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Research into the world of Cloud-Virtual Reality

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Abstract: Virtual Reality technology has not been able to penetrate the mainstream consumer market due to restrictions on hardware and content. With the advancement of cloud computing technologies, Virtual Reality hardware and technology applications may now be supported strongly. The metaverse, cloud VR gaming, and cloud VR stimulator are just a few of the real-world applications that are now employing cloud computing in Virtual Reality. We can lower the cost of Virtual Reality technology which would begin a new era of many users to apply cloud-based technologies. With the aid of technology, it will be possible to operate from anywhere without having to transport a lot of equipment. The performance, usability, and compatibility of Virtual Reality software and hardware can be improved by cloud computing on the level of hardware and content. The VR dataset is made available for public collaboration through the Internet using a VR-Cloud server. The digital asset that represents the layout of our pedestrian bridge comprises images of all the streets, buildings, trees, and other urban amenities. In the virtual environment of the metropolitan area, where they run and stroll according to predetermined behaviour scenarios, the cars and people are created and entered. By employing cloud communication software to analyse simulations of vehicles and pedestrian crowds and to debate design ideas, users share the VR reality by connecting to the VR Cloud servers from remote devices.

This research demonstrates how VR-cloud may be combined with Neuralink and NFT in the virtual

world for future enhancement. This paper is a research note on cloud computing and its application using the Virtual Reality (VR) platform for the modern world with futuristic innovations.

Keywords: Cloud Computing, Metaverse, Neuralink, Virtual Reality, VR-Cloud.

I. Introduction:

In recent years, Virtual Reality (VR)span class='highlighted color-1'>pan> technology has become increasingly prevalent and accessible. This has led to the development of cloud-based VR solutions, which allow for the implementation of VR Software As A Service (SaaS). As VR technology continues to advance, the utilization of cloud computing has become essential for online collaboration in various fields, including urban planning [1]. This is due to the increased need for remote collaboration and accessibility, as well as the cost-effectiveness of cloud-based solutions.

The integration of cloud computing and VR technology has several benefits. Cloud-based VR solutions provide a high degree of scalability, allowing for the integration of VR experiences in a wide range of applications, from small scale projects to large-scale enterprises [2]. Additionally, the utilization of cloud computing in VR allows for improved security, as sensitive data and VR experiences can be stored on secure servers, protected from potential hacking or data breaches [3].

One of the most exciting potential applications of cloud-based VR technology is the development of the metaverse, a shared virtual space that has the potential to change the way we live and work [4]. The metaverse is an ambitious concept that combines elements of virtual reality, augmented reality, and cloud computing to create a shared virtual space where users can interact, collaborate, and create in a seamless and immersive environment [5].

The metaverse is not just a futuristic concept, but a reality that is rapidly developing. As cloud computing and VR technology continue to advance, the metaverse has the potential to revolutionize the way we live, work, and interact with one another. Some experts believe that the metaverse could become the next major computing platform, creating new opportunities for innovation and collaboration across a wide range of industries [6].

Despite the potential benefits of cloud-based VR and the metaverse, there are also several challenges that must be addressed. These include issues related to data privacy and security, as well as the need for standardization and compatibility across different VR platforms and devices.

Additionally, there are technical challenges associated with the development of the metaverse, including the need for high-speed network connectivity and the development of new software and hardware solutions [7].

Fig1: Cloud Computing and Virtual Reality, Image: suyati.

Virtual Reality (VR) technology has come a long way since its inception and is making significant strides in a wide range of fields, including urban planning, as evidenced in [1] and [2]. With the advent of cloud computing, VR is now being implemented as a software-as-a-service, making it more accessible and easier to use, as described in [1]. The use of cloud-based VR has made it possible for multiple users to collaborate in real-time, leading to increased efficiency and better decision-making, as discussed in [3].

One of the exciting prospects of VR is the creation of the metaverse, a shared virtual space where people can interact with each other and digital objects. The metaverse is considered to be the future of technology, as described in [4] and [5]. The integration of cloud computing and VR in the creation of the metaverse presents a new and exciting paradigm, as discussed in [6].

The use of VR in various fields has been extensively researched, as demonstrated in [7] and [8]. It has been found that VR technology can lead to significant improvements in areas such as education, training, and healthcare. For example, VR-based simulations can provide a more engaging and immersive experience for learners, as discussed in [9].

In recent years, the use of VR in urban planning has become more widespread. It has been found that VR-based simulations can provide a more intuitive and interactive experience for urban planners and stakeholders, leading to better decision-making, as discussed in [10]. Cloud-based VR can also be used to collect real-time data from a large number of users, which can then be used to improve urban planning processes, as described in [11]

Consider the prediction made in the middle of 2015 that investment on augmented/Virtual Reality (AR/VR) will reach $150 billion by 2020. The current costs, which include $799 for the HTC Vive, $599 for the Oculus Rift, and $399 for the Sony PlayStation VR (which is scheduled to ship in October 2016), are in line with the forecast.

If you want to experience virtual reality, you will need to invest at least $350 on an AR/VR device as well as roughly $1000 to upgrade your system, for a grand total of $1350.

What options are there for lowering this maintenance cost while improving the Virtual Reality experience? Cloud, cloud, cloud is the solution!

Non-Fungible Tokens (NFTs) are digital assets that represent ownership of a unique item or piece of content, such as a piece of artwork or music. NFTs are stored on a blockchain, which allows for secure and verifiable ownership and transfer of the asset. The article "Study on Non-Fungible Tokens" provides an in-depth examination of NFTs and their use in various industries. The study provides an overview of the NFT market, including its history, current state, and future potential. The article also examines the technical aspects of NFTs, including the use of blockchain technology and smart contracts. Additionally, the study explores the potential benefits of NFTs, including increased security and transparency in ownership and transfer, as well as new revenue streams for creators of unique digital content.

Elon Musk launched Neuralink, a business that focuses on creating and studying brain technologies, such as cloud-based artificial intelligence. In order to improve human cognitive capacities and eventually establish a symbiotic link between humans and artificial intelligence, the business seeks to develop cutting-edge brain implants. The cloud-based AI being developed by Neuralink will enable effective and sophisticated neural implant technology by providing real-time data processing and analysis. The company's long-term objectives include making AI available to everyone, using technology to enhance human skills and enhance quality of life. However, the creation and use of these technologies present moral and security issues, and it is still unclear how they will affect society.

II. Research Approach

In order to better understand cloud-based Virtual Reality (VR), researchers are combining technological and theoretical methods. The application of Software As A Service (SaaS) for online collaboration in urban planning is the technological aspect's main focus. [1]. Theoretically, the goal is to comprehend how cloud-based VR may affect society and how it might influence technological advancement in the future. [4]. The study of cloud-based VR also examines how cloud computing will play a part in the creation of a metaverse and how VR may be used to do so. [6, 12].

Several studies have explored the technical possibilities of cloud-based VR and its implementation [1, 3, 11]. These studies have focused on the challenges and opportunities associated with implementing cloud-based VR and have discussed the various technologies and tools required to create a seamless and effective VR experience. They have also explored the impact of cloud computing on the performance of VR systems and have evaluated the trade-off between cost, scalability, and performance.

Another aspect of the research on cloud-based VR is the examination of the security and privacy issues associated with cloud computing. This is particularly relevant in the context of VR as personal and sensitive data may be stored on the cloud, which is vulnerable to cyber-attacks [7, 8]. The research has also explored the potential of VR in facilitating collaboration and communication among users and how it can be used in various domains such as education, medicine, and urban planning [2, 5, 10].

The research on cloud-based VR also explores the impact of VR on society and how it may shape the future of technology. The research examines the potential of VR in creating a metaverse, where users can interact in a virtual world that is connected to the real world [6]. This research has also explored the role of cloud computing in facilitating the development of the metaverse and how it can be used to provide scalable and secure infrastructure for VR systems [7, 12].

Neuralink, a company that specialises in creating implanted brain-machine interfaces, may be able to combine VR technologies to produce a seamless and immersive experience. Neuralink's technology, for instance, may be used to recognise brain impulses and convert them into motions or movements in a virtual setting. Additionally, with the implanted devices, virtual sensations may be given back to the brain to provide a completely participatory experience. New applications in training, simulation, rehabilitation, and gaming may result from this combination. It is crucial to keep in mind that Neuralink and VR integration are still in their infancy, and additional study and development are necessary to fully realise their potential.

III. User Experience:

Virtual Reality (VR) is a computer-generated environment that provides users with a simulated experience of real or imaginary surroundings. Cloud-based Virtual Reality (CBVR) is a recent advancement in VR technology where VR experiences are delivered through the cloud, making it

possible for users to access VR experiences from anywhere with an internet connection. With the advent of CBVR, users are able to have a more immersive and collaborative VR experience, which has a potential to revolutionize various industries such as education, healthcare, entertainment, and more.

3.1Advantages of CBVR

One of the main advantages of CBVR is its accessibility. With CBVR, users no longer need to own expensive VR hardware, as all the processing and rendering are done on remote servers [1]. This also makes it easier to share VR experiences with others, as all users can access the same VR environment through the cloud.

Another advantage of CBVR is its scalability. With CBVR, the processing and rendering capabilities can be increased as needed, making it possible to support large-scale VR experiences [2]. This is particularly important in industries like education, where a large number of users may need to access VR environments simultaneously.

CBVR also provides a more collaborative VR experience, allowing users to interact and communicate with each other in real-time within a VR environment [3]. This opens up new possibilities for online collaboration and teamwork, particularly in industries such as urban planning, where designers and architects can work together in a shared VR environment to create and review designs.

3.2 Challenges of CBVR

Despite its many advantages, CBVR also presents a number of challenges. One of the main challenges is ensuring the security and privacy of VR experiences and user data. As VR experiences are delivered through the cloud, there is a risk of data breaches, hacking, and other security threats [4]. This is particularly concerning in industries like healthcare, where sensitive patient information may be shared in VR environments.

Another challenge of CBVR is the need for a reliable and fast internet connection. VR experiences rely on real-time data transfer, and any lag or interruption in the internet connection can negatively impact the VR experience [5]. This can make it difficult for users in rural or remote areas to access

CBVR experiences, as well as for users with limited or unreliable internet connections.

Fig.2: Virtual Reality usage in different sector ,2021, Image: Finances online.

IV. The using of cloud based Virtual Reality in 10 years

In the next ten years, cloud-based Virtual Reality (VR) is expected to revolutionize the way we interact with digital content. With VR technology becoming more accessible and affordable, the use of cloud-based VR is expected to increase significantly. Here are some ways in which cloud-based VR will be used in the next decade:

4.1: Education and Training: For students of all ages, cloud-based VR will be utilised to provide immersive and engaging learning experiences. VR will enable teachers to design dynamic classes that captivate pupils and make studying more engaging. It will also be utilised to teach workers in a variety of fields, including the military, construction, and healthcare.

4.2.: Remote Work and Collaboration: Cloud-based VR will give workers a method to communicate in real-time in a virtual environment as more individuals choose to work from home. Teams will be able to collaborate more easily on projects regardless of where they are physically located thanks to this.

4.3: Gaming and Entertainment: One of the biggest markets for cloud-based VR is predicted to be the gaming and entertainment industry. A more involved and immersive gaming experience will result from the ability of players to communicate with one another and play games in a virtual environment. VR will also be utilised to develop brand-new entertainment genres like virtual concerts and movie experiences.

4.4: Healthcare: Patients in distant and underserved locations will have easier access to healthcare thanks to cloud-based VR, which will be utilised to deliver remote patient care and treatment. Additionally, it will be utilised to educate medical personnel and offer a secure and accurate setting for performing medical operations.

4.5: Architecture and Urban Planning: In order to make adjustments and test ideas before to construction, architects and urban planners will employ Virtual Reality to create virtual representations of buildings and cities. This will aid in lowering the price and duration of updating physical models.

4.6: Retail and E-commerce: In order to make adjustments and test ideas before to construction, architects and urban planners will employ Virtual Reality to create virtual representations of buildings and cities. This will aid in lowering the price and duration of updating physical models.

4.7: Tourism: Travelers will be able to explore various locations prior to making a trip by using cloud-based VR to build virtual tours of destinations. This will encourage travel and provide individuals the chance to see the globe from the comfort of their own homes.

V. Present usage of cloud based virtual reality

There are several uses for cloud-based Virtual Reality (VR) nowadays. One such application is in remote collaboration, which enables individuals to connect and cooperate in virtual settings. Additionally, it is utilised in training, teaching, and gaming. For instance, a lot of training courses use VR simulations to provide students hands-on practise in a secure setting. Urban planners may also employ cloud-based VR to visualise and evaluate design proposals prior to actual construction by generating virtual models of buildings and cityscapes. Cloud-based VR's use is anticipated to increase as the technology improves in usability and accessibility thanks to developments in 5G and Edge computing, among other areas. Due to the rising demand for VR applications across a variety of sectors, the VR industry is anticipated to surpass $44 billion by 2023.

VI. Conclusion and Future Enhancement

Urban planning, entertainment, education, and other fields may all benefit from the field of "Cloud-based Virtual Reality," which is the convergence of cloud computing with virtual reality. Users may receive realistic and engaging experiences regardless of their device or location thanks to the integration of cloud computing with virtual reality. This may be done by implementing software as a service, which enables the cloud-based distribution of collaborative tools and Virtual Reality experiences.

According to research, cloud-based Virtual Reality has the power to completely change how people communicate and collaborate online. Urban planners, for instance, may collaborate online more easily by visualising and co-designing urban landscapes in real-time thanks to cloud-based virtual reality. Additionally, the usage of cloud computing can improve the scalability and usability of Virtual Reality experiences, hence increasing their accessible to users all over the world.

3 Cloud-based Virtual Reality does, however, have certain drawbacks, including worries about data privacy and security as well as technological restrictions relating to network latency and capacity. Researchers and professionals have proposed 2 a number of solutions, including the usage of edge computing and decentralised cloud architectures, to solve these problems.

The potential for innovation and influence of cloud-based Virtual Reality is considerable, and it has a bright future. Virtual Reality on the cloud is set to play a bigger role in our daily lives and at work as technology advances and more businesses use cloud computing.

Future Enhancement: In this paper, we would like to bring out a suggestion that a revolution in the virtual world may occur if cloud-based Virtual Reality technology and Neuralink technology can be successfully merged. Neuralink technology can make Virtual Reality more lifelike 1 and allow users to experience everything there as truly as they would in the real world. The Neuralink in virtual worlds enables users to feel objects through touch, smell, taste, and other senses. Buying and selling anything 2 in the virtual world may be done using NTF and cryptocurrencies.

In this paper, we may state that cloud-based VR will eventually reduce costs, enabling everyone to experience the virtual world and learn about the new era of the future world. Everything will be based on this technology in the future.

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