

Android-Based Augmented Reality Tourist Guide Application

CHRISTINE W. PITOS

<https://orcid.org/0000-0002-4765-543X>

chrisyyyy@gmail.com

Surigao del Sur State University – Lianga Campus
Philippines

ABSTRACT

This scientific pursuit aimed to develop an Android-based Augmented Reality Tourists Guide Application to enable tourists to experience a visual presentation of tourist destinations in the province of Surigao del Sur, particularly in the BLOM (Barobo, Lianga, Otieza/San Agustin, Marihatag) areas. An Augmented Reality was designed to demonstrate a real-time view, yet artificially augmented information generated and overlaid by a specific computer system, including digital images, texts, and global positioning system location data. The application offered a three-dimensional panoramic virtual tour guiding the tourist destinations in both offline and online mode. The study employed a modified questionnaire to assess the usability of the developed mobile application. Results have shown that the Android-based Augmented Reality Tourists Guide yielded the highest level of acceptability with a grand mean of 90.52% in terms of effectiveness, efficiency, and satisfaction. Further, results reveal that the augmented tour guide application is an excellent digital platform offering travel information to tourists. Additionally, the study could potentially enhance the tourism experience through personalized services offered to meet each tourist's unique needs and preferences.

KEYWORDS

Computer, Augmented Reality, Mobile App, Panoramic, Tourism Experience, Surigao del Sur Philippines

INTRODUCTION

Augmented Reality (AR) is a type of interactive, reality-based display environment that takes the capabilities of computer-generated display, text, and effects to enhance the user's real-world experience. AR has great potentials in the tourism industry because it changes the way tourists interact with the real world, augments tourists' engagement, and makes them focus on a relaxed and fun tour.

Augmented Reality is an innovation that is reliably growing significantly in the different travel industry (Morabito, 2014). The users of augmented reality are offered with a real-world view in real-time but artificially augmented with data that is produced and superimposed PC framework (Keckes & Tomicic, 2017). AR is incredibly valuable in the tourism context (Jung, Chung, & Leue, 2015). The necessity to select precise technology to apply in a particular context at a tourist destination denotes, considering both the visitor demand and capacity of that destination.

Currently, Surigao del Sur is known for its wealth of natural resources. It has tourism potential with diverse and unique natural attractions and cultural tourism to attract tourists. Tourists used websites and printed guide booklets to discover places to visit. Due to the low adoption of technologies and lack of up-to-date information and navigation support, tourists are not able to visit all the attractions (Wijesuriya, 2013). With this limitation, the tourist guide application can be accessed to obtain certainty of information and guidelines in searching for the tourists' attraction in Surigao del Sur. Along these lines, the researcher opted to design an Augmented Reality Tour Guide Application to address these gaps.

The designed Augmented Reality Tourist Guide provides a virtual tour of the tourist destinations. It offers potential travelers to preview the experience they are planning to book. Significantly it offers travelers the right information enhancing their travel experience. The application provides the augmented information with 360 panoramic views that allow more realistic interactions among tourists. Furthermore, the application also boosts the

tourism industry in the province of Surigao del Sur and increases their value as destinations for tourists.

This developmental study is anchored on the Agile Development model approach called Mobile – D, as recommended by Abrahamsson (2007). It is based on Extreme Programming, Crystal methodologies, and Rational Unified Process.

Another model that supports this developmental study is the emerging technology called the Augmented Panoramas of Reality (PARS) by Eiris, et al. (2018). This proof-of-concept research project developed an augmented 360-degree reality panoramas of reality platform that allows the superimposition of information layers over complex situations.

Sayyad and Shinde (2013) present a tour guide system with augmented reality. The system allows tourists to experience user-specific tours with augmented information by recognizing/tracking the contents of an offline tour booklet.

The Input-Process-Output (IPO) model was used in describing the conceptual framework of the study. An IPO model identifies a program’s inputs, outputs, and the processing steps required for transformation.

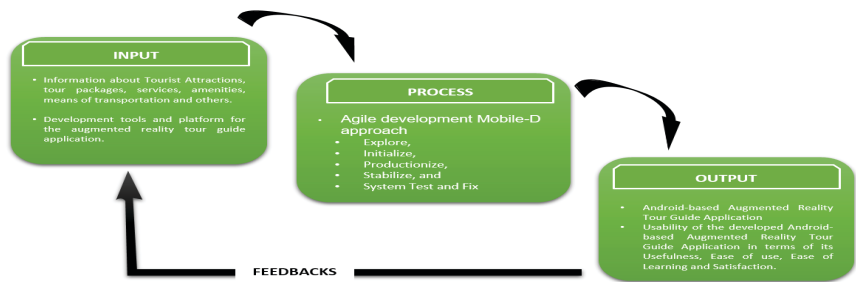


Figure 1. The conceptual framework of the study

As shown in Figure 1, the program’s inputs, the processing steps required for transformation, and the outputs are identified.

The whole idea was used to create an Android-based Augmented Reality Tourist Guide Application allowing the tourist to view the tourist destinations in real observation of places in three-dimensional views.

OBJECTIVES

The purpose of this study is to discover an effective way to create an Android-based Application for the identified tourist destinations of Surigao del Sur. Aims explicitly to examine the profile of the respondents and experiences encountered during the tour to BLOM (Barobo, Lianga, Otieza/ San Agustin, Marihatag) areas of Surigao del Sur, develop an application to create an augmented reality tourist guide to the BLOM destinations, and determine the level of usability of the developed application in terms of its Usefulness, Ease of Use, Ease of Learning and Satisfaction.

METHODOLOGY

Research Design

The study uses the developmental-evaluative research method in assessing the augmented reality tour guide application based on Android. A Mobile-D methodology shown in Figure 2 was used for the development. A survey was conducted to evaluate the usability of the tour guide application to respondents.



Figure 2. Mobile-D phases (VTT Electronics, 2006)

Mobile-D covers five phases (Explore, Initialize, Productionize, Stabilize and System Test and Fix) and are linked with stages, tasks, and practices.

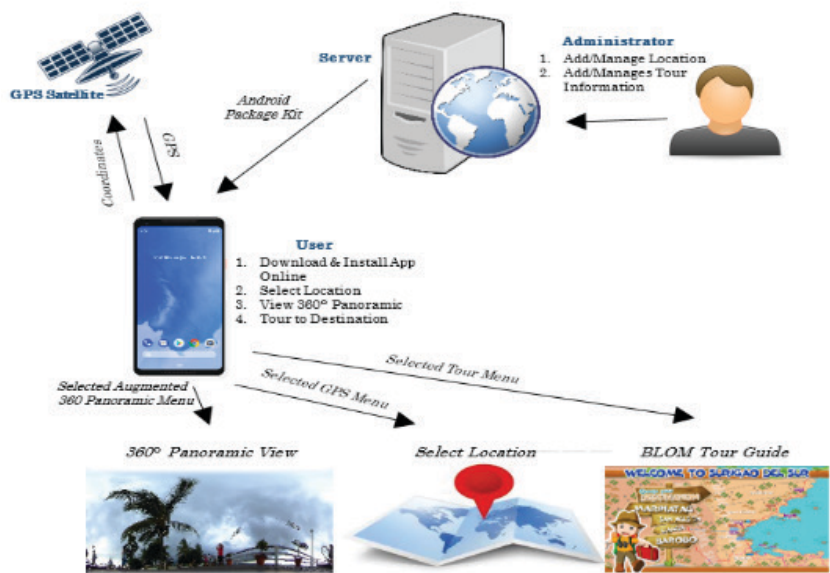


Figure 3: System architecture of the developed application

Figure 3 shows the system architecture of the developed application. Once the software is installed on the android phone, the user interacts with the mobile phone to access the tour guide application. The user can then view the three options. The first option has a list of the different tourist destinations found in BLOM areas. The second choice is the augmented view, which has a 360-degree panoramic image of the selected tourist attraction. Apart from all these things, a tourist also requires where the exact location is and the nearby hotels, ATMs, bus stations, and others. So for this purpose, the third option is the GPS option, which allows the user to have an idea regarding the route of the tourist destination.

Research Site

The study was conducted in the BLOM (Barobo, Lianga, Oteiza/San Agustin, Marihatag) areas of Surigao del Sur.

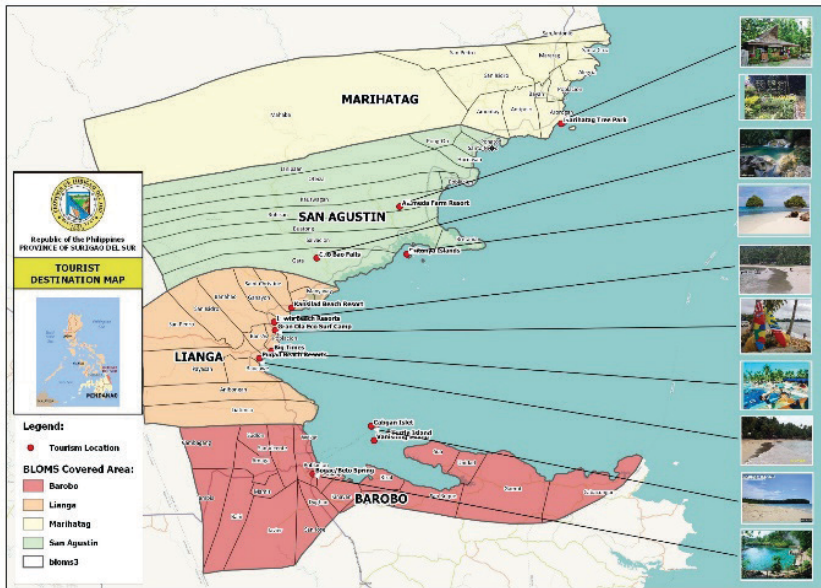


Figure 4. Map of the research locale

A probability sampling technique was used. The researcher divided the entire population into four (4) different strata, then randomly selected the final subjects proportionately.

Research Instrument

The study used the structured questionnaire to find out why there is a need for the development. It adopted the USE Questionnaire developed by Arnold M. Lund (2001) to measure the usability of the developed software application. The respondents were given enough time to use and evaluate the application using the USE rubric. Validation was conducted by the identified IT professionals and tourism experts.

Data Collection

Data were collected through a survey conducted by the researcher. The prepared questionnaire was randomly distributed among the four groups of respondents in BLOM municipalities and their respective barangays. Respondents were given enough time to answer the survey questions.

Before completing the questionnaire, respondents were able to test and use the system as introduced by the researcher.

The gathered data were tabulated and calculated using statistical computations. The mean and the standard deviation were computed. These were the formulas used to compute the result.

For overall usability, the value was calculated using the following formula based on the study of Harwati (2017).

RESULTS AND DISCUSSION

The demographic profile of the respondents

Table 1 shows the demographic profile of the respondents where the application was tested, and feedback was collected about the experiences encountered during the tour to BLOM areas of Surigao del Sur. Most of the respondents are male with a value of 55%, and the age bracket of 25-34 years old gets the highest frequency, which means they are the maximum visitors who visited BLOMs areas of Surigao del Sur.

Table 1. Demographic profile of the respondents

Demographic Variables	Frequency	Percentage (%)
Sex		
Male	88	55
Female	70	43.75
Prefer not to say	2	1.25
Age Bracket		
15- 24 years old	35	21.9
25- 34 years old	52	32.5
35- 44 years old	49	30.6
45 above	24	15

Level of experiences encountered on tour to BLOM areas

The level of experiences encountered by the respondents on tour guide used which says somewhat entertaining represented by 40% of the total respondents, and 1 % says that it is very dull.

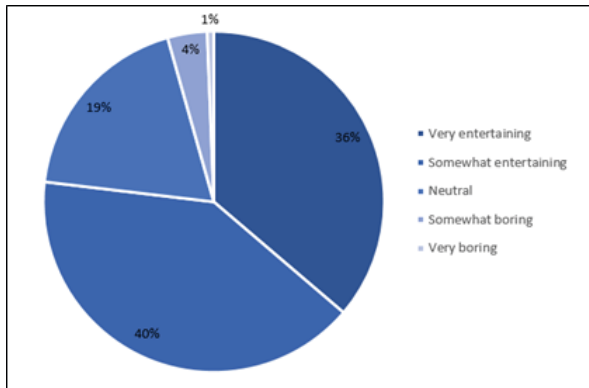


Figure 5 portrays the menu and the three-dimensional panoramic view of the destination. The menu shows a selection of destinations to start the tour. The tour includes views of a exact location and the nearby hotels, ATMs, bus stations, etc. A geographical positioning system is provided to guide the route to tourists. An augmented view of a 360-degree panoramic image is rendered for a real view of the environment.



Figure 5. The developed augmented reality tour guide application

Table 2 presents the level of usability of the developed Mobile Application. The most critical dimensions of usability for users is to measure those dimensions across domains and treat the dimensions of usability as dependent variables as follows: Usefulness, Ease of Use, Ease of Learning, and Satisfaction.

Table 2. Usability of the developed application

Criteria	Mean	Verbal Description
Usefulness Mean Value	4.52	Strongly Agree
Ease of Use Mean Value	4.50	Strongly Agree
Ease of Learning Mean Value	4.53	Strongly Agree
Satisfaction Mean Value	4.53	Strongly Agree
General Mean	4.526	Strongly Agree

Table 2 shows the level of usability of the developed Android-based Augmented Reality Tourist Guide in terms of usefulness, ease of use, ease of learning, and satisfaction. The general mean total of the four criteria shows that the Android-based Augmented Reality Tour Guide meets the minimum requirements and is found usable or worthy based on the results.

Measurement usability resulted in a 90.52% feasibility percentage indicating that the usability result of the Android-based Augmented Reality Tourist Guide within BLOM areas of Surigao del Sur has the value “Feasible” (Harwati, 2017). This research can be used to provide suggestions and inputs in improving the user experience for the Tour Guide of Surigao del Sur in the future. Moreover, the usefulness of the developed application was instituted as significant to mobile growth.

CONCLUSIONS

Most of the users appreciate the developed, designed application that conveys tours into semi-realistic ones. The developed Android-based Augmented Reality Tourists Guide application for tourist destinations in BLOM areas in Surigao del Sur will be uploaded online for utilization and implementation.

RECOMMENDATIONS

The following are highly recommended for advanced users of the designed Android-based Augmented Reality Tourists Guide application. First, the application can be installed in any mobile operating system, not only for android phones. Secondly, the application must be integrated online with Google Maps to have real-time access to data via satellite. Then, the tour guide must have a voice indicator for the users to be guided wherever destination they desire to go to. The application must include all tourist destinations throughout the Surigao del Sur province, not just limiting to BLOM areas.

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Gunning Fog Index:	13.02
Flesch Reading Ease:	35.19
Grammar Checking:	92/100
Plagiarism:	1%