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User Acceptance and Usability of AUGMENTED REALITY (AR) POLIMAS TOUR

Siti Farizah Abu Bakar
Department of Information and Communication Technology,
Politeknik Sultan Abdul Halim Mu'adzam Shah
School of Computing, Universiti Utara Malaysia

Nooraza Othman
Department of Information and Communication Technology,
Politeknik Sultan Abdul Halim Mu'adzam Shah

Abdul Aziz Ab Nasir
Department of Information and Communication Technology,
Politeknik Sultan Abdul Halim Mu'adzam Shah

Abstract:

Politeknik Sultan Abdul Halim Mu'adzam Shah (POLIMAS) is a Malaysian Polytechnic institute that specialises in engineering, commerce and information technology. Orientation week will be held once a semester to welcome new students. Most POLIMAS students and visitors have no idea where the various buildings in the area are. The buildings they're looking for is obscured from view, making it difficult to locate. Thus, Department of Information and Communication Technology, POLIMAS, developed an application called AUGMENTED REALITY (AR) POLIMAS TOUR to address the issues. User must first download this app before they can use it as a student or as a visitor or staff. Then, using the application, the user will scan the image on the poster that is posted to a specific building to locate the desired place. Google Form was used to conduct a survey of 69 participants, including first-semester students, staff, and visitors, about their experiences with the AR POLIMAS TOUR application. There are five elements to this questionnaire: The Respondent's profile; Perception of Use; Ease of Use; Task Objectives; and Satisfaction with the application's use. In general, the AR POLIMAS TOUR's interface was deemed to be user-friendly, consistent and visually appealing, which contributed to the application's degree of usability. Students, staff, and visitors can save time and energy by using application that make use of cutting-edge technology, such as augmented reality. It is possible, however, to make this application even more appealing to users by including more animation elements.

Key words: *Campus Tour; Augmented Reality; POLIMAS*

1.0 Introduction

Campus tours are one of the most effective ways to present visitors, new students, prospective students, and their families to the educational institution or campus atmosphere (Okerson, 2016). However, the college campus may have sophisticated buildings, and it will be difficult for new students and visitors who are visiting for the first time to identify each and every block to orient themselves and recognise areas (Surekha et al., 2019). It is difficult to see every part of the campus in a single day due to the vast size of the site. A campus tour is frequently planned to familiarise prospective students with the college's facilities and environment (Ang et al., 2021). Politeknik Sultan Abdul Halim Mu'adzam Shah (POLIMAS) campus is situated on 28 hectares in the Kubang Pasu, district of Kedah. POLIMAS has developed into a top-notch educational institution in terms of academics, co-curricular activities, and technical training. POLIMAS's Orientation Week for new students includes an on-campus tour given by staff and senior students who serve as members of the program committee. During orientation week, it is impossible for students to remember all of the buildings in the POLIMAS after a brief campus tour. Aside from first-semester students, anyone visiting POLIMAS for personal or official reasons may have difficulty locating specific buildings inside POLIMAS. Furthermore, the 2018 Standard and Industrial Research Institute of Malaysia (SIRIM) Audit Meeting found that POLIMAS lacked signage directing visitors to the buildings located within the compound.

To address this issue, Augmented Reality (AR) POLIMAS TOUR application was developed by the Department of Information and Communication Technology, POLIMAS, which is being driven by AR technology. AR has become one of the most popular technology developments in the current era of technological advancement. In a real-world setting, AR integrates physical things with digital data. Real-time interaction, accurate registration of virtual and real 3D objects, and the merging of reality and virtual things in a real environment are the three pillars of AR (Billinghurst et al., 2014). AR applications today use mobile devices' cameras to create real-time live displays that combine relevant and contextually suitable content like text, video, or photographs (Pravesh et al., 2018). The growing use of smartphones and tablets has made AR, in particular, more accessible (Hackl & Wolfe, 2017). Hence, AR technology is very suitable to be applied in POLIMAS as all students and visitors have

smartphone facilities. While AR is a new sort of experience that enhances the actual world with computer generated material, it's also an evolving one (Katiyar et al., 2015).

AR is divided into several types, namely: 1. Marker-based augmented reality, 2. Marker-less augmented reality, 3. Projection augmented reality, and 4. Superimposition based augmented reality (Rusnida et al., 2020). However, the developers used a marker-based approach to develop this application, which is more appropriate for the POLIMAS campus context. Using this method, Maker-Based AR focuses on delivering extra information about the objects once recognition of it has been made. It's possible to see what's right in front of the camera with marker-based AR. This is how user get information about what's on the screen. The use of a 3D model of an object as a marker in AR can be replaced (Dian et al., 2019). In order to display a digital image when the camera is directed at a static marker, marker-based AR requires the use of a visible static marker (Romli et al., 2020), which is provided by this application through a poster that can be downloaded from POLIMAS website and also attached to strategic buildings and places in POLIMAS. The image in the poster is an actual image of the building or place that the students or visitors wants to go to. When the "marker" has been scanned, then they will be able to see visually in the form of animated guide how to go from one location to another. In addition, users can also get detailed information about the rooms available on each floor of the building.

This application has three sections: "Scan," "Building Information," and "About." The "Scan" component scans the "marker," which can be photos from posters or any other source that the phone's camera can interpret. Users can learn more about the building or location they want to visit by using the "Building Info" component. The final component is "About," which provides a detailed guide to users on how to utilise this application. The following are some of the app's advantages: 1. Provide animated directions and help to users so they may quickly get to a spot. 2. As a guide, provide users with information about the location or position of a place in a new area. 3. Provide a realistic picture and image of a site. 4. Use the "Building Info" tool to provide specific information on the status of a location. 5. This device comes with a user handbook that describes how to use it in detail. 6. Application that are interactive and high-tech that can entice users to use them. 7. Repetitive animations help students and visitors learn how to go to their destination area in greater detail. 8. Shows a detailed map of the area the user will be visiting.

Figure 1.0 *: Sample of Snapshots of Application*

2.0 Data Analysis and Findings

This study was distributed to find out the extent of User Acceptance and Usability of AUGMENTED REALITY (AR) POLIMAS TOUR application. The following are the results of the study obtained from 69 respondents who are students, staff and visitors who visited POLMAS. Respondents gave feedback on primary findings, namely through questionnaires.

This study is divided into FOUR (4) research objectives, namely:

a. Perception of Use of AR TOUR POLIMAS

b. Perception of Ease of Using AR POLIMAS TOUR

c. Understanding the Task Objectives of AR POLIMAS TOUR

d. Understanding the Satisfaction of Using AR POLIMAS TOUR

2.1 Respondent Profile

Part A of this study is related to Respondent Profiles. The total number of respondents (69), 47.8% were male respondents while 52.2% were female respondents.

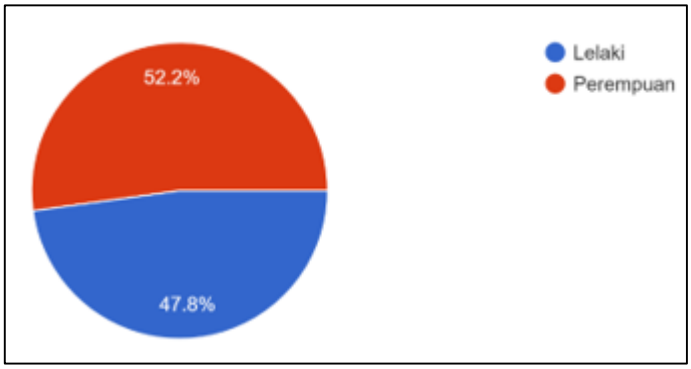

***Figure 2.1**: Gender of Respondent*

Furthermore, the findings showed that respondents under the age of 20 years were 72.5%, 20-29 years 24.6%, 40-49 years 1.4% and over 50 years 1.4%. This can be seen in Table 2.1.

Table 2.1: **Age of Respondent**

No	Criteria	Frequency	Percent(%)
1.	<20	50	72.5
2.	20-29	17	24.6
3.	30-39	0	0
4.	40-49	1	1.4
5.	>50	1	1.4

In this study, 87% of the respondents are POLIMAS citizens and 13% are visitors who visit POLIMAS for work or formalities.

2.2 Findings of Objective 1 Study on Perception of Use of AR POLIMAS TOUR

Based on Table 2.2 shows the views of respondents related to the perception of the use of AR POLIMAS TOUR.

Table 2.2: Perception of Use of AR POLIMAS TOUR

No	Criteria	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)
1.	This application can facilitate the search for buildings in POLIMAS.	37.7	43.5	14.5	2.9	1.4
2.	This application can provide directions (route / animation) building in POLIMAS.	37.7	43.5	15.9	1.4	1.4
3.	This application can provide building information in POLIMAS.	39.1	37.7	20.3	1.4	1.4
4.	This application can reduce the time taken to get to a particular location.	37.7	37.7	21.7	0	2.9
5.	This application has clear information related to buildings in POLIMAS to get to a particular location.	39.1	39.1	20.3	0	1.4

2.3 Findings of Objective 2 Study on Perception of Ease of Using AR POLIMAS TOUR

This part of the survey is concerned with the perception of ease of using AR POLIMAS TOUR (Refer to Table 2.3).

Table 2.3: Perception of Ease of Using AR POLIMAS TOUR

No	Criteria	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)
1.	This application is very easy to learn.	39.1	34.8	23.2	1.4	1.4
2.	The app easily performs directed tasks.	33.3	45.4	18.8	0	1.4
3.	My skills are increasing when using this application.	39.1	39.1	18.8	1.4	1.4
4.	The app is easy to interact and user friendly.	33.3	40.6	21.7	2.9	1.4
5.	This application is easy to use.	37.7	39.1	18.8	2.9	1.4
6.	This application is easy to use.	42	33.3	20.3	2.9	1.4

2.4 Findings of Objective 3 Study on Understanding the Task Objectives of AR POLIMAS TOUR

Based on Table 2.4 shows the respondents understand the Task Objectives of AR POLIMAS TOUR.

Table 2.4: Understanding the Task Objectives of AR POLIMAS TOUR

No	Criteria	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)
1.	I am able to complete my tasks quickly when using this app.	37.7	34.8	23.2	1.4	2.9
2.	I am able to complete my tasks effectively when using this application.	30.4	46.4	17.4	2.9	2.9
3.	I am able to complete my tasks efficiently when using this application.	34.8	46.4	15.9	0	2.9
4.	Based on my experience using this application, I chose to use it again.	36.2	34.8	23.2	2.9	2.9
5.	I believe I will be more proactive when using this app.	33.3	44.9	18.8	0	1.4

2.5 Findings of Objective 3 Study on Understanding the Satisfaction of Using AR POLIMAS TOUR

This part of the survey is concerned with understanding the satisfaction of respondents using AR POLIMAS TOUR (Refer to Table 2.5).

Table 2.5: Understanding the Satisfaction of Using AR POLIMAS TOUR

No	Criteria	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)
1.	Understanding the Satisfaction of Using AR POLIMAS TOUR	34.8	37.7	23.2	1.4	2.9
2.	I am satisfied with the overall function of AR POLIMAS TOUR.	36.2	43.5	15.9	1.4	2.9
3.	I am satisfied with the overall function of AR POLIMAS TOUR.	40.6	33.3	23.2	1.4	1.4
4.	I feel AR POLIMAS TOUR meets my needs.	42	30.4	24.9	1.4	1.4

Based on the results, all respondent managed to successfully interact with the AR POLIMAS TOUR and most of them take a short time to complete the evaluation. The study found that interface of the AR POLIMAS TOUR is easy to use as it is user-friendly. It also found that the AR POLIMAS TOUR is clear, consistent and visually appealing was integral to the level of usability. Detailed feedback on the usability of the AR POLIMAS which can then be used to improved its effectiveness, efficiency and ultimately increase its potential to be widely used.

3.0 Discussion and Conclusions

AR POLIMAS TOUR is notable in that it is the first of its kind to be utilised by a Malaysian Polytechnic during the registration of new students. This application combines cutting-edge technology, specifically augmented reality, to assist and guide students, particularly new

students and visitors to a new building and place in POLIMAS. Furthermore, this application is easy to update as needed to meet the needs of the institution. POLIMAS' vision and mision, for example, have been incorporated to this app in preparation for Asia Pacific Accreditation and Certification Commission (APACC) Reaccreditation in year 2024. More buildings and markers can be added to this application from time to time, hence saving time, money, and energy. It is also possible to add more animated aspects to this app in the future to keep users engaged in it.

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