Exploration of Geographic Location Using VR System

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Abstract: **Virtual reality is a term used to describe a simulated reality, where the user is shown the simulated world instead of the real world by using a Google VR headset. The popularity of virtual reality is rising every year. The goal of this project is to develop a simulation to visualize a geographic location in virtual reality, so user should be able to select a location and explore the area in virtual reality in 3D as if he/she was present there. To create the solution three parts are required: a source (place), a converter, and an engine. First the user chooses a geographic location and build into a 3D model in a 3D designs of software and export it to an engine-supported format. The file is then imported into the engine to display the model in virtual reality. Thus implemented a prototype solution by importing the 3D model into unity engine and merging some prefabs from Google VR SDK to the model. For movement purpose a Look Walk script is written and added with the 3D model. The programming language used for scripting is C.**

Keywords: **Sketch up, Unity, C#.**

1. Introduction

Virtual reality (VR) is a term used to describe an experience of a reality that is not real, but simulated. As our senses are the only way of perceiving reality, they can be misled. Misleading is done by replacing our senses information with made-up information, e.g., a simulation of reality, or a completely made up reality. As vision is the strongest sensory input that humans have, replacing it with a virtual world can make a person feel as if they are in another world. Lately VR has started getting popular due to it becoming more possible with recent hardware improvements. Previously VR had performance limitations and low capital interest. The growth of VR has become a fast-growing trend over the last couple of years, going from almost nothing except a few novel toys over the years, to an established business. Most newer virtual reality environment are visual experiences which are displayed either on a computer screen or projector.

2. Existing System

This system uses the Oculus rift for virtual visualization along with controllers for virtual movements. This system thus has little software complexities.

3. Proposed System

We develop a simulation in virtual reality to visualize a geographic location virtually which is affordable by everyone. The user can able to select any geographical location available and able to explore a location in virtual reality as if he is present there using Google card board box. Through Google card board box we can visualize the selected location virtually in 360 degrees and also by tilting the Google card board box downwards being in the same resting position we can move in the virtual world. Thus, user can visualize any locations at any time.

4. Software Used

A. Sketch up

Sketch Up is a 3D modeling computer program for a wide range of drawing applications such as architectural, interior design landscape architecture, civil and mechanical engineering, film and video game design. It is available as a web based application, Sketch Up Free, a freeware version, Sketch Up Make, and a paid version with additional functionality, Sketch Up Pro. Sketch Up is owned by a mapping surveying and navigation equipment company. There is an online library of free model assemblies e.g.: windows, doors, automobiles, 3D Warehouse, to which users may contribute models.

B. Unity 3D

Unity 3D is a multi-platform game engine from Unity Technologies. TheUnity3Dengine supports many different types of platforms, ranging from mobile operative system as iOS to a PC with Steam VR. Unity3D supports both Unity script (i.e., Unity's version of JavaScript) and C# (previously Boo1) as languages for functions. A scene in Unity3D is an empty environment, where all the game objects, such as camera, lightning and scripts are placed in the scene. A game object is an entity, which contains components to define what it is, for example adding a camera component to the game object makes the game object a camera. Script components are scripts that can be applied to a game object, they work as object oriented programming and is applied as a component, and can then access the game objects other components and properties. Unity 3D fully supports C# and is also where the majority of documentation for Unity3D is written. The engine is open source compared to many other engines, which means the

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engine is easier to adapt to the purpose you need the engine.

Fig. 1. Unity

5. Supported Platforms

Unity is a cross-platform engine. The Unity editor is supported on Windows and macros, with a version of the editor available for the Linux platform, albeit in an experimental stage, while the engine itself currently supports building games for more than 25 different platforms, including mobile, desktop, consoles, and virtual reality. Platforms include iOS, Android, Tizen One, 3DS, Oculus Rift, Google Cardboard, Steam VR, PlayStation VR, Gear VR, Windows Mixed Reality, Daydream, Android TV, Samsung Smart TV, tvOS, Nintendo Switch, Fire OS, Facebook Game room, Apple's ARKit, Google's ARCore, Vuforia, and Magic Leap.

6. Plugins used

A. Google VR SDK

An SDK is a collection of software used for developing applications for a specific device or operating system. Google VR Elements is a collection of Unity for developing high-quality VR experiences. The core mechanics in each demo are built to be easily configurable and reusable for your own applications. Elements currently cover the following VR principles.

C, C++, java.

B. Locomotion

When crafting VR applications, it is often important to let the player to move around their virtual environment. Techniques for enabling navigating a VR environment are referred to as locomotion.

C. Render and light

Performance is critical to VR apps but can be especially challenging on mobile GPUs. Many commonly available mobile shades and per-pixel lighting solutions provide high quality results but perform poorly on mobile VR systems due to extremely high resolutions, rendering multiple views, distortion and general mobile performance issues. The Rendering & Lighting demo uses Daydream Renderer to showcase rendering effects that are typically difficult to achieve on mobile hardware.

D. C#

C# is an object-oriented programming language developed by Microsoft. The C# language is a type safe language. A known feature in C# is its garbage collection to free memory used by unused objects. The C# programming language has similar syntax to the programming languages C, C++, java.

E. Visual studios 2008

Visual Studio is an Integrated Development Environment (IDE) that was developed by Microsoft. The web application was developed using the Visual Studio software, highlighting, intelligent code completion, snippets, and code refactoring. It is highly customizable, allowing users to change the theme, keyboard shortcuts, preferences, and install extensions that add additional functionality. Visual Studio Code can be a great companion to Unity for editing and debugging C# files. C:\users\{username}\AppData\Local\Programs\Microsoft VS Code\Code.exe on Windows by default. Unity has built-in support for opening scripts in Visual Studio Code as an external script editor on Windows and macOS. Unity will detect when Visual Studio Code is selected as an external script editor and pass the correct arguments to it when opening.

Fig. 2. Visual studio

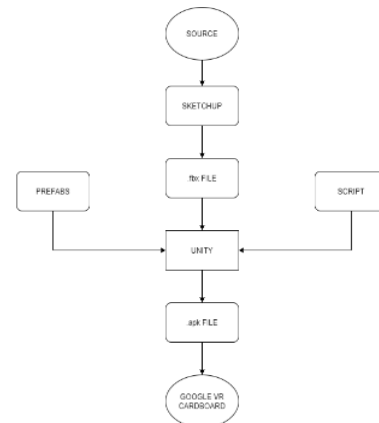### F. Sequence of operation

Fig. 3. Sequence operation

7. Google Cardboard

Google Cardboard is a virtual reality (VR) platform developed by Google. Named for its fold-out cardboard viewer into which a smartphone is inserted, the platform is intended as a low-cost system to encourage interest and development in VR applications. Users can either build their own viewer from simple, low- cost components using specifications published by Google, or purchase a pre- manufactured one. To use the platform, users run Cardboard-compatible mobile apps on their phone, place it into the back of the viewer, and view content through the lenses. In theory, creating a VR experience is straightforward. Instead of displaying your world as a single image on screen, you display two images. They come from two cameras placed a few inches apart, and the user views the image from the left camera with the left eye and vice versa, creating the appearance of depth. Additionally, with some judicious use of motion sensors, you can detect the direction the user is facing. Combine that with the 3D world you've created, and you've got yourself an immersive experience.

Fig. 4. Cardboard

8. Result

The exploration of geographical locations using VR system has been proposed so it helps the students and normal persons to notice and have the opportunity to see the geographical views using our VR system. Viewer profiles ensure Cardboard users experience seamless interaction between their viewer and Cardboard-enabled apps. Using a QR code, the smartphone scans the viewer's specifications and optimizes Cardboard-compatible VR apps for that particular viewer.

9. Conclusion

The popularity of virtual reality is rising every year, but it's in still experimental stage and not affordable by everyone. In existing to stimulate in virtual reality with can done only with the controllers with cannot be afford by all. Since the VR box with controllers are not cost efficient, therefore experiencing the virtual reality by everyone is one of the primary needs. Here we used to google cardboard for viewing virtual reality environment and for movement we included a look walk script using C# language which helps to stimulate in the virtual reality environment without any controllers. This system is expected to achieve good interest from the market since on mass production, while the system is realized on cardboard, will prove cost efficient.

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