Chapter 6
Existing Standards and Programs for Use in Mobile Augmented Reality

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ABSTRACT

Augmented reality (AR) brings flexibility and openness to learning. It also strengthens connections between learners in multiple contexts by adding a new dimension to mobile learning. As well, AR facilitates the learning process of the learners by bringing different disciplines together with education. This chapter focuses on technologies, tools, programs, operating systems, a number of standards as well as some parts of web infrastructure standards for use in mobile AR applications and then discusses the current state, issues, and direction of the development and the use of these apps. The purpose of this chapter is to provide information on that can be used by developers of mobile AR applications for learning and to assist educators and instructional designers in developing mobile augmented reality apps for learning by using AR development tools that provide them to create custom mobile AR applications without programming skills.

INTRODUCTION

Mobile devices are affecting people's the way of work, spending of time, knowledge acquisition and learning/teaching methods besides making calls. Besides, using mobile devices in education is increasing depending on technologies that feeding them (Martin, Diaz, Sancristobal, Gil, Castro, & Peire, 2011; Özdamar Keskin & Kuzu, 2015). Augmented Reality (AR), which is considered to be one of these technologies, has not realized the expected impact in education before 2010. But after 2010, it is observed trends or developments from augmented reality towards mobile augmented reality associated with the additional capabilities of mobile devices such as camera, GPS (Global Positioning System), image rec-

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ognition; compass (Johnson, Levine, Smith, & Stone, 2010). The basic hardware requirements of first AR applications independently from mobile devices are such as a display, tracking, input devices and computers (Jeon, Kim, & Lee, 2010). Nowadays, there has been significant progress in miniaturization and performance improvement of mobile computing platforms for integrating mobile augmented reality such as notebook computers, personal digital assistants, tablets, ultra-mobile PCs, mobile phones (or smartphones), and AR glasses (Huang, Hui, Peylo, & Chatzopoulos, 2013). Latest smartphones are equipped with brilliant cameras, accelerometers, GPS devices, compasses, barometers, step counters and many more sensors to capture contextual data. Thus, the smartphones and tablets are mainly seen suitable for AR platforms in recent years. On the other hand, mobile augmented reality is a relatively young technology, so the business models and usage patterns are still evolving (Makumburage, 2015). Augmented Reality reached the peak of its hype in 2010, and it has substantial long-term potential and will reach mainstream adoption within five to ten years. "Gartner Hype Cycle positioning of AR as of July 2012" is shown in Figure 1 (Padzensky, 2014).

AR is mainly related to the concept of virtual reality. However, virtual reality attempts to create an artificial world that a person can experience and explore interactively. AR makes way for an interactive experience but aims to supplement the real world, rather than creating an entirely artificial environment around the user (Hollerer, 2004). AR also includes activities providing augmentation or expansion of the physical environment that can be seen by reflecting real surfaces via mobile devices. AR is sometimes defined to produce any activity by adding a new dimension to the physical space, but with a web-enabled mobile device, layers can be hidden and suspended in nominal dimension and then may appear in space.

Figure 1. Gartner hype cycle positioning of augmented reality as of July 2012