INTRODUCTION

The aim of this project is to create a virtual sandbox environment. The environment will be believable, realistic and will be controlled using two controllers.

The environment presented will be a game based in a small series of rooms based on exploring the use of hand interaction in a virtual environment. The choice of environment allows several concepts to be implemented whilst still feeling seamless.

The method of interaction in conjunction with the generated environment will give the user a wide range of possibilities to explore and a good insight into how we interact with objects in VR.

OCULUS QUEST

The device being used to develop and test this system is the Oculus Quest. The quest is Oculus' portable rendition of a feature-rich, high quality Virtual Reality headset. It is a standalone device that requires no further processing power unlike some other headsets, such as the Oculus Rift S or HTC

Vive. With the headset also being relatively affordable, it makes the platform very accessible. The headset is connected to a PC via a cable if the desire is to use it for development and any created games can be directly built to the headset. This makes the experience of developing



completely foolproof as long as the settings are correct.

OTHER TECHNOLOGIES



The cable that comes with the Oculus Quest is known as the Oculus Link and allows the user to connect the headset to a PC. This gives access to development and games that aren't on the Oculus store.



Unity is the game engine used to develop the game. It has great Oculus integration with free SDK's available on the Asset Store.



C# is the language typically used in Unity. The seamless integration allows for advanced scripts using realistic physics making the experience more immersive.

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HandboxVR **Exploring Hand and Finger Based** Interaction With a Virtual Environment



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With the basics of interaction in place, further goals and developments would be focused on continuing to make the environment as believable as possible. A good route for this would be adding things like haptic feedback which, is seen in a few more advanced games on the Oculus Store. The hand tracking is rather basic as it is limited to the controllers provided with the Quest and the different parts of the hand are split between the available buttons. Further implementation of full hand tracking would be a next step but the method is, not only quite advanced but also, expensive.

METHODS

The design of the system will be done within the Unity Game Engine. This is the current most popular game engine and provides seamless integration for Oculus as well as advanced physics. Several room simulations will be added to give the user a wide range of activities to try.

Distribution can be done through exporting an executable or by uploading the finished product to the Oculus store as a developer. The system will be complete and ready to use on any compatible headset.

Thorough testing will be needed as there are ethical issues to consider when working with VR. Any physical symptoms will need to be reported and the user must be made aware of this before playing.

RESULTS

The free-to-roam virtually generated environment provides an immersive and educational experience for users of any skill level. It can teach the basics of VR including movement, grip, physics and even teleportation. Each task provides a different insight into Virtual interaction and shows the power and potential of the platform.

Despite being available to use on any headset that supports it, the Oculus Quest is a great device for those looking to experience VR without a hefty price tag. The portability and power makes it a very enjoyable experience for anyone interested.

The Unity Game Engine provided the foundations and support needed to make an advanced, yet simple to implement system and shows why it is the most popular game engine at his time.

FURTHER DEVELOPMENTS

