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BETA-VERSE

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Abstract: The future of virtual experience has been enhanced nowadays, these results in the form of various diplomatic problems and desired solutions are given via Beta-Verse. Science fiction often refers to this as a hyperbolically developed version of the Internet that takes the form of a single, universal virtual world that is facilitated by the use of virtual and augmented reality headsets. Whenever the user is interacting with the machine, they will have a Virtual and Perceptual experience in Real-Time, XR Technology combines virtual, real-world environments and realities through the use of VR (Virtual Reality) and AR (Augmented Reality), Users can generate new forms of reality by bringing digital objects into the physical world or by bringing physical objects into the digital world.

Keywords: Beta-Verse, Augmented Reality (AR), Virtual Reality (VR), Extended Reality (XR), Digital World, Physical World.

I. INTRODUCTION

Beta-Verse offers Architectures a real-time virtual experience, utilizing typical software architectures to create 3-D models, picture renders, walkthroughs, etc. The output can be presented in a physical and virtual medium so that the clients can interact with it. As a result, it measures and scales objects to match the technology, as well as activities that occur in remote locations (buying digital land and constructing virtual homes, taking part in a virtual social experience, etc.). This eventually takes place in the Beta-Verse. Architects create a model and provide a detailed plan to the graphic experts, and they integrate the requirements and process the XR model for deployment. Furthermore, the audio professionals integrate a surround sound system into the XR box to create the desired mood. As a result, the method becomes more urgent, allowing customers to satisfy their expectations.

II. METHODS AND MATERIALS

Virtual Reality

Virtual Reality is a technology that allows individuals to immerse themselves in a world that is either wholly different from reality or quite similar to it. Virtual reality headsets produce realistic visuals and sounds, and VR settings that integrate all five senses, including taste, smell, and touch, are available. It allows humans to gain new experiences and come to be in places they are not able to be at a particular time.

Augmented Reality

Augmented reality, unlike virtual reality, does not create a whole new world. In this technology, the existing physical environment is enriched with graphics, video, sounds, and other data to enhance it with specific features. As this technology simply adds attributes to our reality rather than completely reshaping it, we can say that AR exists "on top". A synthetic environment cannot be interacted with at the same time.

Mixed Reality

Mixed reality blends real and virtual world aspects, allowing physical and synthetic items to interact in novel ways. These objects can also react to one another in real time. This sort of reality is characterized by its flexibility. Because of that, "mixed" environments combine the best features of both the real and synthetic worlds. Users can observe the real world as well as some virtual things that are anchored to a specific real spot and can be treated as real objects using MR.

From the Fig. 1 and Fig. 2 and Table. 1 we can clearly understand the difference between Augmented Reality, Virtual Reality and Mixed Reality

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Fig. 1 AR, VR, MR and XR

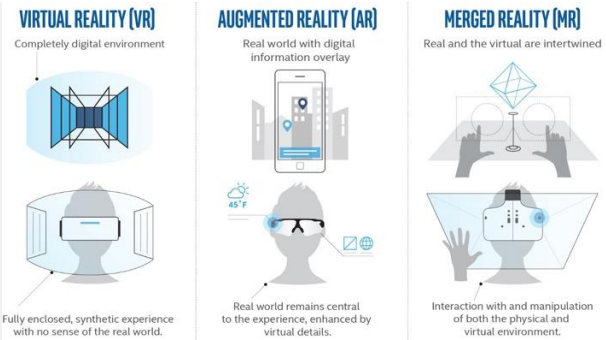

Fig. 2 Difference Between AR, VR and MR

Features	Virtual Reality	Mixed Reality	Augmented Reality
Display device	Mostly using Special headset or smart glasses	Headsets optional	Headsets optional
Image source	Computer graphics or real images produced by a computer	Combination of computer-generated images and real-life objects	Combination of computer-generated images and real-life objects
Environment	Fully digital	Both virtual and real-life objects are seamlessly blended	Both virtual and real-life objects are seamlessly blended
Presence	Feeling of being transported somewhere else with no sense of the real world	Feeling of still being in the real world, but with new elements and objects superimposed	Feeling of still being in the real world, but with new elements and objects superimposed
Awareness	Perfectly rendered virtual objects that cannot be distinguished from real objects	Perfectly rendered virtual objects that cannot be distinguished from real objects	Virtual objects can be identified based on their nature and behavior, such as floating text that follows a user
Interaction	Joysticks and controller	Finger touch and tap interaction	Either controllers or gestures
Perspective	Virtual objects will change their position and size according to the user's perspective in the virtual world	Virtual objects behave based on user's perspective in the real world	Virtual objects behave based on user's perspective in the real world
Usage	Extensively used in games, education and training	Moderately used in games and training	Scarce usage
Consumer Adoption	Low due to high cost and complex hardware requirements	High due to low cost and ease of downloading application on mobile phones	Low due to high cost and complex hardware requirements

Table. 1 Difference Between AR, VR and MR

Extended Reality

The three pillars of extended reality are virtual reality, augmented reality, and mixed reality, which is why it combines the best features of all three. It is concerned with technologically enabled human-machine interactions, according to the extended reality definition, which incorporates both physical and virtual environments. Because each of the underlying technologies is interdependent, advancements that lead to modifications also lead to new XR experiences. However, extended reality addresses more than just the barrier between information and talent: XR solutions, such as 3D settings, greatly improve the ability to gain meaningful insights.

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METHODOLOGY

Fig. 3 The flow of the proposed solution

XR Headgear

Extended Reality has a variety of uses, including entertainment, education, and business. VR, augmented reality, and mixed reality are other distinct types of XR technology. In most Extended Reality (XR) applications, the user's physical presence is replicated through the use of XR headgear or multi-projected surroundings. Using Extended Reality equipment, an individual is able to view and interact with items and features in the artificial world. Commonly, XR headgear consists of a head-mounted display with a small screen in front of the eyes, but it can also be achieved using specially designed rooms with multiple large screens. In Extended Reality, audio and video feedback are used, but haptic technology is sometimes also incorporated to provide other kinds of feedback.

XR Glove

XR gloves are input devices for human–computer interaction that are worn like gloves. Different sensor technologies are used to capture physical data, such as finger bending. To capture the global position/rotation data of a glove, a tracking device, such as a magnetic tracking device or an inertial tracking device, is sometimes attached. The movements are interpreted by the glove's software; thus, any movement might signify anything. These gestures can then be classified into useful information, such as sign language or other symbolic functions. Haptic feedback, which simulates the sensation of touch, can be provided by a high-end XR glove. The XR glove can also be used as an output device. Traditionally, XR gloves have been prohibitively expensive, with finger bend sensors and tracking devices being supplied separately. Virtual reality environments often use XR gloves to mimic human hand movements.

Interhaptics Application

Without any prior coding skills, the Interhaptics programme can be used to create haptic feedback for Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR), and Extended Reality (XR) applications. VR, AR, and MR apps keep users engaged by incorporating haptics and hand interactions. Its purpose is to let VR, AR, and MR developers to include haptic feedback in their virtual, augmented, and mixed reality projects. Training apps, marketing simulations, and games should be made more realistic, immersive, and relevant.

Sketchup Plugin

SketchUp 3D modelling software is a powerful 3D modelling application utilised in a variety of design industries, including architectural, interior, industrial, and product design, landscape architecture, civil and mechanical engineering, theatre, film, and video games. Currently owned by Trimble Inc., SketchUp Free is available online, and SketchUp Pro has additional functionality which is paid. This tool has a variety of drawing layouts, surface representations, and the ability to insert models into Google Earth.

3DS Max Plugin

The software, made by Autodesk, is a professional 3D computer graphics package that can be used to create games, animations, and models. The former name of the software was 3D Studio and 3D Studio Max. Autodesk Media and Entertainment is in charge of its development and production. It can be used on Microsoft Windows platforms and has modelling capabilities and a flexible plugin architecture. It is often used by video game developers, TV commercial producers, and architectural visualisation studios. Additionally, it is used for movie effects and previsualization. In addition to 3ds Max's modelling and animation tools, the program also offers shaders, dynamic simulation, particle systems, radiosity, normal map creation, global illumination, a customizable user interface, new icons, and its own scripting language. Extended Reality (XR) is depicted in images like Fig. 4, Fig. 5, and Fig. 6.

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Fig. 4

Fig. 5

Fig. 6

PROPOSED METHODOLOGY

The civil industry's new era of XR has been enhanced, paving the way for future development, particularly for architects and civil engineers. The proposed method is to encapsulate the several forms of virtualization (AR, VR, MR) all these are embedded into a hardware system to achieve the goal of XR in the civil industry. Using basic typical software products like SketchUp and 3DS Max which integrates into a common medium called Interhaptics, helps to attain the concepts of Extended Reality (XR). The architect prepared a blueprint and a three-dimensional model that featured more precise dimensions and measurements. The architect is more likely to deliver a plan to the graphic designer in an optimum form, and the graphic designer is more likely to design with the given information. With the help of Interhaptics the graphic designer structures the model for the extended view and the plugins which are included in the software namely: SketchUp and 3DS Max. The SketchUp plugin is used to shape 3D models and elevate inside and exterior architectural structures. 3DS Max makes a refined 3D model and beautifies the structure in factitious form, the plugin is composed of various components, materials, assets, objects, etc. Interhaptics comprises several kinds of the deployment process, where the Haptic Render Scripts (HRS) integrates and makes the active model be rendering expeditiously. After the process of rendering, it communicates with the devices of XR. The XR Glove and Headgear are connected to the internet and provide a virtual experience for the user.

Challenges in XR Technology

Five major challenges could be faced in using XR technology, they are:

Display: To exhibit richer visual material and fluidly transfer between real and virtual worlds, XR requires a radical revolution in display technology.

Communication Illumination: It's a huge problem to make virtual objects in augmented environments look like real objects, especially under different lighting situations.

Power and thermal: It's difficult to balance the power and thermal limits of compact XR glasses with the always-on, compute-intensive workloads of XR.

Connectivity: For XR to attain its full potential, it needs constant and ubiquitous access to the internet and cloud services.

Motion Tracking: To engage intuitively with our XR glasses and generate immersion, we need intelligent on-device tracking of our heads, hands, and eyes.

III. RESULTS AND DISCUSSION

The major disadvantage of using Augmented Reality (AR), Virtual Reality (VR) and Mixed Reality (MR) technology is: The Head gears are extremely costly, Content development is usually hard, Demos are slow and in AR, VR, and XR-based applications, there is lack of privacy. The major advantage of using XR is It allows a safe and experimental XR experience, With an XRS and additional access options it is convenient to scale and reuse, An XRS aids firms in gathering critical training metrics that assess knowledge retention and show if their investment is yielding a measurable return on investment and Access to data is quick and easy. Because XR eliminates distance constraints, humans can easily access remote data. This proposed methodology results in the favour of Architectures to create an Extended Reality hardware and software tool for the clients to experience the Virtual world with the help of XR headgear and XR gloves. It is not only for Architectures. It can be used for other fields like Engineering, Education & Training industry, Geospatial Industry, Medial/ Healthcare Industry, Entertainment, Real Estate, Marketing, etc.

The show stopper (Business potential) of Beta-Verse is: In education industry, using XR technology learning process becomes so easy, and like HoloAnatomy, allow teachers to instruct students remotely. In Space Industry, visualizing of space will be helpful, to get more knowledge about it. In Remote work, Remote workers can communicate with co-workers or clients through Beta-Verse. Inspectors and engineers in construction and engineering can monitor their sites through a visual headpiece instead of working physically, allowing them to discover faults and engage with on-site personnel in real time. Similar to Trimble Connect for HoloLens, an app can link 3D content from the screen to the construction site.

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IV. CONCLUSION

In addition to being most commonly associated with entertainment. Virtual Reality, Augmented Reality, and Mixed Reality have been gaining a significant growth in amount of traction in both academia and the workplace. The widespread use of XR raises questions regarding new methodologies and uses for VR and AR, as well as the different possibilities that are already being explored in MR applications. MR, as an extension of VR and AR, has shown to be invaluable as a tool for blending the virtual CAD model world with building on-site in real-time. Though still in its infancy, MR appears to have the potential to simplify operations in buildings and enhance collaboration in design projects. MR opens the foundation for the adoption of future construction technologies by going beyond basic visualization and serving as a fabrication tool. VR, AR and MR are increasingly being used within the field of architecture as powerful teaching tools. The medium is versatile in its application since it can convey, appraise, and virtualize experience. The Architectures can bring the idea through the XR gadget and explain their proposal to the clients in a well-delivered manner with the use of XR technology and the offered technique.

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