

The Study on the Car Mechanics e-Training AR(Augmented Reality) System for Real-time Augmented Contents

Ji-Yean Yoon¹, Dong-Jin Kim¹, Yu-Doo Kim¹ and Il-Young Moon¹,

¹ Dept. of Computer Engineering, Korea Tech
{jiyoun17, ehdwlsjsw, kydman, iymoon}@koreatech.ac.kr

Abstract. Currently augmented reality has been widely used in various fields. It especially have an effective on education environment. On this paper, We have studied it that can immediately transfer educational content for technical augmented reality system for training applied technique like car maintenance that is continuous developing. System using this content, We implement augmented reality system using CDN Server and Web environment so that producer can immediately update.

Keywords: Augmented Reality, e-Training, Automobile, Maintenance, Authoring Tool

1 Introduction

Augmented reality is typical example of simulated e-Training system. It especially have an effect on car maintenance training. In environment forged augmented reality, car maintenance trainee can experience more effective training because they get auto component position and repair order through augmented information. But existing augmented reality is difficult for content provider to update or modify augmented information. Especially system that using augmented reality has a difference in augmented information's updating amount by content and updating time is not on a cycle.

To modify the system take much time or cost. So on this paper, we studied how to people who are expert on this field but this software developer research an authoring tool so that develop content easily and check a content which developed with authoring tool.

¹ 1600 Chungjeolno, Byeongchunmyun, Cheonan, Chungnam, Rep. of Korea

2 Existing Augmented Reality System

Existing systems are not generally separated between training contents and parts of augmented reality which will actually move on augmented reality system that is anticipated educational effect.

This is a way of development augmented reality system by being consulted from education expert even if they are separated. There is a problem of its information unavailability if content and augmented reality development is limited by provider.

It is effective on information delivery to augment information in actual environment as learning support tool in learning environment. But it may has problem if education content continuously change and update.

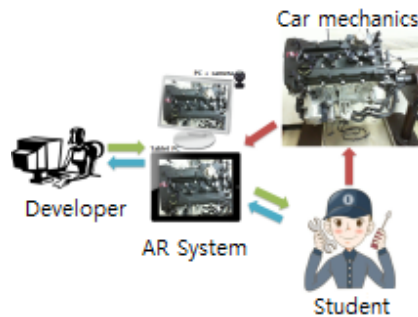


Fig. 1. Existing Augmented Reality system

3 Proposed Augmented Reality System

To improve previously mentioned problem of augmented reality system, we proposed this system environment as shown in the Fig. 2.

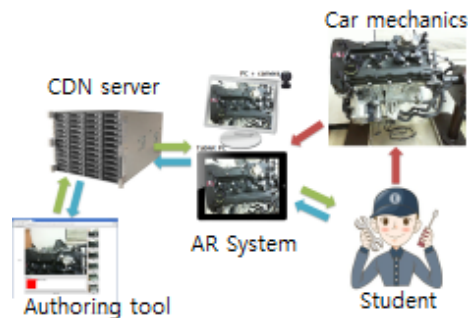


Fig. 2. Proposed Augmented Reality system

First of all, we make authoring tool that content developer can directly produce by himself and also make CDN Server so that trainee can update immediately. Authored content includes information of augmentation position and image source. These information is stored on CDN Server and transfer relevant information to augmented reality system. Augmented reality system is a method which read content information immediately and then it show content to display.

In this way, content providers make content to ease and trainee to show.

4 Implementation

Proposed augmented reality system consists of Server which store and supervise content, authoring tool which provide content and augmented reality software that content augment on real-world for trainee to display.

4.1 Content authoring tool

Content authoring tool do making content file which has information about part to augment the Augmented Reality System. Authoring Tool can make 'XML FILE' of information of part to augment and store on server. And it can also modify content file stored on server.

Content provider can easily make by using Drag and Drop with authoring tool. It can check by setting background, making up a list of items to augment and making real environment. And it is produced content by placing items to augment on Main UI. Authoring tool have some strong points that content provider can work wherever you can connect to the internet and it doesn't need to distribute developed content.



Fig. 3. Authoring Tool

This tool is developed on the Flex environment. Main UI consists of Flex' graphic control. Client can immediately respond XML FILE from server through HTTP Request. Then the XML FILE parse itself and it makes updating content authoring Main UI.

XML FILE has information about each aspect and augmented item position. A step needs information about 6 aspect. so XML FILE should be designed as shown below.

```
<TekVille>
  <aspect index="value">
    <object x="value" y="value" img="src" />
  </aspect>
  <aspect index="value">
    <object x="value" y="value" img="src" />
  </aspect>
  ...
</TekVille>
```

4.2 CDN Server

CDN Server store data like actual texts and images used information that will be augmented in XML FILE authored on authoring tool and content.

Content which be gathered be stored classified in order, each content is able to create, delete and modify by authoring tool.

4.3 AR Software

Main function of augmented reality software is same as existing augmented reality system. It recognize by following on real-world and then augment education content recognized image. We adopted Marker-less tracking method as image recognition way. Marker-less method is recognize as it is but use marker. So it needs to high quality recognition technique and can use graphic information like general magazine, poster and characteristic information of actual object[1]. On this study, We used SURF algorism as image recognition based on feature for Marker-less tracking. Image recognition based on feature is a method which gets features in images and coordination with the features. Especially SURF can stably get features even viewpoint change, rotation, and illuminance change of object. And it is a method has high operation speed in comparison with SIFT method[2][3].

Over against existing augment reality system, being stored augmented content and augmented position read stored XML FILE immediately. It augment content by mapping coordination on recognized images on the basis of XML FILE has position information. It is applicable when position information of XML FILE changes.

Below Fig. 4 are examples of augmented reality system display.



Fig. 4. AR Software Display

5 Conclusion

There are some strong points in educational environment used augmented reality technique. It help learner's understanding because they can directly check and watch what they want to see in real content by showing detailedly parts of lack and unclearness in existing educational media. It also improve reality and immersion by comparison with existing theoretical education.

But in case of technical training education like car maintenance which is continuous developing costs highly because sudden change of education content makes that producing content is more harder and complex. Especially existing augmented reality system has a problem that augment reality system has to change when content change because there is no separation between producing content and augment reality system development. For improvement this problem, we separated between producing content and augmented reality system development on this paper. So it improves learners' learning effect because it enable face-to-face(1:1) self-directed learning and its producing is more easier and cheaper than before in that content was already produced once.

We can anticipate its availability in not only car maintenance education but various fields of augmented reality used technical and flexible.

Acknowledgement. This work was supported by the Industrial Strategic technology development program (10040102, Development of self-initiated and hands-on e-Training service technology for the car mechanics) funded by the Ministry of Knowledge Economy(MKE, Korea).

References

1. The Nikkei communications editorial, Smart-phones and the web revolution, all of Augmented Reality, Ha-Na Ryu, Mentor, 2010.
2. In-Gwon Oh, Hyun-Jin Kim and Jae-Chan Namgung, "Real Time Facial Recognition using SURF and Hippocampal Neuron Networks", Korean Institute of Information Technology Paper, No. 10, Vol 01, pp. 178-185, 2012.
3. Herbert Bay, Tinne Tuytelaars, and Luc Van Gool, "SURF: Speeded Up Robust Features", 2006.6. National Center for Biotechnology Information, <http://www.ncbi.nlm.nih.gov>