

Virtual Studio System for Augmented Reality & Chroma Key Processing

Seoksoo Kim *

* Department of Multimedia, Hannam University, Daejeon, KOREA

sskim0123@naver.com

Abstract— Chroma key image synthesis, out of Images A and B, makes transparent a specific scope of Image B and reflects Image A on it, and the chroma key which can synthesize an object with a desired background realizes an effect that the object seems to exist in that background. By combining real information with virtual information in this process and applying AR(Augmented Reality) technology to increase information delivery, an inexpensive and convenient HD virtual studio can be applied. That is, even though upcoming HD digital broadcasting service requires a shift from existing SD to HD resolution is required for HD digital broadcasting service, most of the HD equipments are expensive. Therefore, there are needed a low-priced HD virtual studio system which is being used only in public broadcasting network and a HD virtual studio system with chroma key applied.

Keywords— Augmented Reality, Chroma Key, Image Processing, Visual Studio, Virtual Studio

I. INTRODUCTION

A speedy development towards information society has changed many parts of our lives. Virtual reality, one of many technologies that have changed our environment, is used to develop new technologies in the fields such as game, education, training and healthcare, and gradually takes its place in our lives. The effect that a user seems to be in VR world and an efficient interaction between the user and the system are its advantages[1].

Recently, the increased availability of high-speed network, application of WIBRO or FTTH high-speed network and the development of hardware capability allowed a small business service provider or individual to write and provide digital media service, which will work as an advantage in the development of market in the digital media related fields, including high-resolution works, commercials, multimedia broadcasting and internet education. However, despite the expanded market and developed technologies, in case of the

entertainment media, an individual or small business service provider might have restrictions on production of personal casting and visual media, due to increased economical pressure caused by difficulties in securing of professional studio and constructing system[2].

AR-based virtual studio can be applied to solve this problem. The virtual studio can cover the restrictions in physical space and can be an efficient alternative for the development of dynamic and realistic digital media by inserting real objects or virtual objects. Besides, AR technology can provide more natural and realistic media by supplying an efficient interface via which a user produce a virtual studio, and can be applied in the interface that supports interaction in diverse ubiquitous environments[3].

Although a shift from existing SD resolution to HD resolution is needed to keep up with the shift to HD digital broadcasting, considering the high price of most HD equipments, a cheap alternative to HD virtual studio system which is being used only in public broadcasting network is required, and HD virtual studio system with chroma key applied will be introduced in this paper.

II. TRANSFORMATION OF CHROMA KEY AND VIRTUAL STUDIO

Chroma key is an image synthesis technology which, supposing there are Images A and B, makes transparent a specific scope of Image B and reflects Image A on it. Since chroma key can synthesize an object with a desired background, it realizes an effect that the object seems to exist in that background. Therefore, the chroma key technology

encourages positive participation, for example in education, and it is being used mostly in environment where professional systems are installed[4].

Recently, different fields of industry are applying implementation techniques of 'chroma key that is not present in real image but displayed on the screen'. Virtual studio system is mostly used in shooting weather forecast segment of news, movie, virtual commercial or teaching English education among children. Besides, it is being applied in multi-media education system and image control system. In the broadcasting field, chroma key has been known as a technique applied with expensive broadcasting equipment and HD virtual studio environment. For the implementation of chroma key effects, the broadcasting station sets a uniform-colored background space and excludes the frequency of the applicable color out of data entered from the camera. As the chroma key is sensitive to lighting conditions, an environment having perfect lighting facilities and one-colored background, and several days of work schedule and a highly skillful technique are required[5, 6].

Chroma key which is an image synthesis technology, supposing there are Images A and B, makes transparent a specific scope of Image B and reflects Image A on it. Since chroma key can synthesize an object with a desired background, it realizes an effect that the object seems to exist in that background. Therefore, the chroma key technology encourages positive participation, for example in education, and it is being used mostly in environment where professional systems are installed[7].

III. AR APPLICATION SCENARIO

An image which is done by HD image processing via chroma key, will be applied to the following augmented reality [8, 9, 10].

A. Acquire location-related information

After executing augmented reality app and when a phone's camera fixates on a particular building, it collects information on the current location of the phone, direction where the phone is oriented toward to, and the degree of angle by using API (function).

B. Send location-related information to server

Acquired information is sent to a location information system. The information is sent to a server for a reason that a phone cannot possibly hold all available information relevant to current location.

C. Send supplementary information to a server

A server identifies all relevant information, including supplementary information and then sends it back to a phone's augmented reality application.

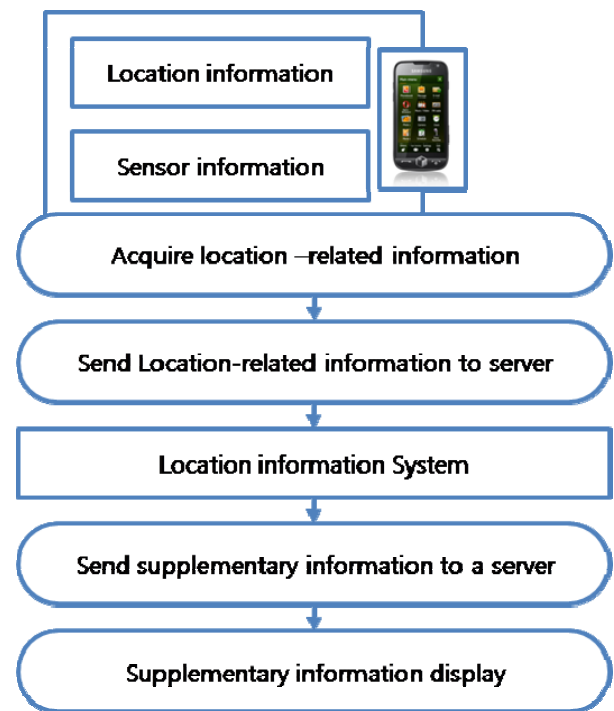


Figure 1. A process making augmented reality

IV. HD VIRTUAL STUDIO SYSTEM WITH CHROMA KEY APPLIED

As shown in the Fig. 2, instruction scene (teacher/student) image and audio data are recorded in HD resolution and sent in real time. This system is easier in software mode and lower-priced with simple equipments. Besides, its structure can be easily managed and requires low maintenance cost.

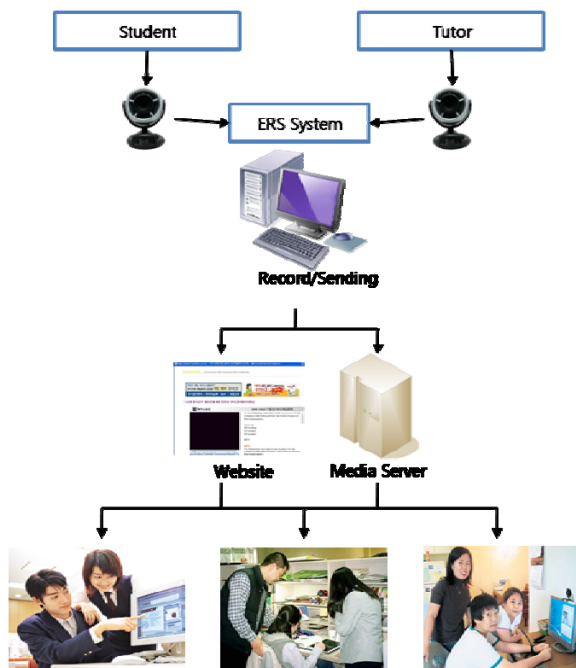


Figure 2. System Structure

Figure 3 shows the system flowcharts, where each camera and mike makes video files through its encoder and send them to the network at the same time.

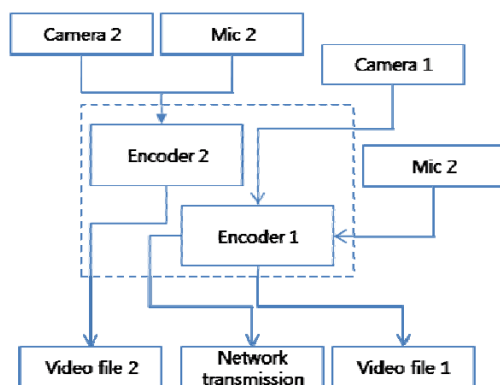


Figure 3. System Flowchart

The key functions of this system are as followings;

- Video recording/transmission
- Diverse image support from HD to SD-level
- P/T driver control and remote control via software
- Time recording function
- Recording start time and end time setting

- Real-time image transmission function and Sending saved files to server
- Configuration settings including video/audio/resolution/image input etc.

V. CONCLUSION

A speedy development towards information society has changed many parts of our lives. Virtual reality, one of many technologies that have changed our environment, is used to develop new technologies in the fields such as game, education, training and healthcare, and gradually takes its place in our lives.

Since chroma key can synthesize an object with a desired background, it realizes an effect that the object seems to exist in that background. By combining real information with virtual information in this process and applying AR technology to increase information delivery, a low-priced and simple HD virtual studio can be applied. That is, although a shift from existing SD resolution to HD resolution is needed to keep up with the current shift to HD digital broadcasting, considering the high price of most HD equipments, a cheap alternative to HD virtual studio system which is being used only in public broadcasting network is required, and HD virtual studio system with chroma key applied will be introduced in this paper.

Virtual studio system is being mostly used in shooting weather forecast segment of news, movie, virtual commercial or teaching English education among children. Besides, it can be applied in multi-media education system and image control system.

REFERENCES

- [1] In-Young Ryu, Eun-Young Ahn, Jae-Won, "Implementation of Historic Educational Contents Using Virtual Reality, " The Korea Contents Association, vol. 9, no.8, pp. 32-40, 2009.
- [2] D. W. Seo, J. Y. Lee, "Augmented Reality-based Tangible Virtual Studio," Korean Society for precision Engineering conference, 2009.
- [3] Gyuwon Lee, Dongu Seo, Jaeyel Lee, "Using Augmented Reality Simulation ubiquitous maintenance services," Society of CAD/CAM Engineers, pp. 302-308, 2006.
- [4] Sun-Mee Kang, Moon-Sao Chang, Sun-Dong "Real time chromakey processing algorithms in general environment using the alpha channel," Korea Intelligent Information Systems Society, vol. 20, no.1, pp. 188-189, 2010.
- [5] Lee, Sang-Yeob Joo, Heon-Sik, "A Study on the Implementation of Robust Automatic Adaptative Chroma-key Method," Journal of the Korea Society of Computer and Information, vol. 13, no.1, pp. 21-27, 2008.

- [6] Joong Han Kim, Doo Il Choi, Woo Yeon Cho, "A Study On The Implementation of Real Time Image Composition System Using Adaptive Algorithm," Conference on Information and control systems , vol. 25, no.2, pp. 569–572, 2003.
- [7] SunDong Kwak, MoonSao Chang, SunMee Kang, "Real time chromakey processing algorithms in general environment using the alpha channel," Korea Intelligent Information Systems Society 2010 conference, vol. 20, no.1, pp. 188–189, 2010.
- [8] Lighthouse.: Augmented Reality's Implementation Principle. [Online]. Available:<http://blog.naver.com/lighthousede?Redirect=Log&logNo=70085196276>
- [9] H.Fujikake, T.Fukaya, "Development of high-speed liquid crystal light shutters for an intermittent-light projection display (invisible light system) supporting TV performers in virtual studios," ITE Annual Meeting, 2002.
- [10] M.Kawakita, T.Kurita, H.Kikuchi, S.Inoue, "HDTV AXI-VISION CAMERA," Proc. IBC, 2002.