



App based souvenirs and entry tickets: A new means of enhancing post visit memories: A case study from Taiwan



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ABSTRACT

Post-travel experiences influence whether a tourist decides to revisit a destination. Tourists usually use souvenirs as triggers to connect with their past travel. We have created a cloud-based mobile augmented reality (AR) system (MARS) accessible via, for example, a theme park's entrance ticket. MARS can auto-grab information from the theme park's website's real-time information and broadcast special events displayed by AR mode. MARS makes recalling one's travel experience more vivid because it becomes both visualized and interactive. Moreover, MARS is intended to increase tourists' motivation to revisit. The system is intended to enhance a tourist's post-travel experience. This gives the post-travel experience new value, and increases motivation to revisit.

1. Introduction

Tourism is one of the most significant industries in many countries and its importance is growing rapidly. Tourists temporarily leave home, travel to different places, and interact with their destination's environment and, usually, with the residents there. They normally share their travel photos and videos with others (family, friends, and acquaintances) (Clawson, 1964; Cohen, 1979; Tussyadiah & Fesenmaier, 2008). Scholars suggest that travel is a linear process, and they have defined the tourist experience from a temporal perspective that involves three phases: (1) the pre-travel phase; (2) the on-site phase; and (3) the post-travel phase (Craig-Smith & French, 1994; Graburn, 1989; Jennings, 2006). Moreover, the United Nations World Tourism Organization (UNWTO, 2011) points out that the post-travel experience plays the key role in the travel process because it is not the end but the beginning of travel that crucially affects their decision about subsequent travel. In addition, tourists almost always buy travel souvenirs, such as postcards, to refresh their travel memories. Almost without exception, tourists bring souvenirs back home to help them preserve and commemorate their experience, to provide proof of travel, and to generate an emotional connection with their destination (Swanson & Timothy, 2012).

A theme park entrance ticket, for example, is a passive but essential tourist souvenir. Most souvenirs are often considered formulaic, un-aesthetic and meaningless to tourists significantly decreases their

intention of collecting them and increases their desire to throw them away. Fortunately, augmented reality (AR) technology can solve this problem and enhance the tourist's visual perception and their post-travel experience by providing rich visual contents. AR can provide real-time augmented information overlaid on the souvenirs such as an entrance ticket, and using the backend cloud computing system of MARS, those contents can show real-time changes that correspond with the destination's recent activity. This function can maintain and increase the tourists' motivation to stay connected to the destination and to review their memories. AR has been used in many fields, and especially in the tourism industry, to enhance the tourist experience (Mesáro et al., 2016). However, most such services focus on pre-travel or on-site travel, and few focus on the post-travel experience. Therefore, we put the MARS service interface on the entrance ticket: to focus on the post-travel experience. The entrance ticket and virtual digital contents can be integrated using a single interface, which enables novel applications and services to be developed.

2. Related work

2.1. Souvenirs

“Souvenirs” normally refers to objects that remind us of people, places, and events; that evoke tourists' past travels; and that link a person to the past and to “some specific events” by evoking memories

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(Cohen, 2000; Gordon, 1986; Love & Kohn, 2001; Stewart, 1984). The souvenir is a universal symbol. It transforms tangible objects that enable us to freeze into an extraordinary moment and become personal travel stories. Most tourists collect similar items from different places, pick up natural objects along the way, acquire artifacts, purchase merchandise, and passively preserve (Lai & Deng, 2007). This research focuses on the entrance ticket, which is passively preserved souvenir and usually an essential element in tourism. It is also a symbol for one's first impression of a destination.

2.2. Motivations of collecting souvenirs

Tourists' three main motivations collecting souvenirs are the role of the souvenir as evidence (Gordon, 1986; Wilkins, 2011), as a messenger or conversation piece (Wilkins, 2011), and as a reminder (Litirell et al., 1994; Swanson & Timothy, 2012). However, most souvenirs do not meet tourists' expectations because they often consider them formulaic, unaesthetic, and meaningless. As time passes, the souvenir loses its significance because it has no other functions. Thus, souvenirs are constantly forgotten in deserted corners, stripped of their role as travel mementos (Collins-Kreiner & Zins, 2011). A key factor for enhancing the meaning of a souvenir is to make it function as an emotional connector that causes tourists to increase sharing their travel experiences, solidify their post-travel memories, and to maintain a connection with their destination.

2.3. Souvenirs as tangible display interfaces for AR application

Weiser (1999) conceptualized ubiquitous computing (UbiComp) as an environment where computing technology is embedded into various everyday tangible objects, including the products of the tourism industry. For example, several other studies (Mugellini, Rubegni, Gerardi, & Khaled, 2007; Nunes, Greenberg, & Neustaedter, 2009; Petrelli & Whittaker, 2010) have used souvenirs, private photos or videos taken at the destination, as tangible trigger links (Tangible User Interfaces) with digital information for collecting and sharing travel experience. Those souvenirs, combined with radio frequency identification (RFID) sensor technology to implement the photo-sharing system with a digital photo browser for storing a tourist's travel photos and videos, allow a specific souvenir to trigger the tourist's happy memories. However, every tangible souvenir must have its own RFID tag and use an RFID reader to get photo information, which might make the system too expensive and inconvenient to use. Moreover, people are currently using methods more intuitive and convenient than RFID, e.g., AR technology, to satisfy this demand. The technology has changed from individually based interaction into "anytime, anywhere" mobile and ubiquitous computing services (Olsson, 2012; Satyanarayanan, 2010), which are gradually becoming an everyday reality for a growing number of people all over the planet. Personal mobile devices are being turned into external eyes and ears for sensing embedded information in the surrounding environment. Because of the rapid advances in mobile devices, the number of AR apps is growing. Using mobile AR-based services, tourists can read the "multiple information layers" included in real paper documents, e.g., travel brochures with user interfaces (UIs) for extra virtual digital contents (Luff, Heath, Norrie, Signer, & Herdman, 2004). AR also provides a novel interface for adding extra information available in the real world (Azuma, 1993). This new realm of integrated digital and physical-world information seems to be revolutionizing how information is accessed and presented to people, AR can transform any physical object into a UI for viewing virtual media (Höllner & Feiner, 2004; Wellner, Mackay, & Gold, 1993).

2.4. Mobile augmented reality Systems in Tourism

Therefore, AR is frequently used in the tourism industry: it is perfect for tourism experiences and seems magical to potential tourists. AR

Table 1
The current existing MARS FT entrance tickets.

Case	Service	Travel phase
 NBA Dallas Mavs (2011)	Features game highlights Interactive game	Pre-travel
 NFL Philadelphia Eagles (2012)	Features game highlights An interactive game Team score access	Pre-travel On site-travel
 Royal Challengers Bangalore (2013)	A 3D stadium view Traffic information updates around stadium Parking information "Call-a-cab" tool	Pre-travel On site-travel
 Rugby world cup (2015)	Take a selfie with the official ball Match previews Seating guide Trip planner	Pre-travel On site-travel
 This research (2016)	A 3D destination view and introduction Take a selfie with the 3D view Tourist on-travel experience collection and sharing 3D destination event notification	On site-travel Post-travel

apps can help tourists access valuable information about destinations, enhance the tourist experience, and simultaneously entertain users (Fritz, Susperregui, & Linaza, 2005). Yovcheva, Buhalis, and Gatzidis (2013) define the tourism experience as a complex construct that involves the emotions, feelings, knowledge, and skills resulting from perceiving, processing, and interacting with virtual information that is merged with the real physical world surrounding the tourist. Most tourism apps have been developed for the pre-travel and on-site travel phase, but there are few for the post-travel phase. However, the post-travel experience is the crucial factor that affects tourists' decisions in future pre-travel phases (UNWTO, 2011), which is why we chose to embed the MARS UI on the entrance ticket and focus on the post-travel phase. The entrance ticket can be used as a tangible key to enhancing the post-travel experience rather than being thrown away. Existing mobile AR ticket services have been primarily used for athletic contests, e.g., football games, and focus on the pre-travel and on-site travel phases. They provide pre-travel game highlights, stadium and team information, and an interactive game. They also give on-site traffic information updates around the stadium, seating guides, and parking information. We compared our MARS system with four other instances of embedding a mobile AR UI on an entrance ticket and found that (Table 1), after the game, the four game entrance tickets provided no useful information or service, unlike our MARS AR UI, which gave it a new value.

3. Methods

3.1. Participants

We recruited, from the Tainan Association of Travel Agents, 158

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