CONCEPTUAL MODEL OF MOBILE AUGMENTED REALITY FOR CULTURAL HERITAGE SITE TOWARDS ENJOYABLE INFORMAL LEARNING (MARCHSTEIL)

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Abstrak

Realiti luasan mudah alih (AR) adalah salah satu daripada teknologi termaju yang dapat menyediakan kandungan interaktif untuk pelancong di warisan budaya. Kajian lepas menunjukkan, pengalaman pembelajarantidak formal yang menyeronokkan amat diperlukan bagi pelancong bagi meluaskan pengetahuan dari lawatan mereka. Walaupun banyak aplikasi AR mudah alih telah dibangunkan untuk memaparkan maklumat tapak warisan budaya kerana kurangnya model menyeluruh yang mengambilkira elemen pengalaman pembelajaran tidak formal yang menyeronokkan. Oleh itu, kajian ini mencadangkan satu model konsep AR mudah alih yang komprehensif yang mengambilkira komponen-komponen pengalaman pembelajaran tidak formal yang menyeronokkan di tapak warisan budaya. Kajian ini menggunakan kaedah penyelidikan sains reka bentuk. Model konsep yang dicadangkan telah diteliti dan disahkan melalui penilaian pakar dan perbincangan kumpulan fokus. Penilaian telah dianalisis beradasarkan frekeunsi respon ke atas setiap komponen. Sebagai pembuktian konsep, suatu prototaip dinamakan sebagai (AR@Melaka) telah dibangunkan dan kemudian ianya dinilai dari aspek pembelajaran tidak formal menyerenokkan terhadap 200 orang pelancong di sebuah tapak warisan budaya terkemuka. Dari perspektif pengguna, prototaip AR@Melaka telah terbukti dapat memberikan pembelajaran tidak formal yang menyeronokkan. Kesimpulannya, dapatan ini membuktikan bahawa model konsep yang dicadangkan itu adalah berguna untuk membantu pelancong dalam pembelajaran di tapak warisan budaya dalam cara yang menyeronokkan. Kajian ini menyumbang kepada model konsep untuk dijadikan garis panduan dalam membangunkan realiti luasan mudah-alih yang mengambilkira komponen pembelajaran tidak formal yang menyeronokkan.

Kata kunci: Realiti luasan mudah-alih, Pembelajaran tidak formal yang menyeronokkan, Tapak warisan budaya

Abstract

A mobile augmented reality (AR) is one of the emerging technologies that may provide interactive content to tourists at cultural heritage sites. Past studies show enjoyable informal learning experience is highly needed for tourists to broaden knowledge for tourists. Although many mobile AR applications have been developed to expose cultural heritage site information, they are still lacking in providing such experience due to lack of comprehensive models which taking into consideration the elements of enjoyable informal learning experience in the development of such applications. Therefore, this study proposes a comprehensive conceptual model of mobile AR where it considers the components of enjoyable informal learning experience at cultural heritage site. This study followed design science research methodology. The proposed conceptual model is reviewed and validated through expert review and focus group discussion The review was analysed based on frequency of the responses on each component. As a proof-of-concept, the prototype (named as AR@Melaka) was developed and then evaluated on its enjoyable informal learning aspects to 200 tourists of a renowned cultural heritage site. From user perspective, it is proven that AR@Melaka provides enjoyable informal learning. In conclusion, these findings proved that the conceptual model is useful for assisting tourists in learning at cultural heritage site in an enjoyable way. This study contributes a conceptual model to serve as guidelines for developing a mobile augmented reality that considers an enjoyable informal learning component.

Keywords: Mobile augmented reality, Enjoyable informal learning, Cultural heritage site

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Ulka Chandini Pendit
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List of Abbreviations

API	Application Programming Interface
AR	Augmented Reality
ARCO	Augmented Reality for Cultural Object
ARCHEOGUIDE	Augmented Reality based-Cultural Heritage On-Site GUIDE
BWL	Butterfly Watching Learning System
EDA	Exploratory Data Analysis
EIL	Enjoyable Informal Learning
EULER	Environment of Ubiqitous Learning with Educational Resources
GLUT	OpenGL Utility Toolkit
GPS	Global Positioning System
iTACITUS	Intelligent Tourism and Cultural Information through Ubiquitous Service
LOL@	Local Location Assistant
MART	Mobile Augmented Reality Tour
MAR	Mobile Augmented Reality
MARS	Mobile Augmented Reality System
MARCH	Mobile Augmented Reality for Cultural Heritage
MARCHSTEIL	Mobile Augmented Reality for Cultural Heritage Site towards Enjoyable Informal Learning
MTG	Mobile Tourism Guide
OpenGL	Open Graphics Library
OpenGL ES	Open Graphics Library for Embedded Graphics
OS	Operating System
PoI	Point of Interest
RFID	Radio-Frequency Identification
SDK	Software Development Kit
SHMAR	Sutoon Hoo Mobile Augmented Reality

CHAPTER ONE
INTRODUCTION

Introduction

This chapter presents background of study followed by statement of problem, research questions, objectives of study, research scope and contributions of study.

1.1 Background of Study

Augmented reality (AR) overlays the virtual object to the real world without replacing the real environment (Azuma, 1997). It is usually done by augmenting virtual image or textual annotations to the real world (Pulli et al., 2009). It enhances user perception and interaction with the real world, and present information which user cannot detect directly (Carmigniani & Furht, 2011; Izkara, Pérez, Basogain, & Borro, 2007; Reitmayr & Schmalstieg, 2001).

AR on mobile was developed in 1997 by Steven Feiner and was named the Touring Machine. It can be built in many forms, namely, mobile workstation, tablet PCs, Ultra Mobile PCs (UMPCS), Personal Digital Assistants (PDA), smart-phones and handheld devices (Chen, Tsai, Vedantham, Grzeszczuk, & Girod, 2009; Craig, 2013; Höllerer & Feiner, 2004; Papagiannakis, Singh, & Magnenat-thalmann, 2008). The implementation of mobile AR for cultural heritage had started since fourteen years ago (Angelopoulou, Economou, Bouki, Jin, Pritchard, & Kolyda, 2011; Armanno, Bottino, & Martina, 2012; "iTACITUS,"2007; Kim & Park, 2011; Seo, Kim, & Park, 2011; "Techcooltour," 2013; Vlahakis et al., 2001). It provides image, text, animation, and video and has become alternative for common interpretive media

The contents of the thesis is for internal user only

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