Web Based Online Virtual Reality Class-room

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ABSTRACT

Both eager researchers and software development businesses are constantly using content creation tools for Virtual Reality (VR) to produce new and interesting VR settings and increase connection between academic groups and industry. Because of the unexpected, forced transfer of classroom activities to a totally remote format as a result of the Corona virus pandemic, there is an urgent need for advancement in the online education system. Not only that, but online education is the way of the future, and its infrastructure must be improved for successful teaching and learning. One of the primary challenges in the present video calling-based system is engaging pupils and improving their attentiveness. In this study, we suggest a virtual classroom environment based on VR and Augmented Reality (AR) that will motivate students to learn with a high degree of engagement and attentiveness. With peer-peer and student-teacher interactions in our web based virtual classroom, students may experience the atmosphere of a real classroom. Vuforia may be used to distribute AR models, allowing professors to take lessons more efficiently while increasing student participation. This study presents a novel interactive distance teaching and demonstration mode that allows interaction between the teacher and the virtual scene, as well as the teacher and the student. We stress the smart classroom design, which is built on merging reality.

Keywords: - Virtual Reality, Oculus Quest, Online Education, Remote Learning, Unity 3D, HMD.

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1. INTRODUCTION

The sudden outbreak of COVID-19 has caused unforeseen disruptions in all aspects of society, including schooling. Physical education lessons were cancelled for nearly a year from 2020 to 2021 as personal health and well-being took precedence. To keep up with the pace of their learning, teachers and students have obviously turned to various types of remote learning. The COVID-19 crisis has recently brought the whole globe online, forcing students to transition to remote learning. Applications for Virtual Reality (VR) and Augmented Reality (AR) are attractive areas of study. Virtual Reality is a computer simulation of a three-dimensional artificial object with which a person may interact using Virtual Reality eyewear and special gloves that are coupled to sensors. Augmented Reality systems differ from VR in that they use special effects such as music and 3D models to enhance real-world situations. Virtual reality (VR) is receiving more attention in studies as a key instructional tool that can improve student learning. According to studies, VR improves engagement, focus, interaction, concentration, knowledge retention, and information accessibility. However, there aren't many VR applications in our current education system. As a result, the technique outlined in this paper will be more important than ever before.

Students had the atmosphere and environment to focus and study in an educational institution, where they had opportunities to engage with professors and their fellow peers, in on-campus classrooms. In e-learning platforms, students listen passively and do not engage with professors.

The current online medium of learning through a 2D interface lacks empathy and involvement, decreasing students' focus levels. The core concept of our proposed work is to allow a virtual classroom utilising VR. applications in VR and AR, which improves student efficiency and engagement Unity 3D was chosen over other 3D game creation tools for our project due to its practicality, ability to convert a game to numerous platforms, vast community, a plethora of models and objects in the asset store, and compatibility for two of the most popular programming languages (C# and JavaScript). For designing VR /AR apps, Unity 3D is the most cost-effective, versatile and long-term option. Unity 3D is the core component that integrates all other components and acts as a user interface.

2. PROBLEM STATEMENT

Most of us are accustomed to face-to-face interaction. It has previously allowed us to create profound ties, mutual trust, a family-like vibe, and so on. It is challenging to promote these kinds of relationships, possibilities, and ambitions in our current online learning environment. Students in e-learning platforms passively listen to and engage with professors. The students' learning and attentiveness are more passive, and the majority of them acted as if they were watching television throughout the e-learning classes. Some students want demonstrations on how to accomplish something, which might be difficult to do over a screen in some circumstances (This can be particularly challenging for students with more severe learning needs who benefit from hand over hand support, direct modelling of a task, etc.).

3. OBJECTIVE

Our goal is to propose a new interactive distant teaching and learning mode that allows interaction between the instructor and the virtual scene, as well as between teachers and students. This project provides a system for creating a virtual class-room environment, allowing students to have a real-time class-room experience while not physically present in the class-room. This will enhance the future of learning not just during this type of continuous epidemic, but also for kids who are incapacitated and cannot attend schools or institutions.

4. TOOLS AND TECHNOLOGIES USED

- Unity visual engine – to develop a VR world
- Oculus Quest – VR hardware devices (headgear and gloves)
- Autodesk Character Creator – 3D model generator
- Create a human – avatar

Fig 4.1 - Tools and Technologies

5. PROPOSED METHODOLOGY

Using the Unity Graphic Engine, we design an environment that mimics our classroom, complete with several 3D items such as several desks, a white board, and avatars that will represent the users (students & teachers). There is a plethora of different applications comparable to Unity that may be used to build a virtual world.

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Unity 3D is used to create the virtual classroom setting. VR Synchronization of the user's head, hands, and body is performed. The VR user's movement is then synchronised, including teleportation. The user can access the web-based virtual classroom by using a PC or laptop and wearing the VR gear set. Using the controllers linked to the sensors, users may manoeuvre and excite their avatars.

We'll also have to deal with networking, which has two distinct functions: game object networking for user-object interaction and entity code system for user-user interaction. We will utilise a network manager to carry out these tasks. The user must first visit the website, register, and then choose a VR Avatar from a variety of models. The user can enter the Virtual Reality class-room and experience a real-time class-room by logging in.

5.1 PROPOSED WORK-FLOW DIAGRAM:

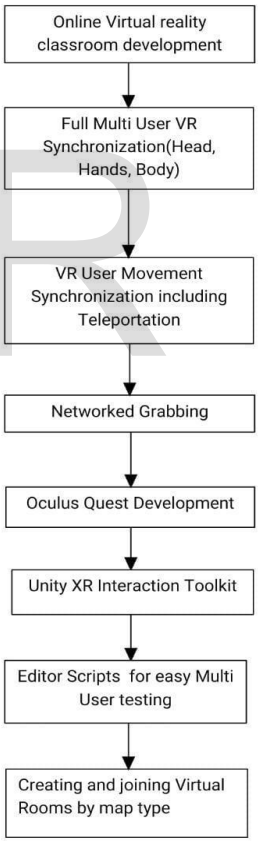

Fig. 5.1.1 - Proposed Work-flow

5.2 ENTERING THE ONLINE VIRTUAL REALITY CLASS-ROOM

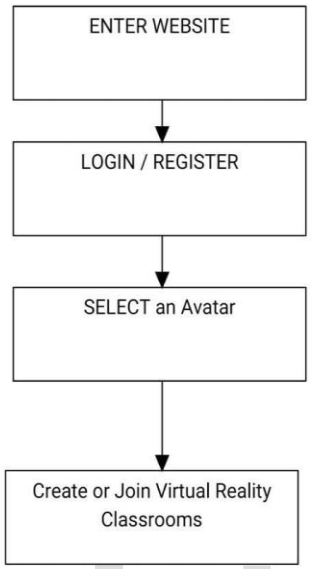

Fig.5.2.1 - Entering the Class-room

6. CONCLUSION

The goal of this project is to create a virtual reality class-room that can be accessible from anywhere. We created and built the Virtual Reality class-room with Unity 3D, allowing users to wander around the room with Oculus Quest, allowing for peer-to-peer learning and student-teacher interaction.

7. REFERENCES

[1] Alzahrani, N. Augmented reality: A systematic review of its benefits and challenges in e-learning contexts. Appl. Sci. 2020.

[2] Paszkiewicz, A.; Salach, M.; Dymora, P.; Bolanowski, M.; Budzik, G.; Kubiak, P. Methodology of Implementing Virtual Reality in Education for Industry 4.0. Sustainability 2021.

[3] Raes, A., Vanneste, P., Pieters, M., Windey, I., Van Den Noortgate, W., & Depaepe, F. (2020). Learning and instruction in the hybrid virtual classroom: An investigation of students' engagement and the effect of quizzes. Computers & Education.

[4] Gandhi, R.D.; Patel, D.S. Virtual Reality–Opportunities and Challenges. Virtual Real. 2018.

[5] Mathur, A.S. Low-cost virtual reality for medical training. In Proceedings of the 2015 IEEE Virtual Reality (VR), Arles, France, 23– 27 March 2015.

[6] Thomas, J.; Bashyal, R.; Goldstein, S.; Suma, E. MuVR: A multi-user virtual reality platform. In Proceedings of the 2014 IEEE Virtual Reality (VR), Minneapolis, MN, USA, 29 March 2014.

[7] Brown, A.; Green, T. Virtual reality: Low-cost tools and resources for the classroom. TechTrends 2016.

[8] Serafin, S.; Adjorlu, A.; Nilsson, N.; Thomsen, L.; Nordahl, R. Considerations on the use of virtual and augmented reality technologies in music education. In Proceedings of the 2017 IEEE Virtual Reality Workshop on K-12 Embodied Learning through Virtual & Augmented Reality (KELVAR), Los Angeles, CA, USA, 19 March 2017.

[9] Zhang, K.; Liu, S.J. The application of virtual reality technology in physical education teaching and training. In Proceedings of the 2016 IEEE International Conference on Service Operations and Logistics, and Informatics (SOLI), Beijing, China, 10–12 July 2016.

[10] Melatti, M.; Johnsen, K. Virtual Reality mediated instruction and learning. In Proceedings of the 2017 IEEE Virtual Reality Workshop.