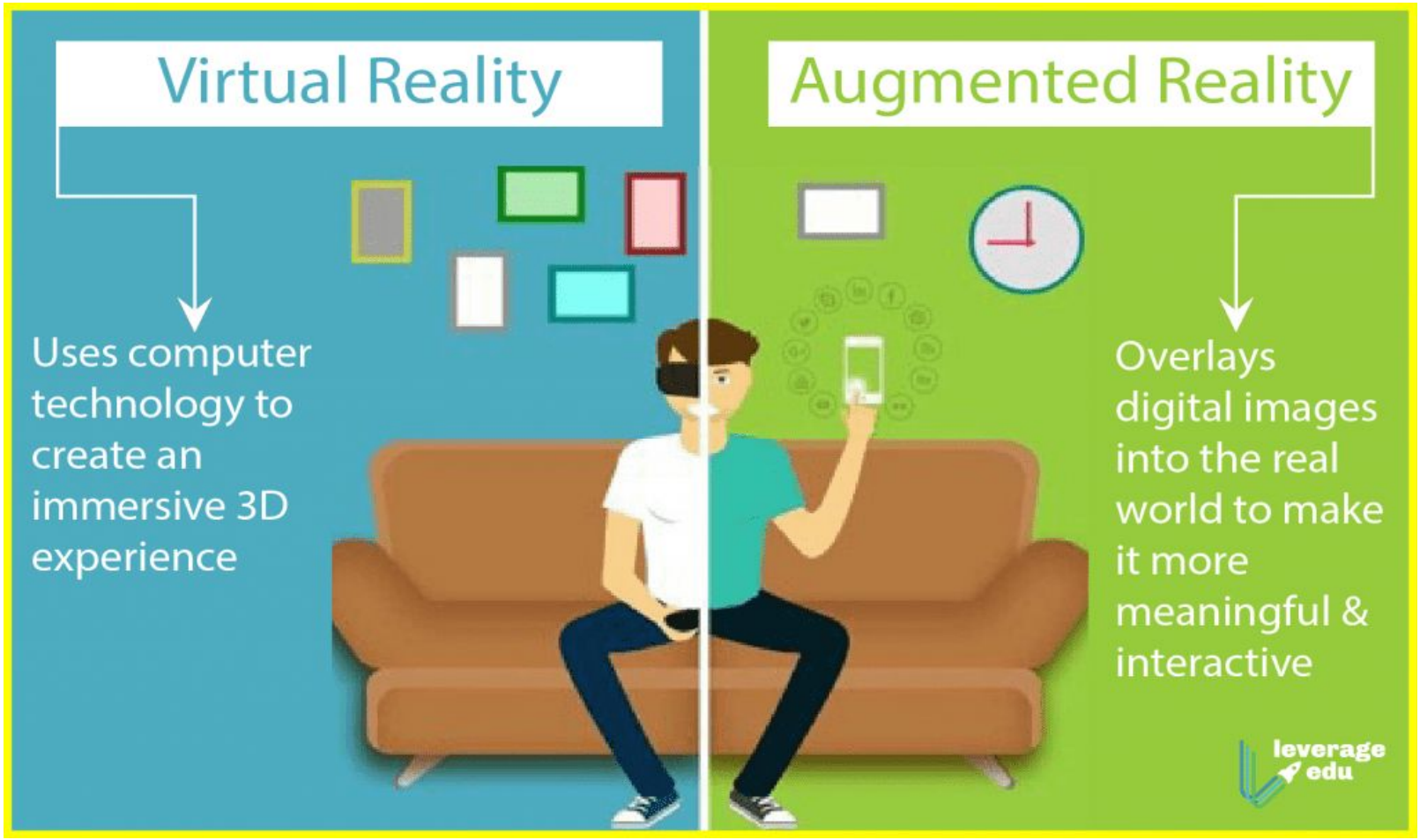
In March, Beat Saber became the first application to sell over 1 million copies in under a year.

Augmented Reality (AR) and Virtual Reality (VR) both refer to interactive digital experiences. Virtual Reality is the technology that provides almost real and/or believable experiences in an immersive environment, while Augmented Reality enhances the real world by superimposing computer-generated information on top of it.

in VR the user is isolated from the world around them, allowing them to work or play within a fabricated space. In a VR environment, users are presented with a new world that can be digitally broadcast directly a headset. which blocks the users from seeing the real world around them. An example of the VR concept would be the Holodeck from the fictional TV series Star Trek, where the user can simulate entire worlds around them to experience as if they were millions of miles away and on another planet.

Augmented reality provides an additive environment, in which the user is presented with additional information that is visually layered
over the actual world around them. In an AR environment, a user may view a display that allows them to see digitally created objects
and text that seemingly co-exist in the world around them. A simple example of AR would be Snapchat app.

virtual reality history and background


Virtual Reality
Augmented Reality
Uses computer technology to create an immersive 3D experience
Overlays digital images into the real world to make it more meaningful & interactive
leverage edu

Augmented Reality (AR) vs. Virtual Reality (VR): What's the Difference?

Virtual reality (VR) immerses people in experiences, often with a lot of expensive technology such as headsets. Augmented reality, on the other hand, usually starts with a real-life view of something (such as the camera of a mobile phone), and projects or inserts images onto the screen or viewer.

The appeal is obvious. Both offer an innovative way to immerse customers in an even more engaging, interactive and personal experience. And if you're in marketing, the ability to show people what using a product is like is huge. But it's easy to get confused by the terminology. What exactly is the difference between virtual reality and augmented reality? We'll break it down for you and share a few examples of each.

AR	VR
The system augments the real-world scene	Completely immersive virtual environment
In AR User always have a sense of presence in the real world	In VR, visual senses are under control of the system
AR is 25% virtual and 75% real	VR is 75% virtual and 25% real
This technology partially immerses the user into the action	This technology fully immerses the user into the action
AR requires upwards of 100 Mbps bandwidth	VR requires at least a 50 Mbps connection
No AR headset is needed.	Some VR headset device is needed.
With AR, end-users are still in touch with the real world while interacting with virtual objects nearer to them.	By using VR technology, VR user is isolated from the real world and immerses himself in a completely fictional world.
It is used to enhance both real and virtual worlds.	It is used to enhance fictional reality for the gaming world.

Advantages of Augmented Reality (AR)

Here are the pros/benefits of Augmented Reality:

- Offers individualized learning
- Fostering the learning process
- Wide variety of fields
- Offers innovation and continuous improvement
- Increase accuracy
- Augmented reality can be used to increase user knowledge and information.
- People can share experiences over long distances.
- Helps developers to build games that offer “real” experience to the user.

Advantages of Virtual Reality (VR)

Here are the pros/benefits of Virtual Reality:

- Immersive learning
- Create an interactive environment
- Increase work capabilities
- Offer convenience
- One of the most important advantages of VR is that it helps you to create a realistic world so that the user can explore the world.
- Virtual reality in the education field makes education more easy and comfortable.
- Virtual reality allows users to experiment with an artificial environment.

Disadvantages of Augmented Reality

Here are the cons/drawbacks of Augmented Reality:

- It is very expensive to implement and develop AR technology-based projects and to maintain it.
- Lack of privacy is a major drawback of AR.
- The low-performance level of AR devices is a major drawback that can arise during the testing phase.
- Augmented reality can cause mental health issues.
- Lack of security may affect the overall augmented reality principle.
- Extreme engagement with AR technology can lead to major healthcare issues such as eye problems and obesity etc.

Disadvantages of Virtual Reality

Here are the cons/drawbacks of Virtual Reality:

- VR is becoming much more common, but programmers will never be able to interact with virtual environments.
- The escapism is commonplace among those that use VR environments, and people start living in the virtual world instead of dealing with real-world issues.
- Training with a VR environment never has the same result as training and working in the real world. This means if somebody done well with simulated tasks in a VR environment, there is still no guarantee that a person doing well in the real world.

Applications of Augmented Reality (AR)

Here are the important applications of AR technology:

- AR apps are being developed which embed text, images, videos, etc.
- Printing and advertising industries are using AR technology apps to display digital content on top of real-world magazines.
- AR technology allows you for the development of translation apps that helps you to interpret the text in other languages for you.
- With the help of the Unity 3d Engine tool, AR is being used to develop real-time 3D Games.

Applications of Virtual Reality (VR)

Here are the important applications of VR:

- VR technology is used to build and enhance a fictional reality for the gaming world.
- VR can use by the military for flight simulations, battlefield simulations, etc.
- VR is used as a digital training device in many sports and to help to measure a sports person’s performance and analyze their techniques.
- It is also becoming a primary method for treating post-traumatic stress.
- Using VR devices such as Google Cardboard, HTC Vive, Oculus Rift, or users can be transported into real-world and imagined environments like squawking penguin colony or even the back of a dragon.
- VR technology offers a safe environment for patients to come into contact with things they fear.
- Medical students use VR to practice and procedures
- Virtual patients are used to help students to develop skills that can later be applied in the real world.

Question?