IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 4 Issue 2, February 2017
ISSN (Online) 2348 – 7968 | Impact Factor (2016) – 5.264
www.ijiset.com

Making a 3D Map Service using Virtual Reality

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Abstract

Map services which provide geographic information to users have evolved from aerial and satellite imagery to more realistic 3D map service with street-view. Recently, there is an approach to provide a map service using virtual reality (VR) or 360 VR service. In this paper, we present a method to make a 3D map service using some 3D modeling tools and illustrate the example of it with the campus map. The 3D map service using the VR can provide more vivid and realistic experience as if we go around campus in a virtual space with a user control.

Keywords: *3D map service, virtual reality, 3D campus map using VR*

1. Introduction

Map services have provided geographic information to users using aerial and satellite imagery. Recently, they evolve to more realistic 3D map service with street-view. Google Earth is a well-known 3D geographical map service which provides street view, navigation and historical imagery. With street view service, you can experience streets as if you were there. The 3D map for street view service is based on the scenery taken from vehicles. In Korea, similar 3D map services are also provided by the Internet platform service providers such as Naver and Kakao.

Many educational institutes consider a map service to provide geographical information for their own campus with a freshman or prospective student. On campus, the road is usually constructed mainly for pedestrians, in which the vehicle fails to capture the scenery for 3D map.

In this paper, we present a method to make a 3D map service for the pedestrian on campus. In addition, we consider 360VR image-based 3D map service which can provide more realistic information for the user who walk around the campus.

2. System Model

The 360 VR system is based on mobile platform e.g. Android with HMD (head mounted display) to exploit external controller and various sensors easily. It can detect the movement of user and respond to it. The system is configured to provide information on the buildings, geographical features and whole terrene (bird's eye view or aerial view). The aerial view helps to identify the overall shape for the people who come to campus first. We try to model the buildings or geographical features as realistic as possible. In addition, we add mini-game to give rise to interest and to concentrate on the 360 VR service. HMD or controller for VR is not easy to control for the beginner. Basic tutorial and manual is provided at initial screen to guide how to use it.

3. System and Its Implementation

3.1 Development Environment

The application programs we used in the implementation are Unity, SketchUp, and Photoshop.

Unity is a game engine technology and an integrated development environment (IDE) as well. It provides a development environment that can collaborate within a single game engine. The main advantage of Unity is that it supports multi-platform. Developers can easily create games of their choice without the need for mobile devices, web browsers, desktops, or consoles. The development environment itself is intuitive and simple enough for the beginner to understand easily. The Unity Asset Store is also a major growth driver. The Asset Store is a space where various materials can be utilized by anyone in the unity game. Developers can use sound, images, characters, and code here for free or for a fee.

SketchUp is a 3D modeling computer program for various drawing applications. It is an easy modeling tool with simple interface. Another big feature of SketchUp is 'Warehouse', 3D Warehouse and Extension Warehouse. The 3D warehouse is a platform where a sketch-up 3D model is automatically uploaded by a sketch-up user and is downloaded and shared. The Extension Warehouse is a shared platform for plug-ins (Ruby) of sketch-ups.

3.2 3D Map Service using Virtual Reality

3D map service using the VR can provide a realistic experience as if we go around campus in a virtual space with a user control. The application program consists of initial screen and execution scene. The initial screen is composed based on the actual images of the lake which was shot at 360 degrees.

Fig. 1 Initial Screen of Application.

The execution screens are composed based on the virtual images of the campus which is made by SketchUp. We apply photo-realistic rendering for modeling buildings of the campus which uses texturization with actual photograph. It can provide more vivid and realistic building model. To create more accurate and realistic terrains, we use Google Earth maps for the campus.

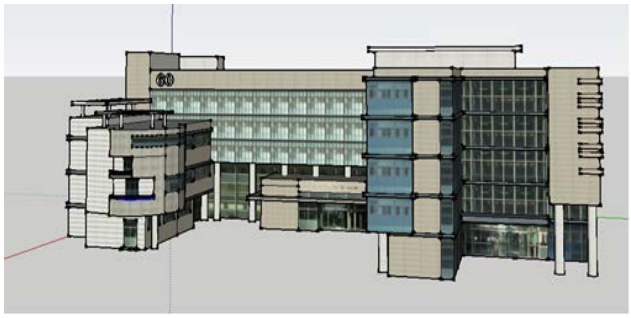

Fig. 2 Building footage created: (a) using Sketchup (upper) (b) using Unity (lower)

We implement pop-up mode which is activated and helps you to select the following functions when you approach the building in the VR application. Also, we implemented several pop-up games using Unity programs which help the users to be immersed and interested in the VR application.

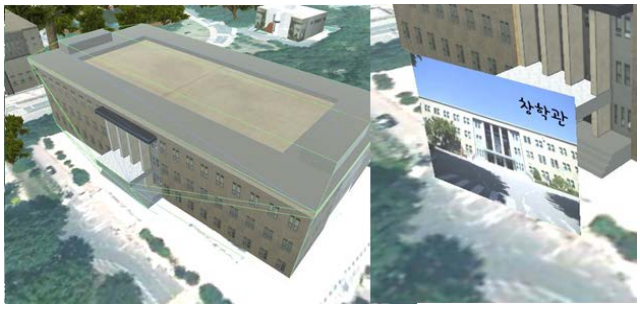

Fig. 3 Popup Image Example

Fig. 4 Virtual Campus Example using Unity

We apply the Bluetooth joystick as input device and made the user move freely in the virtual campus.

4. Conclusions

In this paper, we considered 3D map service using virtual reality. We presented a method to make a 3D map service and illustrated the example of it with the campus map. We implemented the application programs using Unity, SketchUp and applied photo-realistic rendering for modeling buildings of the campus. To create more accurate and realistic terrains, we used Google Earth maps for the campus. Also, we implemented several pop-up games which help the users to be immersed and interested in the VR service. The 3D map service using the VR can provide more realistic experience as if we are there in a virtual space.

Acknowledgments

This study was supported by the Research Program (2016-0843) funded by the Seoul National University of Science and Technology.

References

[1] https://unity3d.com
[2] https://www.sketchup.com/
[3] https://developers.google.com/vr/

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