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# Tourists responses to mobile augmented reality travel guides: The role of emotions on adoption behavior

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ABSTRACT

This research presents a mobile augmented reality (MAR) travel guide, named CorfuAR, which supports personalized recommendations. We report the development process and devise a theoretical model that explores the adoption of MAR applications through their emotional impact. A field study on Corfu visitors ($n = 105$) shows that the functional properties of CorfuAR evoke feelings of pleasure and arousal, which, in turn, influence the behavioral intention of using it. This is the first study that empirically validates the relation between functional system properties, user emotions, and adoption behavior. The paper discusses also the theoretical and managerial implications of our study.



## 1. Introduction

Mobile and wireless technologies enable the provision of novel applications that support visitors while on the move. Such applications include mobile travel guides [1,2] and location-based infotainment services (e.g. GIS-based recommendations [1,3], annotation and bookmarking [4], and mobile social networking [5] to name but a few popular application types). In essence, these applications allow tourists to have seamless and ubiquitous access to travel-related information during their visiting experience, which is presented in a multimedia-rich way. At the same time, location sensing capabilities of mobile devices facilitate filtering of the travel information in order to be tailored to the travelers' needs and wants. The value of mobile travel solutions capitalizes on the properties of leisure and travel; they both concern intangible goods that are highly experiential and might be consumed on an ad hoc basis. Therefore, efficient organization and travelers-tailored presentation of travel-related information are of paramount importance for both tourists and tourism industry stakeholders.

Considering the above, it is not surprising that mobile travel-related applications have received scholars' attention from both an academic and practical perspectives. Topics of interest include approaches and methods to design and implement mobile travel systems and services [1,6–8], user adoption studies [2,9–11]; and business model formulation [12]. An

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underlying commonality among the different research themes refers to the design scope of such applications. Mobile guides involve users to be situated in the surrounding environment of a built place [13,14]. Nevertheless, the design of mobile guides assumes that the built place will fit the mobile device; people, places, and any point of interest (POI) are encoded in digital maps or context-aware notifications. Hence, the design focus of mobile guides lies on one principle; developing digital metaphors of the real-world that assist travelers in covering their information needs while on the move.

Mobile augmented reality (MAR) follows a different design paradigm. Instead of developing a virtual incarnation of the real world, MAR augments the real world with digital information. As such, the design canvas is expanded from the limited space of the mobile phone to also include the physical properties of the built world. MAR is a relatively new technology that offers new affordances for interaction. In essence, MAR promises to enhance user experience by superimposing digital objects or content over the surroundings of the real world [15]. Whilst early research focused on resolving the technical challenges of MAR [16–19] and demonstrating its application potential in several settings [20–23], few studies associate the value of MAR with the domains of travel and tourism [24–27].

This study attempts to shed light on the potential of MAR for supporting mobile tourism applications. We present CorfuAR, a mobile augmented reality tour guide, which supports personalized content provision and navigation features to tourists on the move. We describe the development efforts of our MAR travel guide and emphasize on building the users' profile for the personalized version based on static, pre-discovered activity preferences of users and tracking of their actual behavior. Moreover, we report evidence of an adoption study that assessed the users' intention to use CorfuAR not only in accordance with their perceived performance and usability, but also the emotional impact of the MAR prototype by employing Mehrabian and Russell's [28] PAD theory. The field study revealed the design choices of MAR travel guides that lead to increased user satisfaction and usage intention. All in all, we aspire to provide help to prospective designers and developers to engineer MAR tourism applications.

The paper is organized as follows. Section 2 discusses the functionality of mobile travel guides, the properties of mobile augmented reality applications and the potential for MAR in tourism. Section 3 outlines the functionality and architecture of CorfuAR. Section 4 emphasizes on the personalized version of the mobile augmented reality tourist guide. Section 5 details the methodology and results of the field study that we performed in order to assess the performance, usability and experiential impact of CorfuAR. Finally, we conclude the paper with a critical discussion on the academic and practical implications of our research pertaining to the development and evaluation of mobile augmented reality tourism applications.

## 2. Background

### 2.1. Mobile travel guides

Mobile travel guides have been the subject of scrutiny over the past years by academic scholars. Emphasis has been paid primarily to the identification of their architectural, technological and functional properties [1,29,30]. Consolidating their findings, mobile travel guides provide partially or fully four types of functionality: navigation services, content-based services, social and communication services, and commercial services.

The main concern of navigation services is routing users from their current location to a preferred point of interest (POI) by usually displaying a map of the surrounding area [31]. Content-based services refer to the provision of travel or POI related information. Specifically, these may include personalization features that filter and adapt the visualized content according to users' current context and profile [8,32]. Also, such services may incorporate search facilities to locate and receive information regarding places, topics, or exhibits of interest [33]; and bookmarking which allows users to add locations to an ad hoc generated itinerary in order to better plan, manage, and share their leisure experience [34].

Social and communication services support liaison between the travelers and the accommodation providers, exhibition owners and other stakeholders involved in service provision [12,35]. Moreover, they enable sharing of tourists' experiences through a variety of websites (Facebook, Twitter, TripAdvisor, Blogger, and many other popular online social networks); and in different ways, ranging from posting their stories, their comments, to even their pictures and movie clips [5,36]. It should be noted that recently, social media have emerged as a substantial part of the online tourism domain [37]. Finally, commercial services support mobile purchases and reservations of tourism-related products [38,39].

These functional properties of mobile travel guides follow a common user experience metaphor. Instead of reinforcing the relationship of the travelers with the physical surroundings, these guides develop a simulated environment where individuals are required to be immersed in for requesting and receiving digital content and information. On the contrary, mobile augmented reality aims at shifting the attention of individuals back to the real world, not its digital incarnation. The following subsections discuss the characteristics of MAR technology that justify the growing interest in MAR-enhanced travel and tourist services and applications.

### 2.2. Mobile augmented reality (MAR)

The concept of MAR was developed around the mid-1990s, applying Augmented Reality (AR) in mobile settings. Rather than trying to create an entirely simulated environment, MAR starts with reality itself and then augments it by overlaying