

A Study on the Applied Cases of an Augmented Reality and Based Techniques

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Abstract. As an use of smart devices are rapidly proliferating, lots of augmented reality applications are being developed that have all of the various functions such as camera, GPS, etc. An augmented reality technique is to overlap images or backgrounds in reality with 3D virtual images and show it as one combined image. This study is to investigate how we can apply this advanced technology in actual cases and learn about its based techniques. As the use of smart phone is being invigorated, it is expected that the environment that many people can use an augmented reality services will be constructed, and it obviously means more and more of augmented services will be developed and expanded.

Keywords: Augmented Reality, Virtual Reality, Mixed Reality, Situational Awareness, Head Mounted Device

1 Introduction

IT devices have many things to do with our daily lives. The characters in SF movies enter into an augmented reality through certain programs, and operate the hologram screens up in the air are not anymore imaginations, they are being realized through an augmented technology, drawing many people's attention.

As mentioned earlier, AR (Augmented Reality) shows the images and background images in reality overlapped with 3D virtual images. It is firstly introduced to the world by Boeing company, an airplane manufacturer, in about 1990, as they add some imaginal images to the process of airplane construction [1].

Recent smart devices expand the use of digital information and media through real time, expanding information correspondence and overcoming the restriction of space, and also accelerate the appearance of new business models [2]. These augmented reality technologies are drawing a lot of attentions as a representative applied cases of smart devices recently.

This study is to examine the augmented reality technique and its applied field that is used in various parts such as medical treatment, e-Learning Contents, manufacturing business, games and tourism, etc.

2 Related Studies

2.1 Applies Cases of an Augmented Reality

(1) Medical Service

An augmented reality is being used in various fields of medical service, and one of its examples is operations.

Recently, a minimally invasive surgery is being preferred which requires minimum cuts, so many of surgeries are being operated punching a small hole. The most appropriate method to be applied to these surgeries is the ones using an augmented reality. It is a bit difficult to check inside of the patient's body comparing to the laparotomy, but the technique mixing the current image with MRI or CT images are being used to overcome that problem. It can also draw more close diagnosis by adjusting the patients' affected area. [3].

(2) Education

Education is the easiest part to popularize among all the application fields of an augmented reality. The Magic Book that was developed in New Zealand introduces a method that matches the contents according to the book pages to visualize. This technique is to show the book contents in motions, and it raises kid's attention to the book and improves the educative effects. Moreover, it can even transfer 2D information into 3D images.

(3) Tourism

The AR technique can be used for tourism. For example, the user can see the reproduced image of the past history of the related spaces when they move around the tourist spot wearing HMD (Head Mounted Device). Through a study called "LifePlus", University of Geneva reproduced the characters of Pompeii as if they are alive here and there in historical sites. It is needed to carry an location tracker and an image processing computer for this, but it will be replaced with mobile devices in the near future [3].

3 Element technology based on augmented reality

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3.1 Display technology

The generally used display for an augmented reality is divided into HMD (Head Mounted Device) and Non-HMD(Non-Head Mounted Device). HMD, an head-wearable display device is mostly used for an augmented reality system, and this is divided into an Optical see-through HMD and Video see-through HMD.

HMD and some big or small type displays are mostly used at this moment, but it will be eventually developed to Hand-Held type of display along with the needs of users' mobility and simplicity. The Hand-Held types especially are presented in very various forms, such as PMP, portable game consoles, not only the mobile phone. And the mobile phones in use these days are mostly embedded with camera, it has a good condition to be used for an augmented reality [4].

3.2 Situation Awareness Technology

Situation Awareness Technology includes an image processing technique that can acknowledges and distinguishes the objects within visibility, also a real time locating system and position following technique to offer some virtual information of user's macro environment when it is hard to verify directly due to some obstacles or bad weather. This situation awareness technology can provide users with some useful and needed information at the current situation at the same time, mixing the actual environment with virtual information [5].

3.3 User Interface Technology

An user interface techniques are on development in priority, using human senses such as sight, auditory and sense of touch. The visuospatial skill is the mostly advanced technology among all the virtual and augmented technology, and it includes computer graphics, video related technique and 3D display.

To enhance the reality especially, it is need to visualize the virtual world to the degree of real images by adopting highly developed computer graphic technology, and also the real time laddering technique is inevitable. For the auditory related, a stereophonic sound technique that can reproduce the attributes of sounds in reality, such as sense of direction, distance and space are needed. Also, voice recognition skill and voice synthesis method are required to communicate with avatars that have artificial intelligence in virtual world.

Tactility is an undeveloped field comparing to the audiovisual ones, but is not less important as users actually recognize a lot of information through touch. Therefore,

some techniques to express the sense of tickling, texture and space are in need. They are classified as FF(Force Feedback) and TF(Tactile Feedback). FF makes users feel the power and motor sensation, and is being widely used in the game field. TF is mostly utilized in the medical field, and it helps feel more realistic by delivering the tactile sensation as if users are actually touching the skin texture.

At this moment in the most of the virtual reality system, the technical support to express olfactory sense or sense of taste is rather insignificant. [6].

4 Conclusion

So far, we have looked at some applied cases of an augmented reality and its generic technology. Unlike the existing virtual reality that is about imaginary space and objects, an augmented reality mixes the virtual things with the ones in actual world to reinforce the additional information that cannot be scored only from the real world [7].

As an augmented reality technology is being developed and realized, it will be most actively utilized in the game business, and is also expected to be used widely in the field of education, social media, aviation, medical treatment and health care.

As the use of smart phone is being invigorated, it is expected that the environment that many people can use an augmented reality services will be constructed, and augmented services will be more and more expanded in the future.

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