Metaverse and Beyond: Implementing Advance Multiverse Realms with Smart Technologies

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Abstract. The global Covid-19 pandemic has expedited the shift to an online world, and it looks like we're almost ready for The Metaverse, the next potentially revolutionary development in Internet technology after mobile. The Metaverse will make use of extended reality and head-mounted displays (HMDs), among other things.(XR), encompassing virtual and augmented reality (VR/AR) among other things, as a means of establishing connections between avatars as well as actual users. Furthermore, the Metaverse is intended to offer gamified experiences and virtual entertainment to customers ., which is expected to come from developing Web 3.0 technology will act as a framework for cutting-edge XR experience domains. In this work, we emphasize the expected. 6G post-smartphone era, in which smart wearables like VR/AR headgear are gradually taking the place of smartphones

Keywords: 6G post-smart phone era, crowd-of-Oz (CoZ), extended reality (XR), gamified experiences head-mount.

1 Introduction

Global emergencies like the Covid-19 pandemic brought to light the shortcomings of our current strategy for international production, particularly when value chains fulfil fundamental human needs. Conversely, nevertheless, virtual encounters like Zoom's cloud-based video system for events and meetings online have become incredibly popular after the pandemic .Everything changed to be done online. When the mass use of online social media and distant labour via digital means connections sped up by a worldwide pandemic

Paradigm-shifting: The Metaverse, Internet, just like how mobile Internet grew and improved the 1990s and 2000s early Internet

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2 Current Metaverse Visions

In his long anticipated and recently published book The Metaverse: And How It Will Revolutionize Everything, Canadian writer Matthew Ball argues that one of the most exciting aspects of the Metaverse is how poorly understood it is today. Ball observes that for all the fascination with the Metaverse, the term has no consensus definition or consistent description. Most industry leaders define it in the manner that fits their own worldviews and/or the capabilities of their companies. For instance, Microsoft's CEO Satya Nadella has described the Meta verse as a platform that turns the entire world into an app canvas which could be augmented by cloud software and machine learning. No sur- prise, Microsoft already had a technology stack which had made a change in our day to day life. Payment rails are a crucial component needed to create a completely functional and fulfilling Metaverse. Ball contends that this explains why there are so many investors, analysts, and founders that are interested in the Metaverse consider cryptocurrency and blockchains to be the first digitally local payment rail and a fix for the issues ailing the virtual economy of today.

3 The Dividend Realms of Perspective

Actuality: The domain Time, space, and matter are the variables that make up reality. Actual/Real/Atoms is another perspective that is comparable. We are in the Realm as the domain of corporeal experiences via the ancient a real-life medium. Naturally, it is the domain in which The most familiar are us

Virtuality: Virtuality and Reality are diametrically opposed in the domain of No-Time-No-Space-No-Matter, which is composed of Virtual/Autonomous/Bits. Virtuality is unaffected by the actual world's physical laws. Virtuality in tandem anchoring the Multiverse with Reality. The title of every the two anchors in each of the other realms is directly related to that the titles of every realm on half indicate that they are grounded in Reality, but the names of Every domain on the left side of Multiverse indicates their nature based on virtuality.

Augmented Reality: Undoubtedly the most familiar of these Meanwhile, AR is defined by the Time/Space/ No-Matter. The use of digital technology in AR utilized to improve our perception of the physical globe. Microsoft HoloLens 2 is the flagship AR headgear. It should fragments enhance Reality, atoms ought to be able to logically enhance Virtureality. That is precisely what takes place in the other realm the different types of Augmented Virtuality (AV), which are allows for No-Time/No-Space/Matter

4 Applications of Metaverse in Medical Sector

4.1.Emergence of Metaverse in Various Medical Sectors

The convergence of digitalization, automation, and novel technologies has revolutionized the healthcare landscape, giving rise to innovative models that enhance treatment delivery and reduce costs. The Metaverse, an emerging immersive virtual realm, holds immense potential for healthcare, offering realistic experiences for both patients and medical practitioners. This technology integrates various enabling technologies, including artificial intelligence, virtual reality, augmented reality, the internet of medical devices, robotics, and quantum computing, paving the way for transformative healthcare practices.

4.2 Patient Care

The metaverse can revolutionize patient care by providing an accessible and personalized virtual environment for consultations, diagnostics, and treatment. Patients can interact with their healthcare providers in virtual clinics, reducing geographical barriers and improving accessibility for those in remote areas or with mobility limitations. Virtual reality simulations can enhance patient education, allowing them to visualize their condition, treatment options, and potential outcomes in an immersive and interactive manner.

4.3 AI and AR Technology in Metaverse

AI and AR technology are also playing a pivotal role in the metaverse-driven transformation of patient care. AI-powered algorithms can analyze vast amounts of patient data, including medical records, imaging scans, and wearable device data, to identify patterns and provide real-time insights to healthcare providers. This can aid in early diagnosis, personalized treatment planning, and improved patient outcomes.

4.4 Drug Discovery And Research

The metaverse can accelerate drug discovery and development by facilitating virtual clinical trials and providing real-time data analysis. Researchers can create virtual drug molecules and test their efficacy and safety in simulated patient populations, reducing the time and cost associated with traditional clinical trials. Virtual reality simulations can also be used to study drug interactions and side effects in a controlled environment

4.5 Drug Discovery in Metaverse

The metaverse can facilitate the identification of novel drug targets by providing a virtual space to study complex biological systems and molecular interactions in real-time. Researchers can utilize VR and AR technologies to visualize cellular structures, protein-ligand interactions, and signaling pathways, gaining a deeper understanding of disease mechanisms and potential therapeutic targets. AI-powered algorithms can analyze vast amounts of genomic, proteomic, and phenotypic data to identify patterns and predict potential drug targets with high accuracy

4.6 Clinical Trails

The metaverse can revolutionize clinical trial design and patient recruitment by providing a more efficient and accessible platform for conducting clinical trials. Virtual clinics can be established in the metaverse, enabling patients to participate in clinical trials remotely, reducing the need for travel and improving patient engagement. VR simulations can be used to provide patients with detailed information about clinical trials, enhancing informed consent and reducing patient dropout rates.

4.7 Ethical Considerations And Challenges

The implementation of the metaverse in drug discovery and development raises ethical concerns and challenges that need to be addressed. Data privacy and security are paramount, as the metaverse will collect and store vast amounts of sensitive biological and patient data. Ensuring data protection and preventing unauthorized access is crucial. Responsible use of virtual technologies is also essential to prevent potential adverse effects on human health, such as biases in AI algorithms and misrepresentation of biological processes.

4.8 Decision Support System

The sheer volume and complexity of patient data can make it challenging for clinicians to identify the most effective treatment options for each individual. Decision support systems (DSS) powered by artificial intelligence (AI) and machine learning (ML) algorithms are emerging as valuable tools to assist clinicians in making informed treatment decisions.

Fig. 1. Architecture of a typical wireless sensor node.

5 Medical Training and Diagnostics

The Metaverse technologies can help healthcare professionals in effective planning and diagnosis of diseases

In 2020, the neurosurgeons in the Johns Hopkins Hospital performed a surgery using augmented reality headset developed by Augmedics.The procedure utilized a see-through eye display that overlaid patients' anatomy images akin to X-ray vision to fuse six vertebrae in the patients' spines, alleviating chronic back pain The Metaverse environment enables enhanced surgical preoperative planning by transforming CT scans into 3D reconstructions using headsets. This also helps the surgeons to specifically view, isolate and manipulate anatomical regions to perform critical surgeriesVR tools also offer enhanced prescription treatments. For instance, a VR-based therapy solution utilizes cognitive behavioral therapy (CBT) to treat patients with chronic pain using a VR headset and controllers. These tools promote deep relaxation, attention redirection, and interoceptive awareness, addressing the physiological underpinnings of pain

5.1 Mededucation and traning procedure with Metaverse

The Metaverse presents a transformative opportunity to revolutionize medical education and training. Augmented reality (AR) provides a conducive environment for practical demonstrations, transcending the limitations of traditional theoretical instruction. Renowned institutions are steadily adopting VR, AR, mixed reality (MR), and AI-powered technologies to equip healthcare professionals with comprehensive knowledge and skills. These immersive

simulations enable surgeons to practice complex procedures in real-time while gaining intricate insights into the human anatomy down to the cellular level

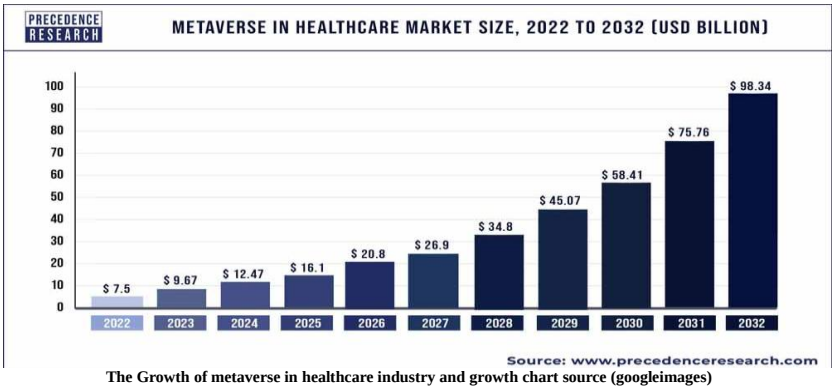
5.2 Future Growth of Health Care with (Metaverse)

The global statistics of the Metaverse reveal that the global healthcare market in the Metaverse holds a value of 5.06 Billion Dollars in 2021 and is expected to reach 71.97 Billion Dollars by 2030 with a compound annual growth rate of 34.8 percent during considered period of forecast (2022-2030) .The integration of AR-VR devices and platforms in their healthcare sector which have attracted more investments in AR based products and applications initiated.

5.3 Conclusion

As the conclusion that the Metaverse holds immense potential to revolutionize the healthcare landscape, transforming medical education, enhancing patient care, and facilitating groundbreaking advancements in medical research and treatment. As the Metaverse continues to evolve, its integration into healthcare will undoubtedly reshape the future of medicine, fostering a more personalized, accessible, and effective healthcare ecosystem for patients and healthcare professionals alike.

Table 1. Metaverse in Health Care.



The Growth of metaverse in healthcare industry and growth chart source (googleimages)

6 The Commercial Metaverse and it's Emergence

The Metaverse has the potential to transform the gaming industry by offering new opportunities for engagement and commerce. It can enable the creation of new revenue streams, such as in-game advertising and virtual goods sales. The Metaverse can also provide developers with the ability to create new gaming experiences that were previously impossible. In the entertainment industry, the Metaverse can provide users with new forms of entertainment, such as virtual concerts and movies. This can create new revenue streams for content creators and reach larger audiences. In the education industry, the Metaverse can offer educators new ways to provide immersive learning experiences for students. In the commerce industry, the Metaverse can create new opportunities for virtual commerce. Users can buy and sell virtual goods and services, such as virtual real estate and digital art. This can create new revenue streams for business and entrepreneurs in the the commercial market

The Metaverse has the potential to revolutionize the industry by enabling new forms of engagement, commerce, and entertainment. However, there are also challenges that need to be addressed, such as privacy and security concerns. Further research is needed to fully understand the potential of the Metaverse and how it can be leveraged to benefits.

6.1 Metaverse in Commercial Markets

The current use of the Metaverse is already well-established in gaming and entertainment, with popular platforms like Second Life, VRChat, and Minecraft providing users with immersive and interactive virtual environments for socializing, gaming, and creative expression with customers.

The Metaverse, a convergence of virtual reality, augmented reality, and the internet, has emerged as a revolutionary paradigm shift, poised to reshape various industries, including e-commerce and the food and beverage sector. Its immersive and interactive nature offers a plethora of opportunities for businesses to engage with customers, enhance brand experiences, and redefine traditional business.

6.2 E-commerce in the Metaverse: A New Era of Immersive Shopping

The Metaverse presents a transformative landscape for e-commerce, transcending the limitations of traditional online shopping. Virtual stores and showrooms provide customers with an unparalleled level of immersion, allowing them to explore products in 3D, interact with virtual environments, and receive personalized recommendations. for the customer.

6.3 Immersive Virtual Stores and Showrooms

Virtual stores and showrooms allow customers to explore products in 3D, interact with virtual environments, and receive personalized recommendations. This immersive experience fosters deeper customer relationships and enhances brand loyalty. Interactive Virtual Shopping Experiences: Virtual shopping experiences can incorporate gamification, social interactions, and personalized recommendations to make shopping more engaging and entertaining. This can lead to increased customer engagement and longer dwell times.Fully Immersive Shopping Experiences: Technology will evolve,making VR and AR systems more sophisticated and the immersion deeper. It can reach the point where shopping online won’t feel virtual anymore, with the engagement and tangibility being similar to physical shopping experiences

6.4 Blockchain Technology: Ensuring Secure and Transparent Transactions

Cryptocurrencies and blockchain technology are shaping the financial landscape of metaverse commerce. Companies like "MetaPay" introduce native digital currencies within virtual spaces, enabling frictionless transactions and global access to goods and services. The integration of blockchain ensures transparency, security, and provenance of virtual assets. NFTs (Non-Fungible Tokens) are being utilized for ownership and trading of digital collectibles, art, and virtual properties within the metaverse. Projects like "VirtuEstate" enable users to buy, sell, and develop virtual real estate backed by blockchain.

6.5 Virtual Dining Experiences: Redefining the Gastronomic Landscape

The Metaverse is also transforming the food and beverage industry, introducing virtual dining experiences that revolutionize the way people consume food. Virtual reality

technology enables restaurants to create immersive dining experiences, transporting customers to virtual environments that replicate the ambiance of their physical establishments. This allows customers to enjoy the atmosphere and décor of a restaurant without physically being present, expanding their dining options and enhancing their overall experience.Interactive menu options further elevate virtual dining experiences. Customers can interact with virtual menus, explore dishes in detail, and receive personalized recommendations based on their preferences. This level of customization and interactivity enhances customer satisfaction and encourages repeat visits.

6.6 The Metaverse: A New Realm for Culinary Exploration

The metaverse, an interconnected network of virtual worlds, provides a boundless canvas for culinary exploration. Unlike traditional dining establishments, which are constrained by physical limitations, virtual restaurants can transcend geographical boundaries, offering a global dining experience to a vast audience. Diners can embark on virtual culinary journeys, savoring delicacies from diverse cultures and eras from the comfort of their own homes.

6.7 Hyper-Realistic Sensory Experiences

Virtual dining extends beyond mere visual representation; it engages all five senses, creating an immersive and multisensory experience. Advanced haptic technology enables diners to feel the textures of food and utensils, while scent-emitting devices transport them to aromatic kitchens and bustling marketplaces. The metaverse also offers the potential for taste simulation, allowing diners to experience the flavors of virtual cuisine without ever consuming a physical morsel.

6.8 Interactive and Social Dining

Virtual dining fosters social interaction, enabling friends and family from across the globe to gather for virtual meals. Diners can engage in lively conversations, share their dining experiences, and even collaborate on virtual cooking classes, fostering a sense of community and shared culinary exploration.

7 Commercial Application of Metaverse in Gaming Sector

The metaverse is poised to revolutionize the gaming sector by introducing a new era of immersive, interconnected, and player-driven experiences. Unlike traditional games that are confined to individual platforms, the metaverse enables seamless cross-platform gameplay, allowing players to embark on virtual adventures across a vast and interconnected network of worlds. This unprecedented level of connectivity will foster a global gaming community, enabling players to connect, collaborate, and compete with others from around the world.

The metaverse also opens up new avenues for player-driven content creation, empowering users to design their own virtual environments, develop unique gameplay mechanics, and monetize their creations. This democratization of content creation will fuel innovation and creativity, leading to a surge of fresh and engaging gaming experiences.

7.1 Design of Maze Games

Pepper's hands were not made for folding origami cubes, so we choose a maze game in place of the previous one things. In our maze game, some MTurk employees online attempt to

guide Pepper virtually to a secret location (a book in our case) arranged among a number of cubicles. For that, Pepper had to carries out simultaneous mapping and localization (SLAM) to independently investigate the physical surroundings by leveraging its integrated GPS sensors. Pepper unifies all the information gathered from its GPS sensors to produce a two-dimensional map of the actual surroundings. After the accomplishment of using the 2D map, Pepper performs SLAM to determine the roughly shortest route to the location of the hidden object using the well-recognized A*Search algorithm one of the most effective methods in graph traversals and path-finding for immediate.We employ Pepper's native NAOqi modules for object detection. Employ YOLO V3 and ImageAI to train our light dataset using a supervised learning strategy based on a convolutional neural network. Using these methods to enable Pepper to discover the concealed object independently, that is, without assistancefrom nearby or far-off human participants) establishes our baselinetest out.

7.2 Brain -Computer Interface (BCI)

Brain-Computer Interfaces (BCIs), also known as "brain ports," establish a direct link between the brain and external devices. They can be categorized as unidirectional or bidirectional based on the direction of information transmission. Unidirectional BCIs facilitate one-way signal exchange between the brain and a computer, while bidirectional BCIs enable simultaneous two-way information exchange between the brain and external devices.Brain-computer connections empower individuals to access information, engage socially, and experience various virtual senses such as taste and touch within the Metaverse. Unlike traditional media limited to two-dimensional sensory experiences, BCIs hold the transformative potential to revolutionize the Metaverse by offering multidimensional and immersive sensory interactions.Since 2019, Neuralink, Elon Musk's BCI startup, has drawn attention for its breakthroughs, notably debuting its BCI system on July 17, 2019, and showcasing a live demonstration of the Neuralink brain implant on August 29, 2020, by reading a pig's brain activity.

7.3 Sustainable Development

In academic discussions, emerging themes revolve around the impact of the metaverse on sustainability, society, and the economy. Researchers highlight the diverse effects of the metaverse on quality of life, social interaction, governance, resource management, and cultural heritage preservation. A new and challenging field of study focuses on the potential contributions of the metaverse to smart urbanism and smart cities. Within this context, the virtual dimension of smart cities in the metaverse emphasizes objectives related to social, economic, and environmental sustainability.Scholars are apprehensive about extended reality's impact on society and the economy. While the metaverse may decrease the need for physical infrastructure, reduce waste, and improve access to services, challenges arise. Concerns focus on the shift from tangible to digital goods and in-person to virtual interactions.

7.4 Future Research Implications

Similar to the current Internet, the metaverse is expected to attract diverse cybercriminals and offenders driven by various motives. Human behavior, including cybercrime, is influenced by a mix of intrinsic and extrinsic motivations. Intrinsic motivations, linked to interest and enjoyment in specific activities, play a role in driving certain behaviors within the metaverse.Certain hackers engage in cyberattacks not for financial gain but for the sheer

challenge and enjoyment of testing their abilities. The metaverse has witnessed instances of such attacks, like a female virtual gamer reporting sexual harassment of her avatar by male avatars within the Meta game Horizon Worlds in early 2022. These cases illustrate instances where cyberattacks are driven by psychological motives rather than financial incentives.Economic theory suggests that external rewards, such as financial incentives, drive human behavior regarding extrinsic motivations. In the context of cybercrime, perpetrators motivated by external factors are inclined to target digitized businesses for greater financial gains. Studying the motivations and profiles of cybercriminals in the metaverse compared to those on the current internet could be a promising area for future research.Concerns have emerged regarding the potential use of the metaverse as a new battleground for cyberwarfare among adversarial nations. Adversary states might target various digital assets, including financial and biometric data, in these conflicts. invasive content, these concerns could intensify.

8 Conclusion an Future Work

Currently, the most widely used platforms in the Metaverse's popularization are games like Roblox and Fortnite.The new Metaverse ought to offer gamified experiences, such as serious video games, and is predicted to bethe forerunner of the sophisticated XR realms of the Multiverseencounters that transcend traditional VR and AR. Within thisIn this paper, we showcased our combined VR/AR headgear and Amazon MTurk

CoZ platform, which makes use of HoloLens and Quest 2 to allow for the remote control of social media through crowdsourcinghumanoid robot Pepper and its virtual avatar. We've increasedthe main emphasis of the Metaverse is on VR/AR to Multiverse'seight different XR experience domains and experimentallycompared the time it took them to complete each task.(TCT) and success/failure rate for two different games—a multiplayer maze game and an origami game played in both offline and online (i.e., networked) modes. Our acquired empirical findings are meant to shed light on the advantagesand drawbacks of various realities, choosing the mostideal one to implement gamified experiences with the least amount ofTCT at reasonable success/failure ratios. Using the particularTCT specifications and gamified system's failure tolerance.Taking experience into consideration, game developers can choose their preferred a singular reality that fulfills the performance requirementsAs an alternative, game designers can blend two or more realities to create crossreality settings where players can traverse or cross multiple Multiverse domains within a particular gamified encounter,producing virtual and physical environments that are integratedcorresponding strengths are balanced with corresponding weaknessesare increased byFuture research endeavors may modify collective intelligence mechanisms by utilizing our acquired results to encourage players to complete their assigned tasks more quickly and more effectively. In light of this, the complete potential of blockchains ought to be investigated through crowdsourcingintellect in a cooperative gaming environmentBlockchains make it possible for users to acquire tokens, which makes play-to-earn gamesin which users can exchange or acquire cryptocurrencyrealistic.Tokens that are not fungible (NFTs). Using the new WebBlockchain 3.0 technology allows for remote expert players to collaborateEngage in conversation with nearby new players via the Internet in various Multiverse realms to collaboratively complete complex tasks more quickly and even more precisely

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