
Interfaith Tourist Guidance Using Augmented Reality at Sacred Religious Places

Xingyu Pan

Department of Computer Science
University College Dublin
Dublin, Ireland
xingyu.pan@ucdconnect.ie

Xuanhui Xu

Department of Computer Science
University College Dublin
Dublin, Ireland
xuanhui.xu@ucdconnect.ie

Muhammad Zahid Iqbal

Department of Computer Science
University College Dublin
Dublin, Ireland
muhammad-zahid.iqbal@ucdconnect.ie

Abstract

Religious tourism is a form of tourism where tourists are interested to visit the place due to its religious importance; the concept as a term has emerged as a result of the understanding of tourists inspirations about such places. It has a long history that people are traveling to the sites which they are considering holy according to their beliefs and worship concepts. Therefore, religious tourism includes visiting local, regional, national or international pilgrimage centers, attending religious ceremonies, conferences and celebrations, and all other religious related meetings.

This research is focusing on interfaith behavioural aspects of tourist of different religions during religious heritage site visits of other religions. This study has found the comparison of the behaviors of the people of different faith regarding the respect, protection and following the rules of the sacred heritage sites. Using Augmented Reality (AR), we proposed a solution for the demonstration about the rules and regulations which are necessary to follow by the travelers to maintain the respect of these places.

ACM Classification Keywords

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Author Keywords

Religious tourism, Technology in tourism, Augmented Reality

Introduction

Mosques, churches, temples, synagogues - despite any faith they belong to, located anywhere in the world, these holy sites have alike worth as tourist's itinerary.

Religious tourism is a significant part of the tourism industry as religion is a most important part of human life, and it has been argued that human beings always need to have believed in a superior entity who sets an example of living in a better life [7]. Religious tourism is usually stated to as faith-based tourism which is acknowledged as one of the alternative tourism to visit the religious worship sites. People go for pilgrimage, leisure purposes independently or in groups [6]. Religious tourism can also be defined as evaluation of touristic journeys for visiting religious attraction centres, practicing the religious beliefs in tourism surroundings, which are diverse from areas, where people live, work or meet their consistent desires[1].

These are pilgrimage sites of great importance on religious attachment, but they own amazing features which attract secular tourists. There are problems related to conflict of interest of pilgrims and tourists[5]. These holy places can be from any religion; Islam, Christianity, Hindu, Budh or Sikh. According to a research of Pew Research Center, Islam is the fastest growing religion in the world. Islam is set to overtake Christianity to become the world's leading religion by 2070 as babies born to Muslims will cross Christian babies births rate by 2035.

Related Work

Shu-pei proposed a conceptual framework, explaining the importance of the LBAR (location-based augmented reality) application to enhance place satisfaction for heritage tourism. Results of this research suggest, the LBAR application provides an immersive experience by creating an optimistic impression on place satisfaction of tourist sites [8]. Lin, P. J., and Kao integrated geographic information systems (GIS), location-based services (LBS), and mobile augmented reality (MAR) to develop an augmented reality application for tourists. Its goal was to provide an opportunity to tourists about tourist attractions, local culture, and scenery. The application was able of augmenting one's experience in the real world with components of virtual reality and functionalities of mobile tour guide[4].

As Garcia-Crespo et al. argued, technological integrated services are highly demanding in the current space of tourism to bring interactivity, entertainment and to engage visitors in the tourist sites[2].

Huang, Yu Chih et al. developed a research framework to understand the use of 3D virtual reality by integrating the technology acceptance model (TAM) and self-determination theory. This study help to find the attraction created by interactive tourist destinations using 3D virtual worlds [3].

Research Motivation

This research objective is to find how interfaith tourist attitude adopted at sacred places with the following dimensions and finding a solution to overcome this.

- On-site problems faced by the tourists during the visit of the holy places of the other religions;
- Differences of behaviour adopted by the people of the same religion or different religion and faith during the

visit;

- Comparison of behaviors of communal and different religions regarding the protection and respect of the heritage site[7].

Design & Analysis

In order to develop an adaptive mobile AR application for the users, firstly, we need to set up the user experience goals and figure out the requirement specifications of the system to build up our own design space.

User experience goals

Our system is an application to help tourist to learn about the local culture and avoid the religious conflict. Therefore, the most significant goal of the application is to solve the interfaith problem effectively. Secondly, the application should be easy to use. That means, the system should not involve too complicated interaction and all the operations should be clear and simple. Meanwhile, the application should have completely guidelines for the users. The users should be able to access to the guidelines anytime during the usage. The last goal of the system is that users can engage a lot through using the application.

System design specifications

In this subsection, all of the specifications to design the system will be introduced, including the target user group, the functional requirement specifications and the run-time environments.

Target user group specifications

The target users are the tourists and foreigners who come to another country or region for the first time. The users are assumed to be non-religious or the believers of any one of the religions in the world. Gender is also a factor to be considered in the system, male and female might have a

different experience. Finally, considering of some people are illiterate or have disability on reading, the system will also work out the solutions to these target users.

Functional requirement specifications

In this application, the minimum functional requirement is to realize all the use cases that we defined. According to the use case diagram shown in Figure1, there are three main branches on the use case tree. The first use case is that the users are able to check the composition of the local religions. And this use case enable the other three cases, which are checking religion conflicts and setting the user's religion and location. The second use case is to get notifications of precautions while approaching to a religious place. Checking detail or closing notifications are the use cases origin from this use case. The last main use case is to experience augmented reality tour of the religion places. The users are also able to enable or disable the voice guide. The voice guide is aiming for the illiterate or visual-disordered users.

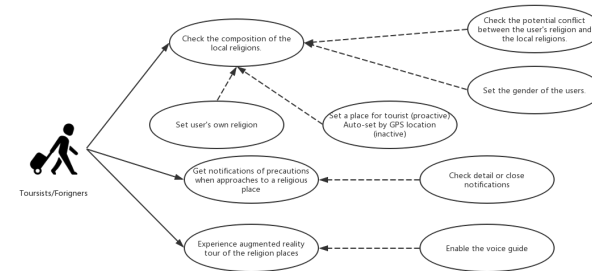


Figure 1: The use case diagram of the system

Run-time environment

Our application is a mobile in-situ AR application. The system requires augmented reality supporting SDK, therefore, Apple mobile devices or the Android phones supporting AR Core could be used. Furthermore, the run-time environment requires the network, GPS, storage and camera permission admitted. The application could also be run on AR smart glasses such as Movorio BT-300 and future Apple Smart Glasses.

Representative Design Concepts

In this subsection, we will introduce three representative design concepts of the interface in the system. These interfaces are designed to apply on three different scenarios: Conflict Checking, Precaution Notifications and Augmented Reality Guide. The details of each concepts are as following.

Design 1: Conflict Checking

Before a user enter an other country or region, he or she can have a conflict checking ahead. The system would compare the user's religion and gender and other information with the religions in the destination and then tell the user what he or she need to note. For example, in Muslim country,

Design 2: Precaution Notifications

One of the main features in this application is to notify user before and during the process of visiting a religious shrine. Before the user is entering the construction or area, the system would check the conflict of religions based on the user data and the region data. By referencing GPS and point of interest (POI), the rules and culture information would be attached to the region data, waiting to be compared. After the calculation, the system would send a notification to the user about all the things he or she needs to

pay attention to, such as the clothing, gesture and manners.

Once user received the notifications, he or she can tap in any specific point to see the details. All the details would be showed on the main page of the application, including the source background of this manner or gesture and some religion stories that can be told about this. By pushing the information about the religion to the user, user is able to get to know the religion gradually and naturally, which helps the user immerse into the cultural easily and learn some knowledge at the same time. However, the notification system on AR classes would be a little bit different from the mobile phone platform one. As it could be hard for user to control the smart glasses (especially some temples and shrines are not allowing aloud talking, which makes the voice control inappropriate), the smart glasses version of notification would only show the information after being compared.

The notification does not show up only for the conflict checking. During the process of visiting, the system would push notifications to some specific situations. For instance, the system would hear the volume of the environment consistently. If the shrine were not allowing aloud talking, the system would send notification when the surrounding sound is over a specific decibel. Moreover, when a user tries to enter a forbidden area, the system might detect this by using the GPS and artificial intelligence and warn the user they are in the wrong place.

Design 3: Augmented Reality Worship Guide

The most representative concept of this project would be the application of AR. By implementing the AR functions into the mobile device, the device can act as a religion tutor, teaching the users how do the proper manner and gesture when they try to do the praying.

It is common that When tourist want to do a pray when

they are moved by the environment, however, without any knowledge, they do not how to behave to communicate to the above. With the help of this application, they have a chance to learn the gesture and process easily and properly. For the simple praying gesture, the system will recognize the situation by the location and POI then show the user the correct worship gesture (Figure 2). As long as the AR glasses equipped with hand tracking algorithms or technique, the system would evaluate how good uses imitate the gesture and give them more advice about how to improve their movements (Figure 3). For the complex praying event, the system would analysis the date of the day and the terrain of the region to provide a most proper praying process, including what kind of material does the user need and what motions needs to be achieved. For example, in Buddhism, different date of the year requires believer to do different setups and do the praying to different immortals. They system would guide the user step by step and evaluate the result of the user's present, which provides them a reference and increases users' engagement.



Figure 2: Gesture guide on mobile device



Figure 3: Gesture guide on AR glasses

Prototype Evaluation

In this section, we will introduce our plan for evaluate the application including the evaluation method and experimental query techniques.

Evaluation Method

We chose heuristic evaluation as our evaluation method. Comparing to the cognitive walkthrough and model based evaluation, the heuristic evaluation consumes less time and doesn't require too many experts for the evaluation process. Therefore, for such a small application, the heuristic evaluation is our best choice to balancing the cost and the effectiveness.

Experimental query technique

In our evaluation procedure, experiment, interview and questionnaire will be our candidate experimental query technique. Comparing with conducting experiments, interviews doesn't spend too long time, and the results are

more subjective. Since one of our user experience goals is to solve the interfaith problem effectively, the interviews would help the users express their own opinion better. And comparing with the questionnaires, the interviews are more flexible. As a result, interview will be the final query technique.

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