AN AUGMENTED REALITY LOCATION DETECTION SYSTEM FOR EDUCATION

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Bachelor of Science with Honours (Cognitive Science) 2005
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AN AUGMENTED REALITY LOCATION DETECTION SYSTEM FOR EDUCATION

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This project is submitted in partial fulfillment of the requirements for Bachelor of Science with Honors (Cognitive Science)
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ABSTRACT

AN AUGMENTED REALITY LOCATION DETECTION SYSTEM FOR EDUCATION

Imee Shahnaz Binti Mohd Bashah

The main focus of the project is to develop an augmented reality system as a teaching aid for student. Augmented reality can be defined as a system that permits user to view the virtual images that superimposed with the real world. The development of the system is based on the prototype given and been modified based on the chosen topic. System will detect the location of the object and display the virtual alphabet. Then, it will pronounce the chosen object. Method that been use in developing the system is image processing, location detection and voice application. The proposition in developing the system is to assist student in their early learning process. It can also help and boost students' learning ability especially children, to understand more about the world around them. The development of system is not limited for education only, but can be applied in other fields such as medical, engineering, design, tourism and other related studies.
ABSTRAK

SISTEM PENGENSKAN LOKASI “AUGMENTED REALITY” UNTUK PEMBELAJARAN

Imee Shahnaz Binti Mohd Bashah

CHAPTER 1
INTRODUCTION

1.0 Introduction

This chapter discusses about the introduction of the project based on the background of the research, problem statements, research questions, objectives of the project, values of the research, scope of the project and outline of the overall project.
1.1 **Background of Literature**

Education is one of the most important elements in everyone life. With the emergence of new technologies, it gives an impact to the traditional learning development. The basic reason is that to make the best use of emerging technologies to enhance existing methods of learning and create new ways to fulfil teachers' core teaching and learning mission. Through this development, it can make the differences between ordinary teaching and also learning new ways so that it can be more effective to the learners. This is how augmented reality comes into the picture. The term augmented reality is about using computers to overlay virtual information onto the real world. It is a hybrid system that permits user to view the real world with virtual images by using the head mounted display (HMD). With the current development of information communication technology in Malaysia, this project the pioneer to explore this domain.

This project is to design and develop a system for students in their early learning process. The purpose is to help and boost their understanding about the world around them. Apart from that, it can help these youngsters to recognize alphabets and how to pronounce certain letters or words appropriately. Knowing how to recognize and pronounce letters or words is a very important task and can help differentiate the shape and sound of word utterance. Besides, the system can help in
enhancing learning environment among the youngster, before entering formal education class.

The aim of this system is to assist the youngsters in their acquisition of knowledge especially to those who did not get proper guidance from the elders. It is very useful to help students to be exposed to the new learning environment and thus enhances their interests in learning.

1.1.1 Augmented Reality Application in Other Fields

1.1.1.2 Medical

In medical field for example, augmented reality technology is used to help doctors as a visualization and training aids for surgery. The system will collect 3-D datasets of patients in real time by using non-invasive sensor like Magnetic Resonance Imaging (MRI), Computed Tomography scans (CT scan), or ultrasound imaging. By using this system, it can reduce the trauma of an operation where the system provides an internal view without the need for longer incisions. Apart from that, AR technology will be helpful for medical visualization task in the surgical room. Surgeons become aware of some features that could not be detected by the MRI or CT scans. With the use of the system, it can give a direct precision task such as displaying where to drill a hole into the skull for brain surgery (Azuma, 1997).
AR might be useful for medical training purposes. Virtual instructions possibly will remind a trainee surgeon on the required action without wasting time looked to the manual. Virtual object can also identify organs and specific locations to avoid (Durlach, 1995). As an example of AR technology in medical field, a research group from University of North California (UNC), Chapel Hill conduct a research on scanning the womb of a pregnant woman using the ultrasound sensor, generating a 3-D representation of the fetus inside the womb and displaying that in a see-through head mounted display (HMD) (Figure 1.1).

![Virtual Fetus. (Azuma, 1997)](image)

1.1.1.2 Manufacturing and Repair

Another prospective application of AR technology is the maintenance and repairing of complex machinery (Azuma, 1997). Instructions also give a better understanding as a 3-D drawings superimposed upon the actual equipment by showing a gradually tasks need to be done and how to accomplish the tasks rather
than using the manuals with text and pictures. Strong information instruction in electronic form might save space and reduce costs.

Several researches done in this field for example, Steve Feiner's group at Columbia built a laser printer maintenance application (Feiner, 1993). Figure 1.2 shows the users view, where the computer-generated wire frame can tell user how to remove the paper tray.

![Figure 1.2: Prototype laser printer maintenance application. (Azuma, 1997)](image)

1.1.1.3 Annotating and Visualization

AR technology also can be used to annotate object and environments with information. User can point upon a part of an engine model and an AR model and an AR system will display the name of the part that is being pointed to (Rose, 1994) (Figure 1.3).
1.1.1.4 Robot Path Planning

AR technology in robotic is very useful since teleoperation of a robot is often faced a difficult problem. In controlling the robot directly, it is more preferable to control a virtual version of the robot (Azuma, 1997). User will plan and specify the robot action by manipulating the virtual version in real time. Once it tested and determined, then user instruct the real robot to perform the specified plan. The advantages using virtual model is that the user can predict the effect of manipulating the environment and also serving as a planning and previewing tool to aid the user in performing the desired task. Figure 1.4 shows how a virtual outline can symbolize a future location of a robot arm.
1.2 Problem statement

In our traditional way of learning, usually we are using the real books that often provide as the focus of face-to-face collaboration between the reader and the book. The flat surface of the real book is not interactive enough and no intermingling between the student and the book. For example, dictionary for young readers are expected to master in reading, learning and conversation. However, its aim does not meet the main objective due to severe limitations such as the physical nature of motionless and rigid. The main goal of this project is to make learning become more interesting by giving a new definition of learning by using this new technology. Fascinating pictures might provide instant recognition, but without proper guideline this can lead more confusion and frustration especially when learning how to spell and pronounce the word correctly. Curricular today are filled with facts and students
tend to memorize everything and rehearse them in examination. Now, by using technology, it can help student to develop deeper understanding about the knowledge and also to control their own learning skills. As teaching becomes more advanced, it will become more important that the technology and the learning relationship are thoroughly explored and understood (Hasslebring, 2002). The used of the system is to ease of reference for the youngster to spell and pronounce the complex words. Without proper guidance from the elders, AR might be the best teacher to build up good foundation for the youngster before entering school.

1.3 Research Questions

In designing and developing this system, there are few research questions that are need to be answer throughout the implementation of the system. The research questions that should be answer are:

- What improvement can be made in education using AR technology?
- How this system can enhance student interest in learning?
- How this system can assist student in their pronouncing and spelling?
1.4 Objectives of Study

The objective is divided into two categories; general objectives and specific objectives.

1.4.1 General Objective

The idea of the research is to design and develop a system for children learning using AR technology, which can motivate and enhance their interest in their everyday learning. Apart from that, the system aim to emphasize the usefulness of utter and spelling among them.

1.4.2 Specific Objective

The specific objectives of the study are:

a) To design and develop an AR location detection system in education.

b) To develop the AR system using location detection technique.

c) To develop a system to assist student in pronouncing and spelling.
1.5 **Values of Research**

Augmented reality technology is an emerging technology that promises a potential value in education. AR interfaces offer seamless interaction between the real and virtual world, a tangible interface metaphor and a means for transitioning between real and virtual worlds (Billinghurst, 2003). AR technology is used to superimpose the word with the real object. The project purpose the development of AR system in education especially for children to helped in enhancing learning skill for better understanding about the world around them. Apart from that, this system can assist children in their learning environment with mixture combination of AR and real world by seeing, hearing and understanding, especially in pronouncing and spelling. The system helps and encourage in learning education. It can be the best base for the youngster before go through the formal system in learning environment. Furthermore, the system is useful to enhance children skills especially in learning word and helps to build up self-confident in pronouncing difficult words during communication.

1.6 **Scope of the Project**

Traditional ways of learning environment are using a book that is rigid and not interactive enough for children. By designing and developing a prototype system, the aim is to enhance children enthusiasm in learning especially in pronouncing and