Virtual Reality & Augmented Reality

Virtual Reality

What is Virtual Reality?

- The Virtual Reality is a technology that use software to generate realistic images, sound and other sensations that replicate real world environment.
- A user can interact and manipulate with the virtual objects of virtual world with the help of specialized devices like display screens or other devices.

- A person using virtual reality equipment is typically able to "look around" the artificial world.
- virtual realities are displayed either on a computer monitor, a projector screen, or with a virtual reality headset.
- Virtual reality environment is captured by using 360 degree special video camera.

History

- 1965-The beginnings of VR.
- 1977-Interaction through body movement
- 1982-The first computer- generated movie
- 1983-First virtual environment
- 1987-Development of immersive VR
- 1993-Invention of surgery rehearsal system.
- 2007-Google introduced Street View, a service that shows panoramic views

Immersive Virtual Reality

- An immersive Virtual Reality adds special gadgets like Head mounted displays and Boom.
- Stereoscopic viewing adds enhanced features like deep peeping through the Virtual world.
- Eliminating the real world and placing the human in a computer generated world is one of the enhancements.
- Interactions with the objects in the Virtual world are controlled by a data glove, head mounted display and other gadgets.

Head Mounted Display

- Consists of two miniature display screens that produces the stereoscopic images and an optical position tracking system
- It tracks the orientation of the humans head in the Virtual world and that produces the impulse to the image generating large projection Areas to get more immersive feeling.
- Characteristics: walk through , look around, fly through in the 3d Virtual world Computer.

Application of virtual reality

- Movies - Virtual reality is applied in 3-D movies to try and immerse the viewer into the movie and/or virtual setting and environments.

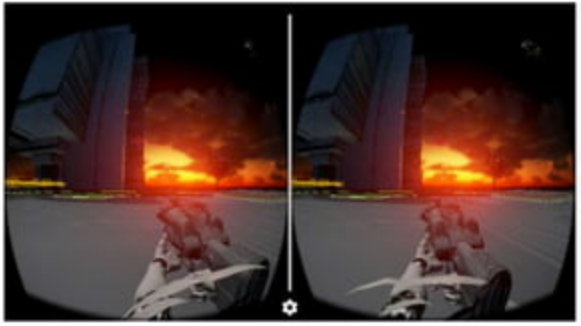
- Video Games - Virtual reality is evident in video games. Now you can physically interact with a game by using your body and motions to control characters and other elements of the game that years ago people would only imagine.

- Education -Virtual reality for teaching and learning situations. The advantage of this is that it enables large groups of students to interact with each other as well as within a three dimensional environment. Creating Virtual Labs.

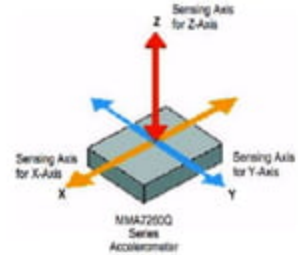
- **Training**- VR is used by trainers to provide learners with a virtual environment where they can develop their skills without the real-world consequences of failing.
- Architectural Design- Architectural design firms and various clients in the real estate industry to tour virtual models of proposed building designs.

How Virtual Reality works?

- virtual reality tricks your brain into believing you are in a 3D world. VR does this is with the stereoscopic display. This works by displaying two slightly different angles of the scene to each eye, simulating depth.



- On Android, your phone's accelerometer, gyroscope and magnetometer are used to achieve movement of the headset. The accelerometer is used to detect three dimensional movement with the gyroscope being used to detect angular movement.
- Using these sensors, your phone can accurately predict where you are looking at any given time while using VR.



Advantages of VR

1) Virtual reality creates a realistic world
2) It enables user to explore places.
3) Through Virtual Reality user can experiment with an artificial environment.
4) Virtual Reality make the education more easily and comfort.

Disadvantages of Virtual Reality

1) The equipments used in virtual reality are very expensive.
2) It consists of complex technology.
3) In virtual reality environment we can't move by our own like in the real world.

Current Virtual Reality devices in Market

- Oculus Rift

The **Oculus Rift** is a virtual reality headset developed and manufactured by Oculus VR, a division of Facebook Inc., released on March 28, 2016.

Google Cardboard

Google Cardboard is a virtual reality (VR) platform developed by **Google** for use with a head mount for a smartphone. Named for its fold-out **cardboard** viewer, the platform is intended as a low-cost system to encourage interest and development in VR applications.

Samsung GearVR

- The Samsung Gear VR is a mobile virtual reality headset developed by Samsung Electronics, in collaboration with Oculus, and manufactured by Samsung. When in use, a compatible Samsung Galaxy device (Galaxy Note 5, Galaxy S6/S6 Edge/S6 Edge+, or Galaxy S7/S7 Edge) acts as the headset's display and processor, while the Gear VR unit itself acts as the controller,

Augmented Reality

What is Augmented Reality?

- A combination of a real scene viewed by a user and a virtual scene generated by a computer that augments the scene with additional information.

- An AR system adds virtual computer- generated objects, audio and other sense enhancements to a real-world environment in real time.
- The Goal of AR is to Create a system such that a user CANNOT tell the difference between the real world and the virtual augmentation of it.

History

- 1980: Steve Mann creates the first wearable computer, a computer vision system with text and graphical overlays on a mediated reality
- 1989: Jaron Lanier coins the phrase Virtual Reality and creates the first commercial business around virtual worlds
- 2013: Google announces an open beta test of its Google Glass augmented reality glasses.
- 2015: Microsoft announces Windows Holographic and the HoloLens augmented reality headset
- 2016: Niantic released *Pokémon Go* for iOS and Android in July 2016.

Technology Component

- Hardware- Hardware components for augmented reality are processor display, sensors an input devices.
- Display-Various technologies are used in Augmented Reality rendering including optical projection systems, monitors, handheld devices, and display systems worn on the human body.
- Eyeglasses- AR displays can be rendered on devices resembling eyeglasses.

- **Contact lenses-** Contact lenses that display AR imaging are in development.

- Handheld- Handheld displays employ a small display that fits in a user's hand such as Mobile phones and tablets.

- **Heads up display-** Is any transparent display that presents data without requiring users to look away from their usual viewpoints.

Applications

Augmented reality also has application in similar fields that of Virtual reality

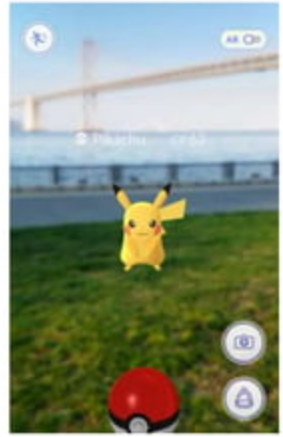
- Medical
- Entertainment
- Military Training
- Engineering Design
- Robotics and Telerobotics
- Manufacturing, Maintenance, and Repair
- Consumer Design
- etc

Medical

AR has application in medicals like observing the internal body systems of patients

Entertainment & Games

AR has applications in Games like and entertainments to play game called pokemon go in which you can catch augmented pokemon characters in real world

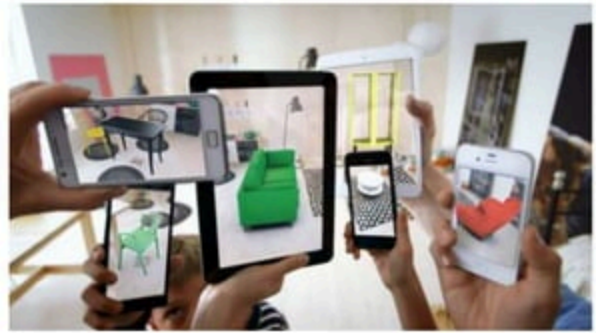


Robotics

- AR is useful for Robots Application where robot will be able to show holographic augmented characters in real world making easier to communicate.

Consumer Design

- A very simple example of application in consumer design would be Imagine you place a augmented sofa in your Room and see if it fits or not before purchasing



Advantages of AR

- Can increase knowledge and information
- People can share experiences with each other in real time over long distances
- Games can provide an even more "real" experience
- Things come to life on people's mobile

Disadvantages of AR

- Lack of Privacy criminals can simply point their phone towards victim and know everything about them
- Production is expensive.
- Difficult to maintain Augmented Reality Systems
- Low performance level.

Augmented Reality vs. Virtual Reality

Augmented Reality

- System augments the real world scene
- User maintains a sense of presence in real world
- Needs a mechanism to combine virtual and real worlds

Virtual Reality:

- Totally immersive environment
- Visual senses are under control of system (sometimes aural and proprioceptive senses too)

Conclusion

Virtual as well as Augmented Reality has very Strong Potentials And maybe they are currently in its initial stage but will have a very big role in our lives in future when these technologies are matured enough.