Advanced Science and Technology Letters
Vol.87 (Art, Culture, Game, Graphics, Broadcasting and Digital Contents 2015), pp.82-87
http://dx.doi.org/10.14257/astl.2015.87.18

A Study on the Real Estate Information System Based on Virtual Reality Technology

Seungwook Kim

Dept. of Land Adminitration Shinhan University, 95 Hoam-ro,
Uijeongbu, Gyeonggi, 480-701, Korea
ksw2142@naver.com

Abstract. Thanks to the development of technology you can experience virtual reality with a smart phone and a virtual reality kit like Google Cardboard and you can see different angles as you move your head 360 degrees and you can see the 3D view as if you were looking around a building. Virtual reality technology can help to convert a real estate information system into a telepresense or telexitstence system through which you can see as if you were there and using it can partly replace going directly to a model house. It is necessary to combine the spatial information technology and virtual reality technology in order to build the real estate information system based on virtual reality technology. In this paper, method for building the real estate information system based on virtual reality technology will be presented.

Keywords: Real estate information system, Virtual reality, Three-dimensional spatial information open platform, Mobile application, Vworld

1 Introduction

Recently there has been increasing interest in information technology companies for virtual reality technology.

Facebook acquired Oculus Rift maker Oculus VR in 2014 for $2 billion. Also Google designed Cardboard Kit which is a fold-out cardboard smartphone mount that affords a virtual reality experience. A smartphone with stereoscopic display software fits into this device and the lenses allow a person to perceive the images as one single three-dimensional image. Samsung Electronics also developed Gear VR which is a virtual reality device in collaboration with Oculus VR.

Virtual Reality technology may be popular with gamers, but IT companies like Facebook plan to leverage the technology to other industries, and I think real estate industry can be one of them.

Therefore, this study attempts to introduce Real Estate Information System Based on Virtual Reality Technology in South Korea.

For this purpose, chapter 2 attempts to make a theoretical investigation of the concept, function and major technology of virtual reality, three-dimensional spatial information platforms and real state information systems.

Chapter 3 discusses the steps or method to build the real estate information system based on virtual reality technology. Chapter 4, the concluding chapter, mentions the

ISSN: 2287-1233 ASTL

expected effect of the elicited model.

2 Theoretical Investigation

2.1 Virtual Reality Technology

Virtual Reality (VR), sometimes referred to as immersive multimedia, is a computer-simulated environment that can simulate physical presence in places in the real world or imagined worlds [7].

Most 3D displays use this stereoscopic method to convey images. Stereoscopy creates the illusion of three-dimensional depth from given two-dimensional images. Human vision, including the perception of depth, is a complex process which only begins with the acquisition of visual information taken in through the eyes; much processing ensues within the brain, as it strives to make intelligent and meaningful sense of the raw information provided.[8] One of the very important visual functions that occur within the brain as it interprets what the eyes see is that of assessing the relative distances of various objects from the viewer, and the depth dimension of those same perceived objects. The brain makes use of a number of cues to determine relative distances and depth in a perceived scene.[8]

In practice, it was very difficult to create a high-fidelity virtual reality experience, because of technical limitations on processing power, image resolution, and communication bandwidth.

However, such limitations have been overcome with progression of processor, imaging, and disk communication which have become more powerful and cost effective over time.

Thanks to the development of technology and the great popularity of the smartphone. Nowadays most smartphones have a processor whose speed is over 2GHz and whose core is over two, a display with resolutions over Full HD(1920×1080), a gyroscope sensor which uses Earth’s gravity to help determine orientation, a GPS receiver whose function is to calculate the user's exact location and an LTE(Long Term Evolution) module whose communication bandwidth is enough for carrying 3D data of the real site.

So smartphones can be the main part of a HMD(Head Mounted Display) with which virtual reality can be experienced and though which stereoscopic image can be viewed. Google Cardboard Kit and Samsung Gear VR are the HMD whose main part is a smartphone.

Fig. 1. Google Cardboard Kit and Samsung Gear VR

2.2 Spatial Information Open Platform and Vworld

The real estate information system based on virtual reality technology should show the real world to users. So the spatial information technology or system is necessary in building real estate information systems based on virtual reality technology.

Spatial information Open platform is the platform which is used with various purposes of seeing and exploiting further in two or three dimensions. Real Estate Information Systems Based on Virtual Reality Technology should be built on not a two-dimensional spatial information systems but a three-dimensional spatial information systems because virtual reality or augmented reality can be realized in it.[5]

Vworld is a Spatial Information Open Platform that offers various ways for using spatial information available and open to everybody and it was held by Ministry of Land and Transportation of Korea.[1]

Vworld has the world's highest level of resolution(8~12cm) so it can show the views which look like real views. Unlike load views it can provide free movement of eyes.[1] so it is fit for VR services.

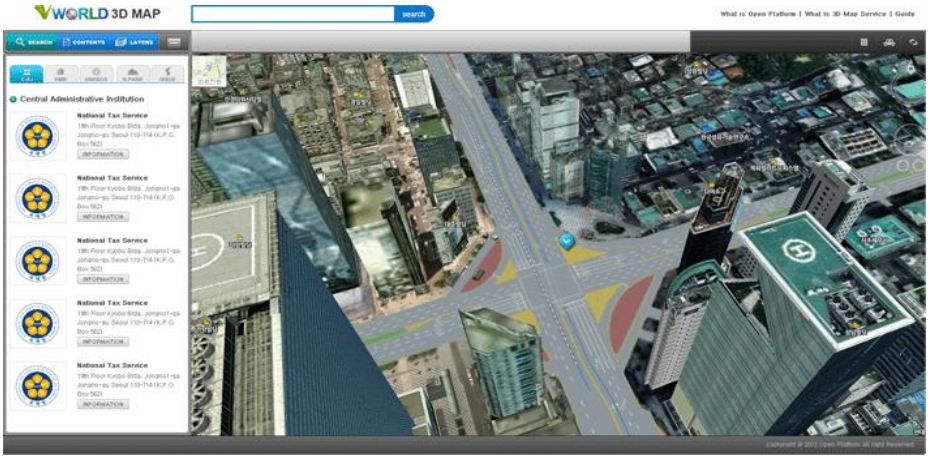

Fig. 2. 3D map of Vworld

2.3 Real Estate Information System

3D spatial information system is a platform that provides the physical information of the real estate. Using it you can see the 3D view as if you were looking around building.

On the other hand, real estate information system is a system that provides information such as public register data and sale data.

First, the real estate public register data can be acquired by connecting spatial information open platform like Vworld.

But in the real estate sale data the credibility on sales item is important. and in Korea, low credibility on the data on sale item in the market and the fear of speculative real estate price and market distortions are continuing on.[6]

So only certified real estate brokers and government agencies should be allowed to add and update the real estate information on it

3 Modeling Real Estate Information System Based on Virtual Reality Technology

3.1. Step 1: Building 3D spatial information platform

The first step is to establish a three-dimensional space information system on which the real estate information system is based. It should be built on not a two-dimensional spatial information systems but a three-dimensional spatial information systems because virtual reality or augmented reality service can be realized on it.

3.2. Step 2: Adding data and 3D images on the 3D spatial information platform

Various real estate information such as address, price, energy performance, 3D image, official price, rent, etc will be added to it.

And interior or exterior 360-degree images of the real estate can be captured by a 3D 360-degree camera such as Samsung Project Beyond.

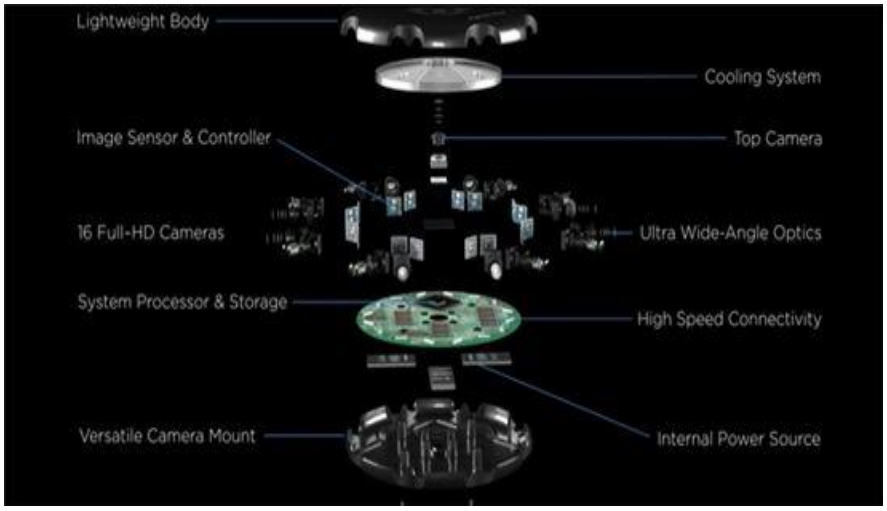

Fig. 3. Components of Samsung Project Beyond, 360-degree camera

3.3. Step 3: Developing 3D mobile application of the real estate information system

In order to use virtual reality technology with a smartphone, the real estate information system based on virtual reality technology should be serviced in the form of mobile applications.

It means mobile applications should be developed based on mobile operating systems such as Google Android or Apple IOS.

3.4. Step 4: Developing VR application, adapting 3D mobile application to VR

Adapting 3D mobile application to VR needs VR SDK (Software Development Kit) such as Google Cardboard SDK. By means of it, the mobile real estate application can convert an ordinary image into a pair of stereoscopic images [2].

4 Conclusion

Virtual Reality technology can make real estate information system much better and it can partly replace model houses. Even if you were not in the model house with it, you could look at the inner and outer spaces of it. It can reduce the costs and efforts in acquiring the information of the real estate which you want to know.

For this purpose, it is necessary to combine the spatial information technology and virtual reality technology in building the real estate information system based on virtual reality technology.

In this paper, 4 steps for building the real estate information system based on virtual reality technology has been presented.

If the real estate information system utilized VR technology, in the future, you would be able to cheaply and easily experience the virtual world just as if you were looking around it.

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