

Augmented Reality and Virtual Reality: A New Way of Seeing the World

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Abstract: Technologies such as (AR) Augmented Reality & (VR) Virtual Reality, which provide immersive digital experiences, interactive environments, simulation, and engagement, have completely changed how we approach learning. However, in order to meet the huge demand in education, these technologies which are still in the emerging stage need to be heavily customized and heavily invested in. This thorough analysis seeks to contextualize the last few years of development of Virtual and Augmented Reality in the Education. For additional study, a total one thousand five hundred and thirty-six articles are chosen using text mining and theme analysis techniques. Based on earlier research on AR and VR in education, hypotheses were developed and are currently being processed and analysed to reveal the current development in literature via Augmented Reality and Virtual Reality, applications, benefits, and future directions. The findings show that wearable technology has contributed significantly to the exponential expansion in the use of Virtual and Augmented Reality in education in recent years. Results also highlight the need for faster adoption and customization of these technologies in educational institutions, based on secondary data. An increasing number of educational applications for the learning process are emerging as Virtual and Augmented Realityexp and quickly. It is advised that researchers stay up to date on the gaps in AR and VR's Changeover to education & develop practical adaptation strategies to maximize the benefits of these technological development with significant developments in high-speed transmission and processing, AR & VR are developing as Display Platforms for Next Generation for more intimate human-digital interactions. Nonetheless, matching the extraordinary Human Vision Performance while keeping Near the Eye Display module tiny and lightweight presents unprecedented hurdles for optical engineering. Fortunately, new advances in Holographic Optical Elements HOEs and Lithography Enable Devices present novel approaches to overcoming these challenges in Virtual and Augmented Reality which would otherwise be problematic with traditional optics

Keywords: Human digital interaction, display platform, technologies, performance, Wearable technology

I. INTRODUCTION

The need for more in-depth human-digital interactions than those seen in conventional flat panel displays has increased due to recent High Speed Connectivity Development and small-sized mobile computing platforms. Headsets for virtual reality (VR) and augmented reality (AR) are becoming the next wave of interactive displays that can offer lifelike Three Dimensional Visual Experience. To just a few, their beneficial uses are found in engineering, gaming, healthcare, and education. While AR encourages interaction between the user, digital information, and the actual environment, it displays virtual pictures with see-through capacity, whereas VR provides a fully immersive experience. When it comes to Display Performance, Virtual and Augmented Reality share a number of difficulties in meeting the strict needs of human vision, such as correct depth cue, Eye box, Angular Resolution, Dynamic Range, and Field of View. Ergonomics is another urgent need, but one unrelated to optical performance. Virtual and Augmented devices should be Lightweight and is small, glasses-like form factor in order to offer a comfortable wearing experience. However, the aforementioned specifications sometimes include many trade-offs, which makes the development of high-performance AR/VR glasses and headsets especially difficult. The initial boom in AR/VR occurred in the 1990s, but it was short-

lived because insufficient Hardware & Digital Content were available. Immersion displays have garnered renewed attention and a revisit within the last ten years. New technologies such as lithography and holography have significantly changed AR/VR Display Systems. In this Paper we will see the fundamental specifications for AR/VR displays and the difficulties that come with them. Next we will see the overview of the characteristics of two new technologies lithography-based devices and holographic optical elements HOEs. Because VR and AR Systems have various structure of devices & requirements. The main obstacles to the Immersive AR & VR system will be examined, along with how these new technologies help to overcome them. Performance summaries for Optical Combiners & Micro Display Light Engines will be provided, providing a thorough understanding of contemporary AR & VR Display Systems.

II. LITERATURE REVIEW

According to the author Sami Paavola, Liubov Folger and Minna Vasarainen., (2021) Extended Reality has become more Powerful and Common in Day to Day Working Life.

Sara Rankholi and Lloyd Waugh., (2013) says augmented reality Gives us the way and view of Real Life World.

Anatony Scavarelli, Ali Arya and Robert J. Teather., (2021) says Virtual Reality & Augmented Reality have the large Focus given on the accessibility and play between the virtual and real environment.

According to the author Zhou Du, Jun Liu and Tianjiao Wang., (2022) the Virtual Reality & Augmented Reality is Disruptive and an emerging growing technology.

According to the author Okolo Chinwe Jane, Chinyere Grace Ezeonwumelu And Chioma Lhuoma Barah., the Augmented reality creates a authentic learning environment and provide language perfection and communication skills.

III. OBJECTIVES

Education:

Instruction With immersive learning experiences offered by AR and VR, students may better explore and comprehend difficult subjects. AR projects digital data into The Physical World, Where the VR & AR lets students experience other locations and eras. Particularly useful for younger pupils who might struggle with more conventional online learning approaches are these tools.

Travels & Tours:

VR & AR technology Enhances tourism by enabling virtual destination tours, hotel evaluations, and interactive travel experiences.

Accounting:

Using AR and VR in accounting can enhance communication with Prospects, Partner's And Clients by providing context and enabling genuine collaboration.

Remote connection:

AR and VR can improve distant connectivity, allowing for greater communication with clients, partners, and prospects.

Entertainment:

VR can provide immersive entertainment experiences for users.

IV. AUGMENTED REALITY

The Concept (AR) Augmented Reality explains the way digital information seamlessly merges into a user's surroundings in real time. By imposing the Content On the Actual Environment, augmented reality technology enhances rather than modifies users' perceptions of reality. The use of AR is a participatory experience that mixes the physical world with Computer Generated 3D Content. The Content Can presented in a variety of sensory modes, including visual, aural, Olfactory, Somatosensory and Haptic. Augmented Reality is defined System that Combines Actual And Real World's allows for real-time interaction, and accurately registers virtual and actual items. The superimposed

sensory information might be beneficial that it adds for the Natural Environment Or Harmful that masks the natural environment. It is a critical technology along the reality-virtuality. Augmented reality defines an Interpretation of reality that has digital data, sounds, images, videos, or other Computer Generated items layered on it. Augmented reality-based technologies have been used as a first step in solving visualization problems in a range of businesses and fields, such as engineering, entertainment, aerospace, medical, the military, and the automobile sector. The real-time application of text, pictures, audio, and other virtual upgrades combined with actual items is known as augmented reality. The AR integrates and enhances human engagement with the real environment.

The Augmented Reality is an Innovation that improves a user's perception of the actual world by superimposing data generated by computers over what they see. The technology is commonly used in phone Augmented Reality Applications That need the user to make use of the camera on their phone. By collecting a picture via the camera and analyzing it in real time, the program provides contextual information such as navigational assistance or gameplay and social interactions that are nevertheless grounded in reality, such as the augmented environments provided by Snapchat lenses. Wearable smart glasses are increasingly being used to provide a more complete AR experience. However, AR is additionally being used to assist employees in industrial and industrial applications using AR head-mounted display gadgets such as the Microsoft HoloLens 2.

Augmented Reality Types:

- **Marker-based:** augmented reality for product packaging, branding, and QR codes.
- **Image tracking:** picture-based augmented reality Geo Positioned AR, often known as AR with GPS, is location-based augmented reality.
- **SLAM:** Augmented reality on surfaces, also known as world monitoring or Simultaneous Localization & Mapping.
- **Spatial tracking:** Tracking spatial augmented reality in areas Tracking objects using augmented reality.
- **Body Tracking :** Using Augmented reality by tracking body like parts.
- **World Mapping:** using Augmented Reality public spaces as a world map.

The Augmented Reality Refers to the Techniques & Terms that enable the overlaying of 3D virtual objects over real-world surroundings and items using an AR device. This allows the virtual objects to communicate with the real-world elements in order to produce meanings that are intended.



Figure 1 Augmented Reality

V. VIRTUAL REALITY

Virtual reality (VR) is a 3D simulation that provides users an immersive experience. Also provides Near Eye displays with position tracking. Virtual reality finds applications in the fields of education, medical, safety, or military training, business (virtual meetings), and entertainment, video games, in particular. VR is a crucial technology within the continuum between reality and virtuality. It is Different from other Digital Visualization Techniques like augmented

virtuality and augmented reality as a result. To provide realistic visuals, other sensations and sounds that mimic the way a person feels in a virtual environment, conventional virtual reality systems now use either multi-projected environments or virtual reality headsets. The effect is also be produced in specially built rooms with several huge screens. Virtual reality headsets, which typically comprise of a display mounted on the head with small size of the screen placed in front of user's eyes, are used to achieve this effect. Although both the Audio & Visual Feedback are commonly included in virtual reality, haptic technology may also provide additional forms of sensory and force feedback. The VR describes the process of generating an authentic experience that is not genuine. You cannot touch it, but you can watch, hear, and engage with it virtually. Virtual Reality mimics and simulates three dimensional 3-D world to users to communicate with. VR apps use interactive devices which can be worn as glasses, headsets, a gloves pair or body suitsto send and receive data as well as involve the User in Virtual world created by computers that mimics reality.

Virtual Reality Types:

Non immersive virtual reality: Virtual reality that isn't immersive A desktop-based virtual environment is known as non-immersive virtual reality. Within the program, you have influence over certain characters or actions. For working on the fly with virtual machines, you can also choose a powerpack laptop. Because more and more people value mobility, manufacturers design robust systems to fit into small bodies.

Fully Immersive Virtual reality :

Completely immersive virtual technology guarantees that your experience in the virtual world is realistic, in contrast to non-immersive virtual reality. You'll get the impression that you're actually there present in the Virtual Environment& thatEverything is occurring to you. This is a high-end virtual reality setup that includes body connections with sense detectors, gloves, and helmets.

Semi-immersive Virtual Reality:

A Combination of completely immersive and non-immersive virtual reality is called semi-immersive virtual reality. this could take the shape of a self-navigating 3D room or virtual environment that you can access via a computer display or a VRbox/Headset. Thus, everything that happens in Virtual environment is focused on you.

The word virtual reality VR refers to a dynamic, three dimensional computer-generated environments that viewers can engage with. VR is often accessed via computers which can display 3D information on a panel, which can include a head mounted display HMD or isolated displays, as well as identification sensors.



Figure 2 Virtual Reality

Augmented Reality vs Virtual Reality

Where VR users are under the system's supervision, AR users are in charge of their existence in the actual world.

VR needs a headgear device, however AR may be accessed with a smartphone.

While VR simply enhances virtual reality, AR Improves simultaneously the virtual and the physical environment.

VI. APPLICATIONS OF AUGMENTED REALITY AND VIRTUAL REALITY

Gaming and entertainment:

Virtual reality (VR) gaming provides an unparalleled degree of immersion, allowing users to enter virtual worlds and engage with characters and surroundings in ways never possible before. With lifelike visuals, tracking of motion, and tactile feedback, gamers may take on enemies in a fully immersive environment, solve puzzles, and go on heart-pounding adventures.

Training and Simulation:

VR has revolutionized our approach to training and simulation. In aviation, armed forces, health care, and industrial sectors, VR allows trainees to perform difficult tasks and simulations in a secure and regulated virtual environment. Without taking actual risks or facing repercussions, surgeons can practice their craft in virtual operating rooms, pilots can polish their abilities in lifelike flight simulators, and workers can receive lifelike workplace training.

Education and learning :

Education is taking on new dimensions thanks to virtual reality. Through immersive and interactive learning opportunities, science, geography, and history may be explored by students in previously unthinkable ways. VR makes learning come to life, making it memorable, impactful, and engaging whether exploring space, ancient civilizations, or even the ocean's depths.

Architecture and design :

VR has been embraced by designers and architects as a potent tool for depicting and displaying their works. Before a single brick is set, clients can use virtual reality (VR) to walk around virtual images of buildings and experience the layout, architecture, and atmosphere. Through this immersive experience, architects are better able to recognize possible problems, make wise decisions, and complete projects that live up to client expectations.

Healthcare and therapy :

Virtual reality is revolutionizing therapy and healthcare. VR is used in pain management to divert patients' attention from their symptoms by engrossing them in relaxing or stimulating virtual worlds. By Interactive Activities, we can restore our mobility and coordination via VR-based therapy. VR is utilized in exposure treatment to establish safe, supportive environments that assist treat fears and anxiety disorders by allowing patients to confront their concerns.

Retail and E-commerce :

By enabling shoppers to digitally try on apparel, visualize furnishings in their residences, or see how things might look in real-world situations before making a purchase, augmented reality (AR) improves the shopping experience.



Figure 3 Augmented Reality and Virtual Reality

VII. CONCLUSION

Technologies like Virtual Reality (VR) & Augmented Reality (AR) are transforming how individuals engage with the digital environment. While VR offers an online representation of an actual scenario, AR overlays virtual components on top of real world. It is anticipated that both technologies will become more commonplace in day-to-day living and improve people's quality of life. Regarding the objectives of each technology, augmented reality & virtual reality are mirror images of each other. Augmented reality adds virtual aspects to the real world, whereas virtual reality mimics the environment digitally. Augmented reality enhances real-world scenes, eliminating the need for headgear devices. virtual reality needs a headgear device and produces an immersive virtual world.

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