**AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY**

**WEEKLY PROGRESS REPORT (WPR)-1**

**Enrollment No.** – A2305222498

**Program** – B.Tech C.S.E

**Batch** – 2022-2026

**Student Name** – Atia Naim

**Faculty Guide’s Name** –Dr NEHA TYAGI

**Project Title:**

Analysis of Augmented and Virtual Reality

**Target set for the week:**

Introduction to AR

Introduction to VR

Contrast between AR and VR

Similarities between AR and VR

**Progress/Achievements of the week:**

Successfully Researched and made report on the basic meaning of AR and VR and studied

their similarities and differences

**Future work plans**:

History of AR and VR

Milestone and significant advantages of AR

Milestone and significant advantages of VR

User experience and design challenges of AR and VR

Regards

**Atia Naim**

**3-CSE 8X**

WPR 1

**Introduction**

**Virtual Reality** is a computer-programmed environment that allows users to engage and explore a 3D virtual domain. It is a stimulating experience that can be either entirely different or similar to the real world. Users are immersed in a digital world that can be perceived through their senses, including sight, hearing, and sometimes touch. All this by just wearing a VR headset or some other specialized equipment.

The key components included in Virtual Reality are: -

* **VR Reality**: It is the primary set of equipment that is to be worn on the head to experience virtual reality. It consists of a high-resolution display, lenses to display the images, and motion sensors to track the user's head movements. It completely covers the user's field of view, blocks out the real-world surrounding, and replaces it with the virtual environment.
* **Input Devices:** The systems use various devices like handheld controllers, data gloves, or motion tracking sensors, that enable user interaction within the virtual environment. These input devices allow users to manipulate objects, navigate through the virtual space, and perform actions within the virtual world.
* **Computer Hardware:** Powerful hardware is required to generate and render a realistic virtual environment. High-performance processors, graphics, cards, and sufficient memory to handle the demanding computational requirements of VR applications.
* **Tracking System:** To create an engrossing encounter, virtual reality often uses tracking systems to monitor the user's movements and adjust the virtual environment accordingly. This allows users to move within the virtual space and have their actions mirrored in the virtual world.
* **Audio Structure:** Sound is one of the fundamental part of virtual reality. it enhances the immersion and practicality of the experience. The setup includes high-quality headphones or inbuilt audio systems to provide spot on spatial audio, allowing users to hear sounds coming from separate directions.

Virtual Reality finds applications in various fields, like in gaming and entertainment. it offers an unmatched degree of immersion, enabling players associate with virtual worlds and characters. VR is also used for training purposes, allowing individuals to practice complex tasks and scenarios in a safe and controlled environment. Architecture and design industries also utilize VR to create virtual walkthroughs, aiding in decision-making processes. VR also plays a crucial role in healthcare sector, it assists in pain management, rehabilitation, and exposure therapy.

As virtual reality technology continues to develop, it holds a great potential to transform various industries, modernize human-computer interaction, and open up new opportunities for entertainment, learning, and communication.

**Augmented Reality** refers to a technology that superimposes virtual content onto the real world by creating an enhanced perception of reality. It combines computer generated elements with the user’s real-world in real time with the use of a camera or other sensors. It captures the surrounding environment and display the augmented content on a device like table, smartphone etc.

The key components included are: -

* **Input devices and Sensors:** Devices like cameras, microphones, GPS, etc. are used. They capture real world data and provide information about the user’s location, movement, and orientation.
* **Processing and Recognition**: The input data is analysed and processed to recognize user’s environment. This includes computer vision techniques, object recognition algorithms and spatial mapping to detect and track real world objects.
* **Content Creation and Rendering**: The system creates virtual content like 2D images, 3D models, animations etc. This virtual content is rendered and precisely aligned with the real-world view to create seamless integration.
* **Display and Output**: The rendered virtual content is displayed to the user through various devise like smartphones, tablets or smart glasses. Audio output can also be used to enhance the AR experience.
* **Interaction and User Interface**: The AR system provides ways for users to interact with the virtual content and manipulate the augmented environment. It involves touch gestures, voice commands, hand tracking, or specialized input devices.

Augmented reality has numerous applications across various fields, including gaming, education, healthcare, marketing, and entertainment. It can enhance training and simulation, improve spatial understanding, enable interactive storytelling, facilitate remote collaboration, and provide contextual information in real-time.

As technology advances, AR is becoming more immersive, precise, and integrated into our daily lives, opening new possibilities for innovation, and transforming the way we perceive and interact with the world around us.

**Similarities between Augmented Reality and Virtual Reality**

Even though virtual and augmented reality are two different technologies, they do overlap on certain grounds.

**Gadget utilisation**

Both AR and VR involve usage of similar gadgets such as headsets or glasses which provide the user with immersive experience. They all involve incorporation of display, sensors, and tracking systems to capture user’s movement.

**Virtual object**

Both at the end deal with virtual objects thus have to be created by the developer. They both deal with 3D content (though 2D content can also be used in AR).

**Interaction**

Involves user interaction where the objects, spaces and content can be manipulated by the user.

**Training and Simulations**

AR and VR are used in various industries, including military, healthcare, and aviation, to provide realistic training simulations and improve learning outcomes.

**Spatial Mapping**

Both technologies can spatial map the user's surroundings to understand the environment and incorporate virtual elements accordingly.

**Education**

The scope of these technologies is immense in the field of education where they can provide the students with realistic visuals to understand the concepts more thoroughly.

**Design and Architecture**

AR and VR when incorporated in design and architecture industries can create virtual prototypes, visualize designs, and showcase projects to clients in a more efficient manner.

**Healthcare and Medical Applications**

Extremely helpful in surgical training and education.

<https://dev.to/david405/virtual-reality-and-augmented-reality-different-or-similar-45kl>

<https://geekflare.com/augmented-reality-vs-virtual-reality/#geekflare-toc-ar-vs-vr-similarities>

**Contrast between Augmented reality and Virtual Reality**

**Basic Idea**

* Augmented reality is a technological technique which integrates the real world with the computer programmed content creating a collaborative environment for the user.
* Virtual reality is a technological technique that replaces the actual surroundings of the user creating a virtual interactive space (like a digital realm) for them.

**User Engagement**

* Augmented reality enhances the user’s actual world by incorporating digital entities, such as 3D objects, graphics and information in users view point. User can interact with both physical and virtual elements simultaneously.
* Virtual reality engages the user in a fictional digital realm. User can only interact with virtual elements or digital entities that too using specific virtual reality hard ware.

**Hardware Requirement**

* Augmented reality could easily be accessed using standard devices like smartphones, tablets and smart glasses.



<https://theconversation.com/what-is-augmented-reality-anyway-99827>

* Virtual reality requires dedicated device like VR headsets for its utilization. VR headsets usually comprises of different motion sensors and screen trackers for its functioning. some common VR headsets are Oculus Rift, Samsung Gear VR, HTC Vive and Google Daydream View.



<https://www.simplilearn.com/tutorials/artificial-intelligence-tutorial/what-is-virtual-reality> , <https://adatis.co.uk/the-future-of-virtual-reality-and-augmented-reality-in-data/>

**Application**

* Augmented reality applications include gaming, education, training simulations, navigation, industrial design, retail, healthcare etc. some common examples of AR are Pokemon Go, Snapchat filters, and AR-assisted surgeries.
* Virtual reality application includes gaming, training simulations like car simulators to learn driving, architecture, virtual tours etc .

**Content Generation**

* Augmented reality content generation is usually done is real time, continuously adapting to user’s environment.
* Virtual reality content generation is usually pre-programmed to provide a specific experience.

**Health and Safety**

* Augmented reality comparatively provide lower safety hazards as the user is still aware of their surroundings.
* On contrary virtual reality can potentially cause motion sickness and dizziness after a prolonged use. it also increases the chances of safety risks if the user is not careful enough.