Chapter 86

(Re)Engineering Cultural Heritage Contexts using Creative Human Computer Interaction Techniques and Mixed Reality Methodologies

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ABSTRACT

The contribution of this research is to argue that truly creative patterns for interaction within cultural heritage contexts must create situations and concepts that could not have been realised without the intervention of those interaction patterns. New forms of human-computer interaction and therefore new tools for navigation must be designed that unite the strengths, features, and possibilities of both the physical and the virtual space. The human-computer interaction techniques and mixed reality methodologies formulated during this research are intended to enhance spatial cognition while implicitly improving pattern recognition. This research reports on the current state of location-based technology including Mobile Augmented Reality (MAR) and GPS. The focus is on its application for use within cultural heritage as an educational and outreach tool. The key questions and areas to be investigated include: What are the requirements for effective digital intervention within the cultural heritage sector? What are the affordances of mixed and augmented reality? What mobile technology is currently being utilised to explore cultural heritage? What are the key projects? Finally, through a series of case studies designed and implemented by the author, some broad design guidelines are outlined. The chapter concludes with an overview of the main issues to consider when (re)engineering cultural heritage contexts.

INTRODUCTION

Traditionally museums and site specific learning environments offer static experiences to their visitors which leave less opportunity for alternative interpretation of those exhibits. According to Cheok (2012), advances in mobile technology are moving us from an era of *information communication* to *experience communication*. As a result the role of cultural heritage and cultural institutions is no longer just to exhibit significant objects but to create augmented contexts which consist of rich, interactive and engaging experiences for visitors. Traditional Virtual Reality (VR) creates a world of its own which is usually totally indifferent to the physical context; in contrast MAR (Mobile Augmented Reality) is intrinsically tied to the local environment. One of the unique affordances of well designed MAR is that it should enable the creation of situations and concepts that could not have been realised with just the physical or just the virtual elements of the context because it unites the strengths, features and possibilities of both. This research is concerned with highlighting best practise in how to formulate these situations and concepts.

WHAT ARE THE REQUIREMENTS FOR EFFECTIVE DIGITAL INTERVENTION WITHIN THE CULTURAL HERITAGE SECTOR?

The central challenge for curators and educational designers is to create contexts that promote effective and engaging learning. With the generation and increasing adoption of mobile augmented reality (MAR) and mixed reality methodologies and techniques we now have the potential to explode the form and complexity of these learning contexts. The core question of this research is can we develop augmented heritage contexts that are more effective because they take advantage of the affordances of these mixed reality methods and techniques. The majority of mobile learning research and mobile app development creates experiences which tie all the requirements of the user's attention down to and onto a four inch screen. This includes the majority of MAR applications. To avoid this, new interfaces must be created that take advantage of the physical and digital affordances of each learning situation.

Gallagher (2010) defines cultural heritage as being concerned with collections of physical structures and the intangible values that they project about the culture in which they are situated. He believes MAR has the potential to augment these heritage contexts bi-directionally:

Traditionally, cultural heritage studies has explored physical structures as stable entities and the intangible values as contextually fluid; augmented reality attacks this traditional structure and demonstrates that the physical structures themselves, along with the values that they accompany, are in states of constant flux. This flux is interpreted, mediated, and reconstructed in the individual learner.

New forms of contextual representation and engineering can now do real-time interactive justice to the complexity of both the form and function of cultural heritage. However, there are some key issues to consider when deciding on a technological solution. Boyer and Marcus (2011) state that an unfortunate fact of most augmented reality applications is that screenshots of an application give a better impression of the functionality than the actual use. In addition, without thoughtful design, digital interventions risk distracting visitors from meaningful engagement with the cultural objects that they are actually designed to augment.

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