Immersive Learning Environment in Virtual Reality

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INTRODUCTION:

This project is built around the idea to produce an alternative method for teaching through immersive and intuitive experiences and environments using Virtual Reality. Creating an enjoyable and captivating way to understand data and learn.

The project will be built as a VR Game with the ability to visit 3 different time periods, **The Roman Empire** [Figure 1], **The Age of Piracy** [Figure 2] , **World War I-II** [Figure 3]with objects and points of interest to visit and learn from. These time periods give a wide reach of interest and opportunity for learning.

TECHNOLOGY:

Some of the main technology that will be used is Unity Game Engine, Blender 3D and The Oculus Rift S.

Unity— Used to develop and display the environments and run the game.

Blender— Used to create assets / objects to incorporate within the environments.

Oculus Rift S— The Oculus Kit consists of a Head Mounted Display and Motion Controllers and these are what allow the experience to be immersive. Using high quality lenses and fluid motion tracking, the kit can be used to receive feedback from the user while displaying a smooth and enjoyable environment back to them.

APPLICATIONS:

This project demonstrates how the usage of Virtual Reality can be implemented within a wide range of areas. For this particular project its focus is Education and Learning, but this could also be adapted towards training and immersive entertainment [1]. There are some well known current applications of this idea such as **Immersive VR Education** [2] and **Class VR** [3].

Covid-19 has changed how we operate within the work sector and also the social aspects of our lives, and this VR Usage could be the bridge between that, allowing for fluid interactions and the ability to feel immersed with others [4].

Figure 1: Screenshot of Roman Empire Environment

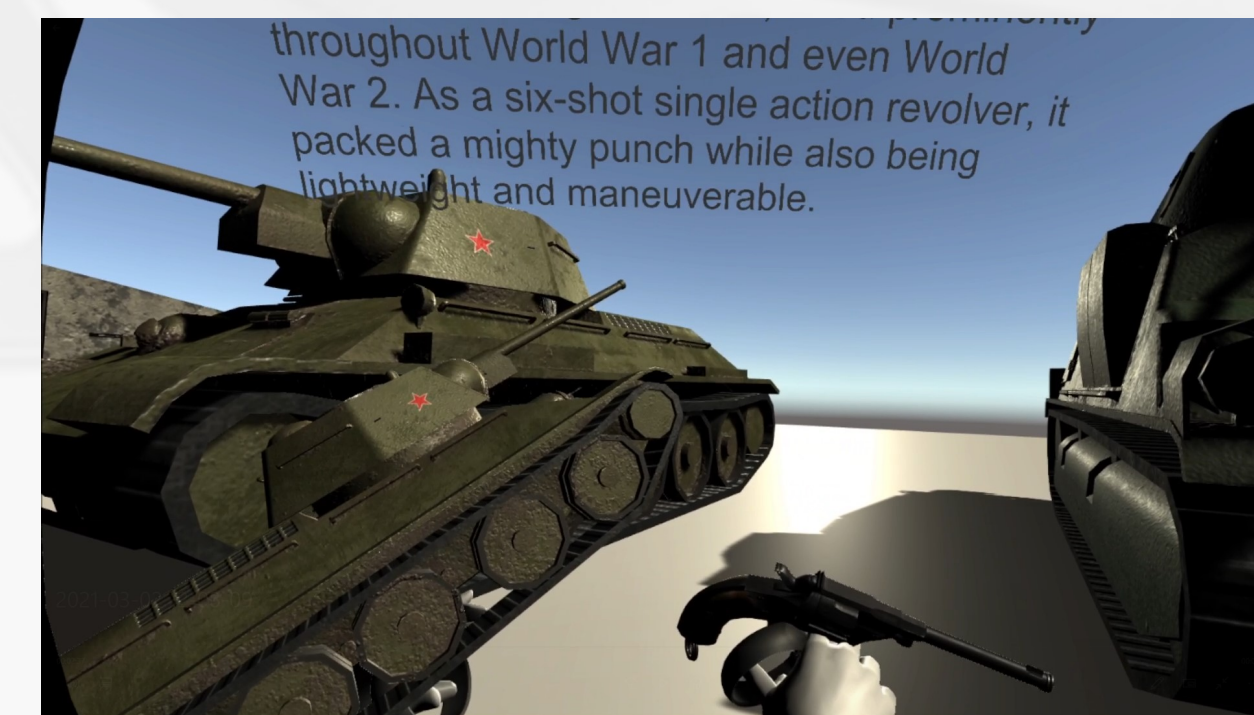

Figure 2: Screenshot of Pirate Era Environment

Figure 3: Screenshot of World War I-II Environment

CITATIONS:

[1] J. Psotka, "Immersive training systems: Virtual reality and education and training," *Instructional Science*, 01-Nov-1995. [Online]. Available: https://link.springer.com/article/10.1007%2FBF00896880. [Accessed: 08-Mar-2021].

[2] M. Mateen and C. Y. P. Kan, "Education during COVID-19: Ready, headset, go!," *The clinical teacher*, Oct-2020. [Online]. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7646265/. [Accessed: 08-Mar-2021].

[3] "Immersive VR Education: Learn through Experience: Home," *VR Education Holdings*, 02-Feb-2021. [Online]. Available: https://immersivevreducation.com/. [Accessed: 08-Mar-2021

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IMPLEMENTATION:

Environments are created using Unity Game Engine and are then displayed through the corresponding **Virtual Reality HMD** (Head Mounted Display). Then by using the provided **Oculus SDK**, this grants full programming ability to the Environment from the **Oculus VR Device**. The SDK controls the motion control and orientation of the Avatar. The backbone of the VR Experience has been created with the user in mind, to assure for safe and continuous use to avoid VR side effects [5].

The user is able to control aspects of the environment, from grabbing objects to teleporting. This is all done within the Unity Instance and can be exported for use in the real world as an *.exe* file.

RESULTS:

The outcome of the project is a functional VR Game which allows the user to travel to different time periods and explore the relating area. While in the area the user can interact with objects pre-set within those environments and can hold them and manipulate them. These objects carry points of interest and display relevant information for the user to see.

All movements and interactions are seamless and many VR interaction rules have been implemented to reduce the risk of the user becoming nauseous or being uncomfortable.

FUTURE WORK:

The future work for this project could consist of implementing more classroom and educational features such as allowing for multiple people to connect to the same server and interact with each other, using virtual whiteboards and chat messages. This would be implemented using Unity's built in Server Manager.

Another additional aspect of improvement would be to allow the user to spawn in certain objects, or have a workshop-like store for creators and users to distribute and use 3rd party assets freely in the environment.

Unity   **blender**   **oculus**