UNIT 5 part A (AGUMENTED AND VIRTUAL REALITY)

VIRTUAL REALITY

What Is Virtual Reality?

Virtual reality (VR) refers to a computer-generated simulation in which a person can interact within an artificial three-dimensional environment using electronic devices, such as special goggles with a screen or gloves fitted with sensors. In this simulated artificial environment, the user is able to have a realistic-feeling experience.

- Virtual reality (VR) creates an immersive artificial world that can seem quite real, via the use of technology.
- Through a virtual reality viewer, users can look up, down, or any which way, as if they were actually there.
- Virtual reality has many use-cases, including entertainment and gaming, or acting as a sales, educational, or training tool.

The concept of virtual reality is built on the natural combination of two words: the virtual and the real. The former means "nearly" or "conceptually," which leads to an experience that is near-reality through the use of technology.

Software creates and serves up virtual worlds that are experienced by users who wear hardware devices such as goggles, headphones, and special gloves. Together, the user can view and interact with the virtual world as if from within.

Virtual reality attempts to create an illusory environment that can be presented to our senses with artificial information, making our minds believe it is (almost) a reality.

VIRTUAL REALITY USE CASES

1) The simplest example of VR is a three dimensional (3D) movie. Using special 3D glasses, one gets the immersive experience of being a part of the movie with on-spot presence. The leaf falling from a tree appears to float right in front of the viewer, or the shot of a speeding car going over a cliff makes the viewer feel the chasm's depth and may give some viewers the feeling of falling. Essentially, the light and sound effects of a 3D movie make our vision and hearing senses believe that it's all happening right in front of us, though nothing exists in physical reality.

2) Technological advances have enabled further enhancement beyond standard 3D glasses. One can now find VR headsets to explore even more. Aided by computer systems, one can now play "real sports" right in their living room by holding sensor-fitted racquets for playing within a computer-controlled game simulation. The VR headset that players wear on their eyes gives the illusion of being on a playground.
3) Other uses of this VR technology involve training and simulation. For example, those wanting to get a driver's license can get a first-hand experience of road driving using a

VR setup that involves handling car parts like the steering wheel, brake, and accelerator. It offers the benefit of experience without the possibility of causing an accident, so students can develop a certain level of expertise in driving before actually being on the road.

4) Sellers of real estate can also use VR-aided walkthroughs of a home or apartment to give a feel for a property without actually having to physically be at the location with a potential buyer.
5) Other developing uses are training astronauts for space travel, exploring the intricacies of miniature objects, and allowing medical students to practice surgery on computer-generated subjects.

IMPORTANT FEATURES OF VIRTUAL REALITY (VR)

1) Viewing System - The best virtual reality experience is possible only if it runs on a good viewing system. Irrespective of the number of users, the viewing system is what connects the last mile.
2) Tracking System- Virtual reality headsets need a sensor camera to recognize movement and provide the best 3D world experience.
3) Interactivity Element - One of the main attractions of a virtual reality experience is that you can interact with the content as if it is real. Earlier, the technology was not good enough to build a realistic experience but all that have changed.

The elements of interaction depend on range, speed, and mapping. The power to move from one place to another inside a virtual world and the ability to change the environment are the best interactivity elements that VR can provide.

4) Artistic Inclination - The virtual environment should provide users with an environment in which they are completely immersed.

The VR artist should focus on the atmosphere, engaging factor, and entertaining factor so that the experience is immersive and users should feel that they are a part of the game or environment they are in.

5) Sensory Management System - If there is a slight variation in the virtual environment like the vibration, movement, or direction, then users should be able to feel it. This is now available in most sophisticated virtual reality headsets.

THE LIMITATIONS OF VIRTUAL REALITY

1) Cost of VR devices

As with any new technology, the initial costs are extremely high. Even mediocre VR devices are priced fairly high. This trend is likely to continue for the decade to come until we figure out how to reduce costs for VR capable devices.

2) Size of VR software

A less looked at the aspect of VR devices, the software for VR is significantly bigger. Since VR devices involve more programming for their immersive experience, it is a given. VR software take up a lot of space and require a lot of computing power compared to other devices. That is one of the reasons that VR software for sale usually look worse than normal computer software.

While compressing software isn't really all that difficult, it'll take time for VR software to shrink in size. But this compression will, in turn, increase the initial costs of VR.

2) Locomotion Sickness

VR successfully mimics the illusion of reality by placing it close to your visual space but it is also the exact thing that can break the illusion that VR is trying to create. VR devices still mimic movement through joysticks and inbuilt game/software mechanics and not the actual movement of the person. This causes what is termed as locomotion sickness.

In medical terms, when moving around in VR, your eyes perceive your body as moving and they send a signal to your brain that you're moving. But the inertia and balance of the body are maintained by fluids in your ears. The ear fluids don't send the same signal since they're not moving which confuses your brain and causes uneasiness, nausea and in the worst cases fainting. It's similar to what you feel when traveling in a bus on a winding road.

3) The weight of VR devices

Barring Google Cardboard, all VR devices are quite heavy and extended use can cause headaches and neck pain. There are ways to cancel out this weight with durable and lighter materials, but this is likely to increase the costs of VR devices substantially. This is why there is a slight consumer tilt to Augmented Reality. Augmented reality tends to cancel out the problem mentioned above.

4) Lack of the vision of the surroundings

Not exactly a deal-breaking problem, but the truth is that, once you put on a VR device, you cannot see around you. This is a great drawback when using a VR device at home and the lack of vision can cause expensive accidents. A lot of videos on the Internet prove the same.

5) Potential Addiction

This is a problem that many psychologists fear when talking about Virtual Reality. VR removes people from reality and that is never really a good thing. VR, for now, loses out on the realism aspect thanks to its limited graphical capability.

But with better graphics and immersive and engaging content, addiction to VR is a very real possibility. Addiction to videogames is already a common problem, but addiction to the VR experience will be more pronounced thanks to the complete immersion that the technology provides.]

6) Potential Eye Damage

Coming to a major problem with VR, potential eye damage is high up in the list. VR is basically a screen placed a few centimeters from your eyes. This has a significant effect on eyesight and eye damage is a major cause of worry.

Our addiction to computers itself raised a new problem called Computer Vision Syndrome..

7) Lack of understanding

VR is still a fairly new concept. While its applications seem far and wide, each technology faces a limitation that cannot be accounted for. So far, VR has been facing its greatest one. What is the use? Apart from a limited application in the gaming, healthcare and education industries, VR serves no utilitarian purposes in major businesses.

AUGMENTED REALITY

What Is Augmented Reality?

Augmented reality (AR) is an enhanced version of the real physical world that is achieved through the use of digital visual elements, sound, or other sensory stimuli delivered via technology. It is a growing trend among companies involved in mobile computing and business applications in particular.

Amid the rise of data collection and analysis, one of augmented reality's primary goals is to highlight specific features of the physical world, increase understanding of those features, and derive smart and accessible insight that can be applied to real-world applications. Such big data can help inform companies' decision-making and gain insight into consumer spending habits, among others.

- Augmented reality (AR) involves overlaying visual, auditory, or other sensory information onto the world in order to enhance one's experience.
- Retailers and other companies can use augmented reality to promote products or services, launch novel marketing campaigns, and collect unique user data.
- Unlike virtual reality, which creates its own cyber environment, augmented reality adds to the existing world as it is.

Augmented reality continues to develop and become more pervasive among a wide range of applications. Since its conception, marketers and technology firms have had to battle the perception that augmented reality is little more than a marketing tool. However, there is

evidence that consumers are beginning to derive tangible benefits from this functionality and expect it as part of their purchasing process.

For example, some early adopters in the retail sector have developed technologies that are designed to enhance the consumer shopping experience. By incorporating augmented reality into catalog apps, stores let consumers visualize how different products would look like in different environments. For furniture, shoppers point the camera at the appropriate room and the product appears in the foreground.

Elsewhere, augmented reality's benefits could extend to the healthcare sector, where it could play a much bigger role. One way would be through apps that enable users to see highly detailed, 3D images of different body systems when they hover their mobile device over a target image. For example, augmented reality could be a powerful learning tool for medical professionals throughout their training.

Augmented Reality vs. Virtual Reality

Augmented reality uses the existing real-world environment and puts virtual information on top of it to enhance the experience.

In contrast, virtual reality immerses users, allowing them to "inhabit" an entirely different environment altogether, notably a virtual one created and rendered by computers. Users may be immersed in an animated scene or an actual location that has been photographed and embedded in a virtual reality app. Through a virtual reality viewer, users can look up, down, or any which way, as if they were actually there.

Features of Augmented Reality

AR can be defined as a system that fulfills three basic features:

1) a combination of real and virtual worlds
2) real-time interaction
3) accurate 3D registration of virtual and real **objects**

What are the advantages and Disadvantages of Augmented Reality?

Advantages of Augmented Reality: -

- It provides a much-enhanced sense of reality than any other technology in use.
- It reduces the difference between what is digitally generated, and which is real in physical world.
- The instructions provided in the AR based application makes it easy to understand the workflow of the application.
- With the guided pathways, it delivers great user experience, thus offers better customer retention as well.
- It is also used by militaries across the world to simulate a battlefield before actually putting their lives at risk.

Disadvantages of Augment Reality: -

- With so limited difference between reality and digital world, sometimes extreme conditions can be simulated which might prove to be dangerous for individuals.
- The applications or devices associated with AR technology suffers from lack of privacy thus putting user data at risk
- There is a huge list of hardware and software resources required for the implementation of AR technology.

APPLICATIONS OF AUGMENTED REALITY

1. **Medical Training**

From operating MRI equipment to performing complex surgeries, AR tech holds the potential to boost the depth and effectiveness of medical training in many areas. Students at the Cleveland Clinic at Case Western Reserve University, for example, will now learn anatomy utilizing an AR headset allowing them to delve into the human body in an interactive 3D format.

2. Retail

In today's physical retail environment, shoppers are using their smartphones more than ever to compare prices or look up additional information on products they're browsing. World famous motorcycle brand Harley Davidson is one great instance of a brand making the most of this trend, by developing an an AR app that shoppers can use in-store. Users can view a motorcycle they might be interesting in buying in the showroom, and customize it using the app to see which colors and features they might like.

3. Repair & Maintenance

One of the biggest industrial use cases of AR is for repair and maintenance of complex equipment. Whether it's a car motor or an MRI machine, repair and maintenance staff are beginning to use AR headsets and glasses while they perform their jobs to provide them with useful information on the spot, suggest potential fixes, and point out potential trouble areas. This use case will only continue to get stronger as machine-to-machine IoT technology grows and can feed information directly to AR headsets.

4. Design & Modeling

From interior design to architecture and construction, AR is helping professionals visualize their final products during the creative process. Use of headsets enables architects, engineers, and design professionals step directly into their buildings and spaces to see how their designs might look, and even make virtual on the spot changes. Urban planners can even model how entire city layouts might look using AR headset visualization. Any design or modeling jobs that involve spatial relationships are a perfect use case for AR tech.

5. Business Logistics

AR presents a variety of opportunities to increase efficiency and cost savings across many areas of business logistics. This includes transportation, warehousing, and route-optimization. Shipping company DHL has already implemented smart AR glasses in some of its warehouses,

where lenses display to workers the shortest route within a warehouse to locate and pick a certain item that needs to be shipping. Providing workers with more efficient ways to go about their job is one of the best ROI use cases in today's business environment.

6. Tourism Industry
Technology has gone a long way towards advancing the tourism industry in recent years, from review sites like TripAdvisor to informative website like Lonely Planet. But AR presents a huge opportunity for travel brands and agents to give potential tourists an even more immersive experience before they travel. Imagine taking a virtual "Walkabout" Australia before on AR glasses before booking a ticket to Sydney, or a leisurely stroll around Paris to see what museums or cafes you might like to visit. AR promises to make selling trips, travel, and vacations a whole lot easier in the future.

7. Classroom Education
While technology like tablets have become widespread in many schools and classrooms, teachers and educators are now ramping up student's learning experience with AR. The Aurasma app, for example, is already being used in classrooms so that students can view their classes via a smartphone or tablet for a more rich learning environment. Students learning about astronomy might see a full map of the solar system, or those in a music class might be able to see musical notes in real time as they learn to play an instrument.

8. Field Service
Whether it's something as small as an air conditioner, or as large as a wind turbine, every day field service technicians get dispatched to repair a piece of mission critical equipment that needs to get up and running as soon as possible. Today, these technicians can arrive on-site with AR glasses or headsets and view whatever they're repairing to more quickly diagnose - and fix - the problem. And instead of having to thumb through a repair manual, technicians can go about their business hands-free to get in and out faster than ever.

9. Entertainment Properties
In the entertainment industry, it's all about building a strong relationship with your branded characters and the audience. Properties like Harry Potter are immensely successful because readers of the books and watchers of the movies feel like they know the characters, and are hungry for additional content. Entertainment brands are now seeing AR as a great marketing opportunity to build deeper bonds between their characters and audience. As a matter of fact, the makers of AR sensation Pokemon Go are soon planning to release a Harry Potter-themed AR game that fans can interact with day in and day out.

10. Public Safety
In the event of an emergency today, people will immediately reach for their smartphone to find out what's going on, where to go, and whether their loved ones are safe. Moreover, first responders arrive on the scene of a fire or earthquake trying to figure out who needs help, and the best way to get them to safety. AR is showing promise in solving both