

Chapter 12

Augmented Reality and Mobile Technologies

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ABSTRACT

Unlike Virtual Reality (VR) that attempts to replace the perception of an immediate environment with an artificial one, Augmented Reality (AR) applications aim to enhance a person's perception of their immediate environment. A blend of both the virtual and the real, AR application interfaces on mobile devices display information that is dependent on users' time and location. AR applications are not necessarily an entirely new technology and have been emerging in various sectors over the past 5 years. For example, in aviation, AR in the form of 'heads-up-displays' has been used to display important data to pilots for decades. As mobile devices diversify in their speed, power consumption needs, network connectivity, and locative functions, developers are able to port AR applications to next generation mobile handsets, opening a wide range of utility and potential across public and private sectors.

INTRODUCTION

Mobile AR technologies offer a unique, context aware means of content delivery with great potential for enhancing the effectiveness and attractiveness of teaching and learning for students in real-time situations. The technology provides a unique means of progressing through teaching and learning in situated environments. Many of the criticisms leveled at VR environments revolve around their struggle to effectively establish a meaningful sense of presence and connection between multiple users in an environment. A key

purpose of any educational environment is to promote social interaction among users located in a shared space. With AR applications, multiple users access a shared space populated by virtual objects, while remaining grounded in the real world. This technique is powerful for both marketing and educational applications when users are co-located and use proximal means of communication (e.g. gestures, speech), but can also interact with location-aware data.

AR applications offer advantages over manual-based and VR models as users can see and touch the actual objects presented while at the same time receiving contextual, interactive, guided informational elements. AR applications are able

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to sequence and highlight specific objects in a users' field of view, depending on the task and context. Additional functionality and contextual information can be integrated into AR applications through possible live interaction with a remote expert to providing further assistance by further updating informational elements displayed by the system application. This chapter will examine the potential and limitations of AR through profiles of projects utilizing mobile AR applications across the domains of business, tourism, and education through an examination of how emerging AR technologies converge mobile content, integrated global positioning system (GPS) functionality, and the affordances of hardware and software in mobile devices.

BACKGROUND

Augmented reality (AR) is an emergent field of computer research developing hardware and

software capable of blending situated, real world experience with computer generated data. To date, most AR research involves integrating processed live video imagery which is "augmented" through the addition of graphics and textual information. Advanced research includes the use of pattern recognition via digital optics, motion tracking, and the generation of controlled environments via sensors.

AR is generally aligned opposite of VR such that rather than attempting to immerse a user into a entirely computer generated environment, the goal of AR is to augment a user's immediate environment with information access and management capabilities. Augmented reality is considered a specific element of the more general concept of computer mediated reality (Med-R). MR pursues the development of technologies that effectively filter a users' vision of their immediate environment through digital overlays on a display placed within a users' field of view. AR applications growing in popularity spurred by the rapid devel-

Figure 1. Technologies employed by AR



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