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Virtual and Augmented Reality Technologies: Potential and Future

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ABSTRACT

The report examines the development of augmented (AR) and virtual reality (VR) technologies, their application in various fields, and methods for creating 3D content using software such as Blender and SketchUp. Despite advances in these technologies, Challenges such as technical limitations and security and health issues are also discussed.

Keywords: virtual reality technology, augmented reality technology.

INTRODUCTION

The topic of the report was chosen due to the growing interest of people in virtual and augmented reality, the development of technologies and the easier way to access them. The concept of augmented reality (AR) is often referred to as enriching the existing world through the virtual environment, expanding it without the observer having to change the sense of presence in reality, as opposed to full virtual immersion (VR). It is used in various industries - gaming, education, fashion and commerce, architecture and healthcare. This enrichment can also be obtained with the help of some applications that aim to create three-dimensional objects. The goal is to present 3D objects using Blender and Sketchup, thus illustrating the idea of easy accessibility and visualization to them [1].

EXPERIMENTAL

Methods

Based on a systematized analytical approach based on scientific publications, the benefits of using augmented and virtual reality in various socio-economic sectors are presented, revealing their huge potential for their increasing use and their use in new areas.

In addition, from the point of view of creating personalized 3D content and using it in the context of virtual and augmented reality, various scientific publications and official documentation of software products such as Blender and Sketchup have been analyzed. This allows us to make a comparative analysis between the two programs and how we could use them to create and use 3D models. We created our own 3D model, which we used in different environments.

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In addition, we take a critical approach to the topic under consideration and present some of the reasoned scientific theses expressed by developers and researchers related to concerns about the impact of virtual and augmented reality on human health.

Recital

Augmented (AR) and virtual reality (VR) technologies have undergone remarkable transformations, paving the way for innovative AR/VR glasses. These devices connect the digital to the physical world, increasing consumer engagement in a variety of sectors, including education, healthcare, entertainment, and industry [2].

Augmented reality (AR) is the integration of digital information with the user's environment in real time. Virtual reality is the use of computer technology to create simulation environments. Virtual reality puts the user inside a three-dimensional experience. AR/VR glasses are sophisticated wearable technologies that overlay digital data on physical environments or create fully immersive virtual realities. The assimilation of AR and VR into wearable devices is revolutionizing the way we perceive and interact with digital information, impacting various aspects of life and work [2].

RESULTS AND DISCUSSION

Current Applications

Education and training

In an educational context, AR/VR glasses offer immersive experiences that go beyond the established paradigms in traditional learning. They enable students to visualize complex concepts and participate in virtual labs where they can conduct experiments without physical constraints. For vocational training, these technologies provide realistic simulations of tasks in the workplace, which is especially useful in fields such as aviation, medicine, and heavy machinery work [2, 3].

The use of flexible learning environments is a newer trend in schools and teaching in general. Virtual reality fits well into this flexible learning model, as it can easily satisfy the technological parts of the lesson. More ideal would be having STEM resources and a computer lab equipped with VR to support the entire class at the same time. The benefit in this scenario is exponential: while students are working on their VR lesson, the teacher is free to use their experiences and learning in a more targeted way with individual students such as organizer, mentor, advisor, mentor, planner, or assessor. This flexibility is invaluable, as schools now recognize that many of the greatest achievements are based on personalized, student-centered learning [4, 5].

Health care

AR/VR glasses are increasingly used in surgical procedures, where they provide increased real-time overlays of the patient's anatomy, increasing precision during surgeries. In therapeutic settings, VR apps help treat conditions such as post-traumatic stress disorder, anxiety, and phobias by immersing patients in a controlled environment where they can stand up and learn to manage their fears safely [2, 6].

Entertainment & Games

The entertainment sector has significantly adopted AR/VR technologies. AR/VR glasses immerse players in virtual worlds or expand the real world with digital elements, offering a new level of engagement in games. They are also explored in films and live events, where they offer audiences unique, personalized experiences [2, 6].

Industrial Applications

In industrial settings, AR/VR glasses improve the efficiency and safety of various operations. For example, they may guide workers through repair processes with superimposed instructions or help assemble the complex of machines by

showing each step on site. This not only speeds up the learning process, it also reduces errors and accidents in the workplace [2, 5, 6].

Problems related to augmented and virtual reality

Technical challenges: Despite successes in the development of AR/VR technologies, there are still issues such as limited battery life, bulky construction, limited field of view, and latency - which hinder wider adoption. Solving these technical challenges is essential to creating more user-friendly devices [2].

The integration of cameras and sensors into AR/VR glasses raises significant privacy concerns, as these devices can capture detailed personal and environmental data. Ensuring reliable data protection and addressing potential security breaches are crucial to maintaining user trust [2].

Prolonged use of AR/VR glasses can lead to visual fatigue, nausea, and even psychological effects due to immersion. Manufacturers and researchers need to address these health implications through better ergonomic designs and perhaps guidelines for use over time [2].

How can we create 3D models for AR/VR?

Blender is a powerful open-source 3D software that allows for modeling, animation, rendering, and visualization. It supports virtual reality (VR) via OpenXR, making it possible to view scenes in 3D space with a VR headset. For augmented reality (AR), Blender can be used to create and export 3D models in formats such as glTF and USDZ, which are then integrated into AR applications and platforms. Although Blender itself does not provide full-fledged AR/VR development, it is a key tool for creating content that can be used in games, simulations, and interactive environments [4, 6].

Using Blender for the purposes of this report, a 3D model of a building was made (Fig. 1). From Blender we transferred our object to Sketchup

Fig. 1. 3D object in Blender.

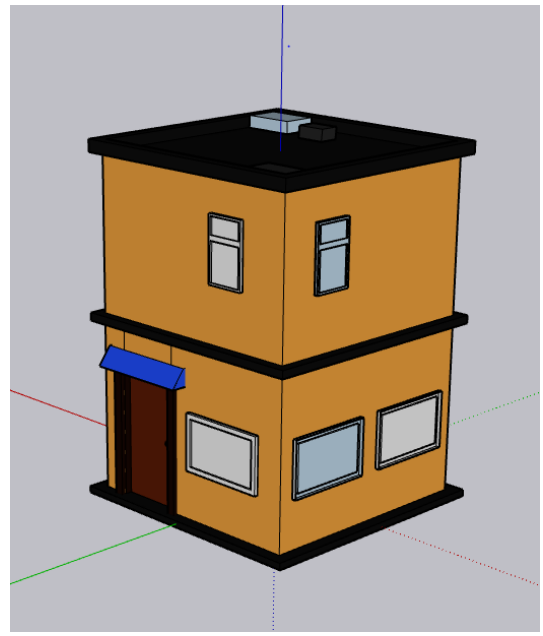

Fig. 2. from a 3D object transferred from Blender to Sketchup.

(Fig. 2) - software that is used for architectural projects, thus demonstrating the high efficiency and usability of Blender and 3D objects in different areas, in our example - with architecture [7].

SketchUp is an interactive 3D modeling software that was originally introduced in 2000 by the startup Last Software, and was later

acquired and largely promoted by Google in 2006. including additional features - SketchUp Pro. From the very beginning, its development has been heavily focused on its ease of use and fast learning curve. Designed to be affordable 3D modeling software for a wide range of applications, such as mechanical engineering, architecture, interior design, and much more, SketchUp is a popular option for beginners in 3D modeling. It offers a graphical interactive interface, with most of its tools always visible by default in the several toolbars and menus [8].

Differences Between Blender and Sketchup

Blender is a 3D rendering tool that is primarily used for visual effects, interactive applications, and video games. It has an excellent timeline for animation and a wide selection of lighting effects. This software is not intended for architectural or engineering activities. The default scale uses "Blender units" rather than exact units of measurement [9].

SketchUp is a 3D modeling program that can be used for applications such as civil and mechanical engineering, architectural and interior design. The user can enter accurate measurements using the metric system (millimeters, centimeters, meters) or the imperial system (inches, feet) [10].

Our model was transferred from Sketchup to Sketchfab. It is a platform that enables users to upload, view, and share 3D models with several features (e.g., annotations, metadata, model interaction) that are irrelevant to the type of object and thus appeal to a diverse audience, including 3D enthusiasts, researchers, gamers, marketers, and large institutions. The key feature of the platform is the 3D viewer, which allows for seamless embedding of models on websites, social media, and forums without the need for additional plugins. The review is compatible with all major browsers and operating systems, supports virtual and augmented reality, and includes a model inspector for quality assessment [11]. The model can be viewed through mobile devices at web space [12].

CONCLUSIONS

Virtual (VR) and augmented reality (AR) technologies are evolving rapidly and are becoming increasingly significant in fields such as education, healthcare, industry, and entertainment. While these technologies offer new opportunities for interaction and learning, there are also a number of challenges associated with their use – technical limitations, security and health issues for users, and the need for more affordable and efficient devices. software such as Blender and SketchUp shows how 3D models can be easily created to integrate into AR/VR platforms, offering new possibilities for visualization and interaction. The example of using Sketchfab demonstrates how these technologies can be used to share 3D content and to deliver interactive and immersive experiences through mobile devices and AR applications.

REFERENCES

1. L. Marques, J.A. Tenedório, M. Burns, T. Romão, F. Birra, J. Marques, A. Pires, Cultural Heritage 3D Modelling and Visualisation within an Augmented Reality Environment, 11, 33, 2017, DOI:10.5821/ace.11.33.4686.
2. N. Kothari, C.P. Jain, D. Kabra, C. Aswani, H. Khichi, Advanced Applications and Future Trends of AR/VR Glasses, Special Issue ISET, 2024, DOI:10.30780/specialissue-ISET-2024/033.
3. E. Peltekova, E. Stefanova, Integration of Virtual Reality in the Learning Process, Mathematics and Education in Mathematics, 2021, 290-297
4. E. Peltekova, A. Dimov, E. Stefanova, Improvement of Students' Achievement via VR Technology, 2018, DOI:10.1007/978-3-319-75175-7_5.
5. E. Peltekova, E. Stefanova, Inquiry-based Learning Outside the Classroom with VR Devices, SITITO'2016, 2016
6. E. Peltekova, E. Stefanova, N. Nikolova,

Space Safari Challenge for STEM Rangers, CompSysTech'19, 2019, https://doi.org/10.1145/3345252.3345273
7. Sket chUp, Benefits of SketchUp, 2025, https://www.sketchup.com/en/benefits-of-sketchup
8. Sculpteo, SketchUp Definition, 2025, https://www.sculpteo.com/en/glossary/sketchup-definition/
9. B. Rosener, 3D Modeling Programs: Comparison of SketchUp and Blender, 2025
10. C. Papadopoulos, K. Schoueri, S. Schreibman, Three-Dimensional Scholarship and Infrastructures, 2025
11. Blender Foundation, Free Software Never Looked This Awesome, 2025, https://www.blender.org/features/
12. https://sketchfab.com/3d-models/doklad-kristo-8d3c5c5d1cc04a898ae4831f977b64a7