Chapter 6

Enhancing Multi-Body Mechanisms With Learning-Aided Cues in an Augmented Reality Environment

ABSTRACT

Augmented reality (AR) is a potential area of research for education, covering issues such as tracking and calibration, and realistic rendering of virtual objects. The ability to augment real world with virtual information has opened the possibility of using AR technology in areas such as education and training as well. In the domain of computer-aided learning (CAL), researchers have long been looking into enhancing the effectiveness of the teaching and learning process by providing cues that could assist learners to better comprehend the materials presented. Although a number of works were done looking into the effectiveness of learning-aided cues, none has really addressed this issue for AR-based learning solutions. This chapter discusses the design and model of an AR based software that uses visual cues to enhance the learning process and the outcome perception results of the cues.

INTRODUCTION

Computer simulations are providing unique insights into the way the world works today (Wolfram, 2002). Students can now experiment real problem

solving task in a virtual world of complex, dynamic systems in a way that was impossible before. Therefore numerous technologies have emerged and are being used in the educational sector to produce a better knowledge society. As such many technologies have emerged and are being used in the educational sector to enhance the learning process. Some of these technologies include the use of software, interactive white boards, multimedia and virtual reality. Most studies found in the literatures also reported the advantages and disadvantages of these technologies (Oleg, 2000); (John, et al. 2002); (Manjit Sidhu, 2009); (Manjit Sidhu, 2011). On the other hand the learning and understanding process of the information presented and learnt from the previously mentioned technologies has not improved much (Huber & Dietmajer 2010). A more recent technology i.e. augmented reality is becoming popular and being tested by many researchers to see if it could help learners visualize and understand the learning process better. Augmented Reality (AR) is commonly known as the ability to overlay computer graphics onto the real world. Unlike immersive Virtual Reality (VR), AR interfaces allow users to see the real world at the same time as virtual imagery attached to real locations and objects. AR concepts also use tangible user interface (TUI). Unlike physical interface whereby the user may interact with the software via a mouse or keyboard connection, TUI uses wireless interaction. Further details on how this technology works are given in (Liarokopis, 2002). The motivation of the research aims to look at alternative solutions to visualize engineering problems using AR and visual cues to enhance the learning process. The system developed in this research was used and tested by first year engineering students at UNITEN. User interviews and questionnaires were used to collect users understanding of the subject matter and perceptions of the learning aided cues employed. All of which showed positive response.

BACKGROUND

According to Bonnie Meyer in her book published in 1975, cueing means the addition of a non-content aspect of prose, which gives emphasis to certain aspects of the semantic content or points out aspects of the structure of the content (de Koning et al., 2010a). Hence, researchers have been identifying and looking at various important cues to aid learners in computer mediated learning environments. The use of multimedia elements in instructional

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