Journal of Advanced Research in Applied Sciences and Engineering Technology

Journal homepage:
https://semarakilmu.com.my/journals/index.php/applied_sciences_eng_tech/index
ISSN: 2462-1943



Expert Review on Augmented Reality Mobile Application for Promoting Asnaf Care

Azizah Che Omar[1,*], Norhana Yusof[1], Mohd Adib Abd Muin[2], Nurulnadwan Aziz[3], Mohd Fakhrul Azreen Mohd Nizam[4]

[1] School of Multimedia Technology and Communication, Universiti Utara Malaysia, 06010 UUM Sintok, Kedah, Malaysia
[2] Islamic Business School, Universiti Utara Malaysia, 06010 UUM Sintok, Kedah, Malaysia
[3] Faculty of Business Management, UiTM Cawangan Terengganu, 23000 Dungun Terengganu, Malaysia
[4] Software Developer, Lembaga Zakat Negeri Kedah, Menara Zakat, Jalan Teluk Wanjah, 05200 Alor Setar, Kedah, Malaysia

ARTICLE INFO

Article history:
Received 30 June 2023
Received in revised form 15 October 2023
Accepted 23 October 2023
Available online 9 November 2023

Keywords:
Mobile-Human Computer Interaction; Interaction Design; Augmented Reality; Expert Review Method

ABSTRACT

People's daily lives are mostly dominated by mobile devices particularly in conducting business activities. Mobile devices are the first genuinely pervasive interaction device, that is now being used for a wide range of services and applications. This includes the promotion of donation activities through the Augmented Reality (AR) mobile application. This study found that one of the organizations that require the use of AR mobile applications to promote their donation activities is Asnaf Care. Currently, all donation activities have been carried out through the Asnaf Care website which still fails to influence and encourage the community to contribute and take part in the donation activities. Therefore, to promote the Asnaf Care fund and increase donations, this research was conducted to develop an AR mobile application. The AR mobile application was evaluated through an expert review method, and changes were made to the overall design, content, and function based on the feedback received. The goal of this study was to successfully promote the Asnaf Care services to users and increase the amount of money raised for impacted individuals.

1. Introduction

Augmented Reality (AR) mobile applications are already widely utilized in a variety of industries, including online services, shopping, and education [1-4]. Aside from that, AR mobile applications are particularly useful in advertising items, tourist attractions and give awareness about certain thing such as depression [5-9] . This is due to the fact that the use of AR mobile applications can pique the interest of consumers due to their unique characteristics [10,11].

However, the use of AR that focuses on the Asnaf group is seen to be very limited [12,13]. Although zakat institutions in Malaysia have begun to adopt the use of technology-based systems, however, it is still limited [13,14]. Based on the study conducted by the researchers, it was found that

* *Corresponding author.*
E-mail address: co.azizah@uum.edu.my

https://doi.org/10.37934/araset.33.3.1727

most zakat institutions in Malaysia use a technology-based system that only focuses on the payment of zakat online and find Asnaf [14,15].

The most common technologies used are website systems and mobile applications such as Mobile Jejak Asnaf MAIWP Federal Territory Islamic Religious Council and Jejak Asnaf Tabung Baitulmal Sarawak as shown in Figure 1. Preliminary interviews with experts also found the use of technology in other matters such as the distribution of zakat and public awareness of the Asnaf group is still at a very low level of use [14-16]. Therefore, it is not surprising that the use of AR technology by zakat institutions in Malaysia is seen to be very limited [15,17].



Fig. 1. Example of MAIWP Asnaf Track and Asnaf Track Mobile Application (Tabung Baitulmal Sarawak)

On the other hand, Kedah Zakat Board (LZNK) has launched the "Asnaf Care" funding system to provide financial aid to those directly affected by the Covid-19 outbreak [18,19]. The "Asnaf Care" fund encourages the community to contribute and take part in distributing food supplies to those who are facing a shortage of food supplies, particularly during the Restriction of Movement Order (RMO) period from 18th March 2020. LZNK forecasts that zakat collections through "Asnaf Care" might reach MYR 36 million, benefiting 700,000 people that are likely to endure weak economic development as a result of the worldwide COVID-19 pandemic during the next six months [20,21]. Therefore, the AR mobile application for promoting "Asnaf Care" namely Mobile Augmented Reality for Promoting Asnaf Care in a short form as Mobile AR4AsnafCare has been developed by this study. It is to ensure the sufficiency of donation funds were available for distribution at such critical times. The Mobile AR4AsnafCare also will open up the opportunities for the public to contribute and donate easily and efffectively towards those who are in need. Upon completing the development phase, an evaluation of the proposed application has been carried out by utilizing the expert review method. The next section explains the details of the research methodology used to carry out this study.

2. Methodology

As depicted in Figure 2, there are two phases completed throughout the study. Phase 1 focused on the development of a prototype of the Mobile AR4AsnafCare. The components and all multimedia elements of the proposed prototype were gathered at this phase according to the requirement

analysis of the client with the knowledge of Human-Computer Interaction (HCI) guidelines [22-25]. Having analyzed all the user requirements then, the prototype of the Mobile AR4AsnafCare application was developed. In this phase, the developers used Unity 2020 to develop the application.

In phase 2, the prototype of Mobile AR4AsnafCare application has been evaluated by utilizing the expert review method. There are five experts involved in this phase. The experts are the representative from the Asnaf Care Zakat Kedah itself and senior lecturers from the School of Multimedia Technology & Communication (SMMTC), Universiti Utara Malaysia (UUM). They have been selected based on their experience and knowledge related to multimedia niche areas, particularly in terms of interaction design, interface design, audio, and graphic design.

Questions related to design, content, and functionality were prepared for the experts as suggested from Aziz *et al.,* [26] and Omar *et al.,* [27]. Then, the questions were given to the experts through Whatsapp during the online interview session. The interview began by having the experts play or watch a demo video of Mobile AR4AsnafCare application. The experts were not interrupted as it is important for them to have the freedom to provide valuable feedback. Written comments were then recorded to improve the developed prototype as proposed from Wang *et al.,* [28] and Yee *et al.,* [29]. The results are analyzed and discussed in the result section.

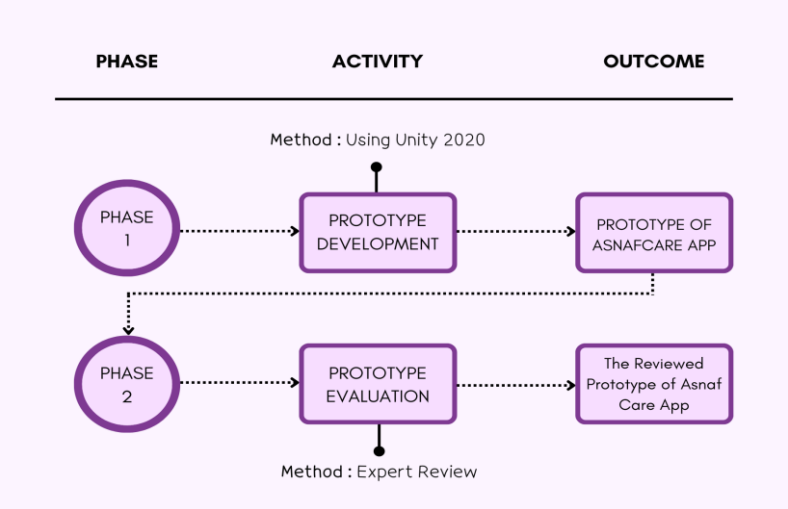


Fig. 2. Research methodology

3. The Prototype of Mobile AR4AsnafCare Application

The concept of interactive design has been integrated into the Mobile AR4AsnafCare application. Figure 3 displays the Home page of the application, where users can click the “About Us”, “Campaign”, “Events” and “Exit'' buttons. Moreover, the logo of Lembaga Zakat Negeri Kedah (LZNK) and the funding system, Asnaf Care were included on all pages of the app.

The “About Us” button navigates users to the next page and consists of three buttons, which are “Info”, “Website” and “AR Button”. When the users click the “Info” button, it navigates the user to another page as shown in Figure 4. Besides that, a “Home” logo has been included as a button at the left bottom of each page that enables users to click to go to the main page, which is the “Home” page.



Fig. 3. "About Us" button in the Home Page that enables users to go to the "About Us" Page when clicked

Next, Figure 4 shows the interface of the "Info" page of the "Info" button. The page displays general info about how Asnaf Care has been created by Lembaga Zakat Negeri Kedah (LZNK). As on the previous page, a "Home" button has been included to make it easier for users to navigate to the main page. Besides that, the left and right arrow buttons have been included so that the users can click each button to go back and forth on the page.



Fig. 4. Info about the creation of Asnaf Care in the "Info" page

For the "Website" button in Figure 5, the button has been linked to the main website that navigates users straight to Asnaf Care's website. On the website, users are able to make donations and browse the website without any difficulties.

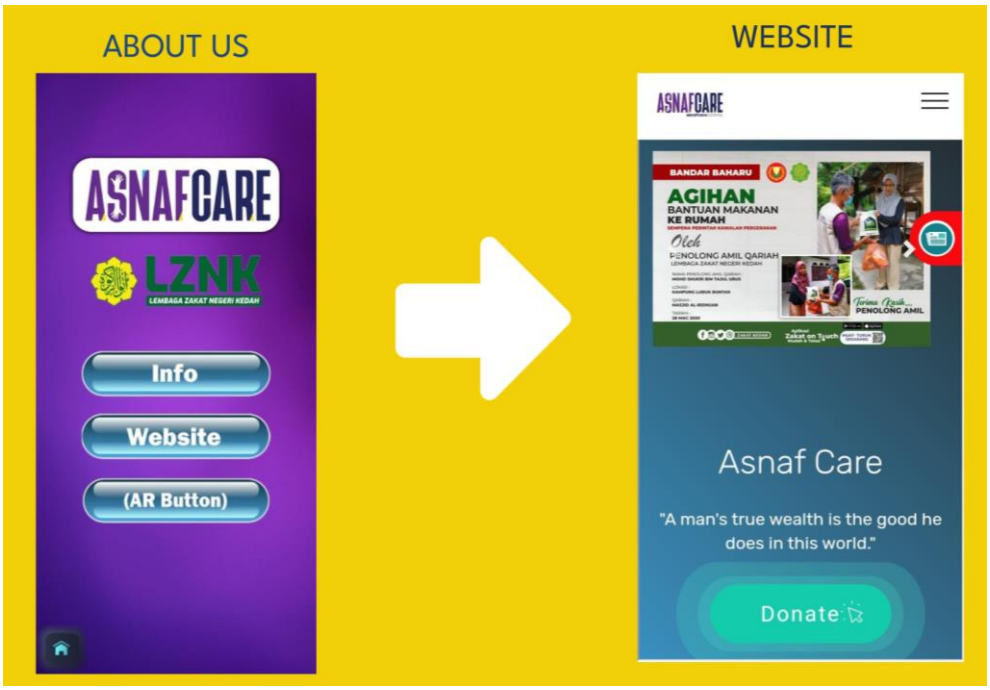


Fig. 5. A "Website" button that brings users to Asnaf Care's website

After that, Figure 6 demonstrates an "AR Button" that requires users to scan the QR Code that displays more info about donations that includes food, cash vouchers, online learning equipment for underprivileged students, clothes, or Asnaf manners such as constructing and restoring Asnaf homes to make it simpler for the public to donate. Besides that, the video QR Code displays an AR that enables users to play a short video about Asnaf Care programs and activities to provide a general idea about what Asnaf Care has been funding.

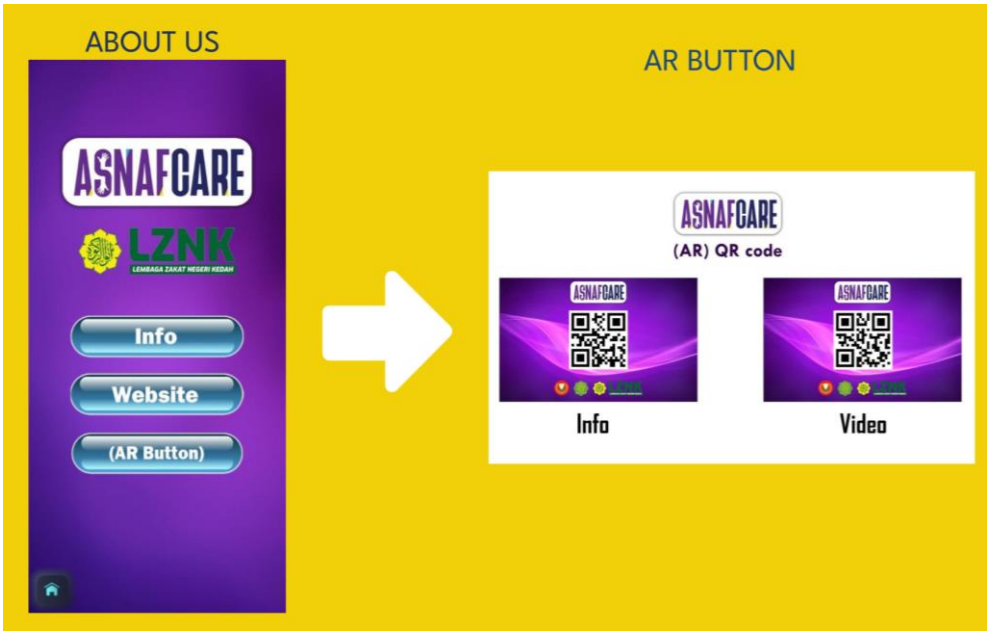


Fig. 6. "AR Button" that requires users to scan the QR Code

Back to the "Home" page, Figure 7 displays the "Campaign" page which shows four pages of the list of the campaign that consists of items such as food, cash vouchers, online learning equipment for underprivileged students, clothes, or Asnaf manners such as constructing and restoring Asnaf homes. Therefore, the first page of the "Campaign" contains a Home button, while the back-and-forth arrow buttons have been included in the rest pages. On the other hand, the "Events" button navigates users to the Facebook page of Lembaga Zakat Negeri Kedah (LZNK) and requires users to log in to their Facebook account if necessary.

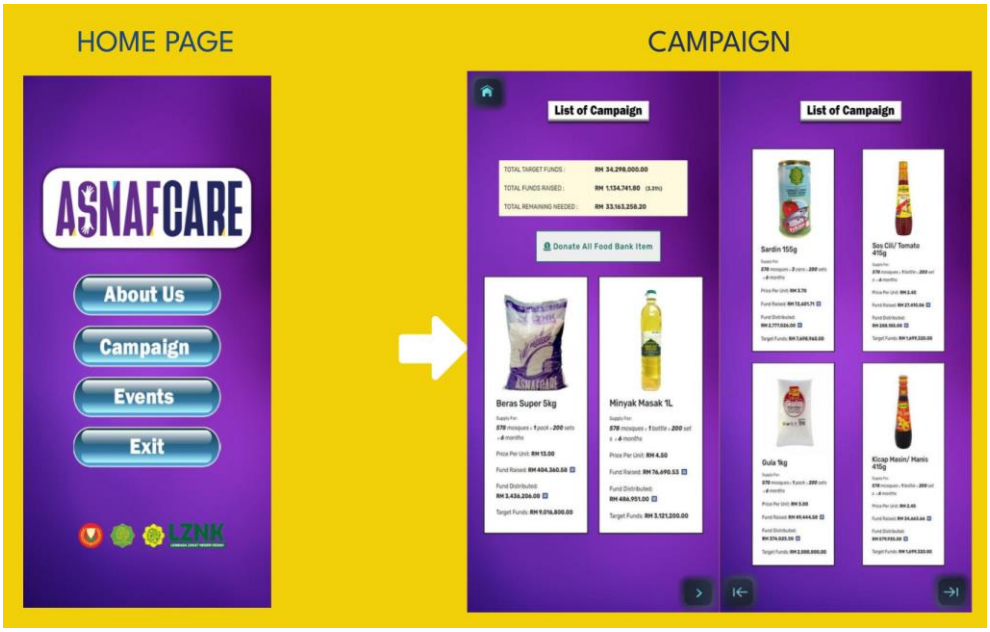


Fig. 7. "Campaign" page enables users to choose from the list of campaigns to that they wish to donate

4. Finding and Discussion

There are a total of 5 experts involved in the evaluation phase to evaluate the Mobile AR4AsnafCare application prototype. The set of interview questions as suggested in Aziz *et al.,* [26] and Omar *et al.,* [27] is tabulated in Table 1 and the result is tabulated in Figure 8.

Table 1
Interview Questions for Expert

No.	Questions	Focus
Q1	Does Mobile AR4AsnafCare has attractive with the design look?	Design
Q2	In your opinion, do you think the design of Mobile AR4AsnafCare is able to promote asnaf care?	Design
Q3	Does the information provided in Mobile AR4AsnafCare can give comprehensive understanding about Asnaf Care to the target user?	Content
Q4	Does the in Mobile AR4AsnafCare is helpful for user to donate for Asnaf people?	Content
Q5	Are the font size and font type in the Mobile AR4AsnafCare suitable to view and read?	Function
Q6	Are all buttons in Mobile AR4AsnafCare functioning well?	Function



Fig. 8. Feedback from the Experts

Table 1 describes the list of six questions for expert that focus on design, content and function. For the Question 1, "Does Mobile AR4AsnafCare has attractive with the design look?", most of the experts agreed that this Mobile AR4AsnafCare application is attractive with the design look especially for Home Page. In Question 2 which is "In your opinion, do you think the design of Mobile AR4AsnafCare is able to promote Asnaf care?", and all experts agreed with the statement that the design in mobile application is able in promoting Asnaf Care clearly.

Besides that majority of experts also agreed in Question 3 that that Mobile AR4AsnafCare application can give comprehensive understanding about Asnaf Care to the target user. User can easily understand more about the Asnaf Care by exploring this Mobile AR4AsnafCare application. In addition, all experts also agreed with the statement in Question 4 that Mobile AR4AsnafCare is helpful for user to donate for Asnaf people. It is easily for user to do donation by choosing aby items provided in Mobile AR4AsnafCare application.

Furthermore, in Question 5 only one expert was neutral with the statement as the expert thought that this mobile application can be improved in terms of the text readable, meanwhile the rest of experts agreed that the font size and font type in the Mobile AR4AsnafCare is suitable to view and read. Lastly, for Question 6, all experts agreed that the buttons in Mobile AR4AsnafCare application are functioning well.

4.1 Experts' Comments

After having an interview session with the experts, the experts also provided their suggestions and valuable comments to improve the quality of the Mobile AR4AsnafCare application as shown in Table 2.

Table 2
Expert's Comments

Expert	Comments
Expert 1	● Overall, it is a good development of Augmented Reality mobile applications. ● The expert suggested that the items should be listed one by one for each page. ● The expert suggested that a "HOME" button should be placed on each campaign page. ● The experts suggested adding audio such as a sound effect when the user clicks on the button. ● The experts explained that the FAQ button should be included in the "HOME" page as it will be easier for users to know more about Asnaf Care.
Expert 2	● Overall, it is a good development of Augmented Reality mobile applications. ● Need a bit of change, especially in the use of pages in the app. ● Simplify the interface to reduce the number of pages. ● The color of the app is nice. ● Change the "ABOUT US" to "INFO" to make it easier for users so that users didn't have to click two times to reach the page. ● The experts suggested changing the "EVENTS" page to a picture with a little info & including a link to FB.
Expert 3	● The experts suggested distinguishing the button between the first page & the second page. ● The app will be more interesting if animated elements were added. ● Explore database coding that is suitable to use on both laptops & smartphones.
Expert 4	● Overall, it is a good development of Augmented Reality mobile applications. ● The expert suggested including all main buttons on 1 page. ● The expert suggested that the "CAMPAIGN" page will look more interesting if it is changed to a navigation page instead of a button to a new page ● Instead of a video, the AR can be replaced with "INFO" which enables users to scan the QR CODE.
Expert 5	● The experts suggested putting a title at the top of each page. ● The experts suggested distinguishing the button between the first page & the second page. ● Move the button to scan QRCode AR to the "HOME" page. ● The experts suggested removing the "WEBSITE" button and converting the "INFO" page to an AR.

Based on the expert review feedback and suggestions from the design and content experts, the developers have made some improvements to the content and interface design of the proposed prototype.

Figure 9 shows the changes that have been re-designed by the developers. The interface of the proposed app has been changed according to the suggestions and feedback from the experts. The Mobile AR4AsnafCare application have been simplified by removing unnecessary pages. "About Us" button has been changed to the "Info" button that requires users to scan the QR Code provided for users to get general info about Asnaf Care (Figure 10) and let people know the existence of the funding system. In addition, the interface has been simplified from two pages becoming one page by replacing the "Website" button with a logo button from the "About Us' page, to the "Home" page that navigates users straight to the main website of Asnaf Care.

The "Campaign" button remains the same while the "Events" button was replaced with the Frequently Asked Questions (FAQ) button. This button enables users to automatically download the FAQ of the Asnaf Care in PDF format. There, users can get all additional info about how to donate and more details on Asnaf Care. Therefore, the "AR Button" has been removed and replaced by the "Info" button with an AR button. In addition, the developers included the Facebook and Website button at the bottom of the page to make it easier for users to click as it navigates users straight to the main website and Facebook page of Asnaf Care.

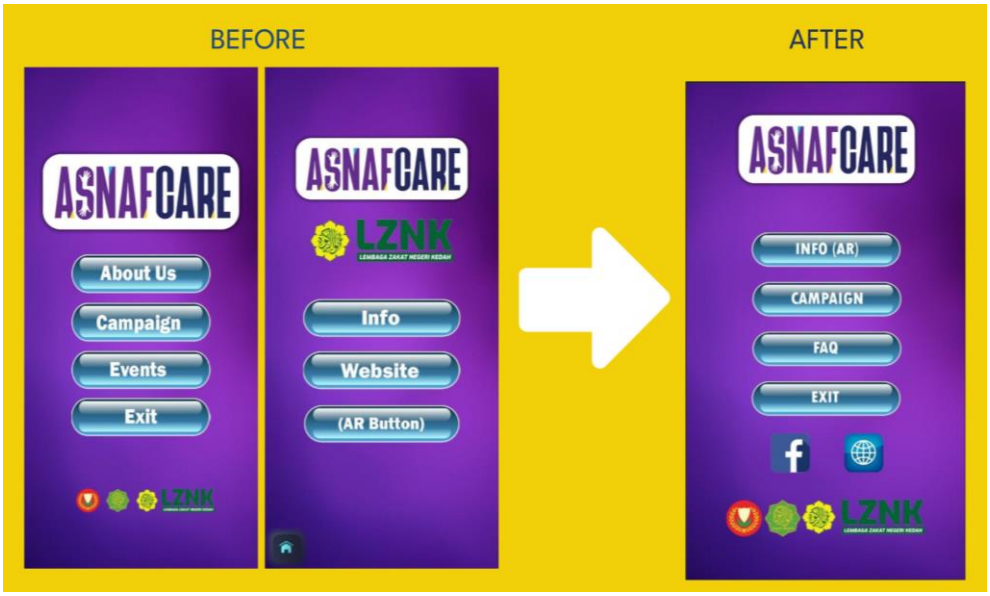


Fig. 9. The changes in the interface by simplifying the pages from two pages into one page



Fig. 10. Change the QR Code for "INFO"

At this initial stage, this study intends to obtain comments from the experts' review method for the overall design, content, and function of the proposed app. Therefore, based on the valuable comments from the experts, several amendments have been performed to improve the development quality of the Mobile AR4AsnafCare application. Through expert reviews, the application's content and interface design has been improved. Heuristic evaluation based on Nelsen's and Molich's Design Guidelines will be carried out in the future study to improve the proposed prototype and obtain a more impactful and significant result.

5. Conclusions

In conclusion, this study has achieved its objective which are (i) to develop the Asnaf Care AR mobile application and (ii) to evaluate the Asnaf Care AR mobile application through an expert review method. However, at this initial stage, the scope of the study is limited to the overall comments of the experts throughout the design, content, and function of the proposed application. Although the comments were classified and analyzed based on the experts' opinions, this study takes into account all the comments seriously and improves the proposed apps according to the expert comments. As this study required more in-depth analysis of the evaluation phase, therefore heuristic evaluation based on Nelsen's and Molich's Design Guidelines and user experience testing will be carried out in the future works of the study.

Acknowledgment

In appreciation, the researchers would like to express their gratitude to the Research and Innovation Management Center (RIMC), Universiti Utara Malaysia (UUM), and Zakat and Innovation Research Institute (IPIZ UUM), as well as the External Agency of the Kedah State Zakat Board (LZNK) for funding this study through the Public External Agency Scheme (Code SO 21318). Also special thanks to our research assistant Muhamad Aidil Fakhrullah Bin Mohd Khalid and Nurhanis Binti Hasim @ Hashim for their contribution in designing and developing the Mobile AR4AsnafCare application as well as special thank you to all the experts who provides the valuable comments to this study.

References

[1] Hilken, Tim, Ko de Ruyter, Mathew Chylinski, Dominik Mahr, and Debbie I. Keeling. "Augmenting the eye of the beholder: exploring the strategic potential of augmented reality to enhance online service experiences." *Journal of the Academy of Marketing Science* 45 (2017): 884-905. https://doi.org/10.1007/s11747-017-0541-x

[2] Phunsa, Suwichai. "Developing an Interactive Augmented Reality to Promote the Products of Local Entrepreneurs." *Journal of Advances in Information Technology* 10, no. 2 (2019). https://doi.org/10.12720/jait.10.2.77-80

[3] Billinghurst, Mark. "Augmented reality in education." *New Horizons for Learning* 12, no. 5 (2002): 1-5.

[4] Hilken, Tim, Ko de Ruyter, Mathew Chylinski, Dominik Mahr, and Debbie I. Keeling. "Augmenting the eye of the beholder: exploring the strategic potential of augmented reality to enhance online service experiences." *Journal of the Academy of Marketing Science* 45 (2017): 884-905. https://doi.org/10.1007/s11747-017-0541-x

[5] Kennedy-Eden, Heather, and Ulrike Gretzel. "A taxanomy of mobile applications in tourism." *e-Review of Tourism Research* 10, no. 2 (2012): 47-50.

[6] Kadi, David, and Albertus Joko Santoso. "Mobile application development with augmented reality for promoting tourism objects in Southwest Sumba." In *2017 3rd International Conference on Science in Information Technology (ICSITech)*, pp. 200-205. IEEE, 2017. https://doi.org/10.1109/ICSITech.2017.8257110

[7] Yusof, Norhana, Nazrul Azha Mohamed Shaari, and Eizwan Hamdie Yusoff. "CBT4Depression: A Cognitive Behaviour Therapy (CBT) Therapeutic Game to Reduce Depression Level among Adolescents." *International Journal of Advanced Computer Science and Applications* 13, no. 9 (2022): 257-264. https://doi.org/10.14569/IJACSA.2022.0130930

[8] Yusof, Norhana, Salina Ismail, Azizah Che Omar, and Sobihatun Nur Abdul Salam. "CBT4Depression : A Therapeutic Game." *International Journal of Recent Technology and Engineering* 7, no. 6S2 (2019): 72-78.

[9] Yusof, Norhana, and Riaza Mohd Rias. "Serious game based therapeutic: Towards therapeutic game design model for adolescence." In *2014 IEEE Conference on e-Learning, e-Management and e-Services (IC3e)*, pp. 40-45. IEEE, 2014. https://doi.org/10.1109/IC3e.2014.7081239

[10] Guarana. "Why Typography Plays An Important Role in The Mobile User Experience." *Guarana Technologies*. July 25, 2019. https://guarana-technologies.com/blog/user-experience/typography/.

[11] Planetary Science Institute. "Augmented Reality (AR)." *Planetary Science Institute*. Accessed July 25, 2022. https://www.psi.edu/techniques/augmented-reality-ar.

[12] Kunapalan, Hemamalani, Norafidah Binti Ismail, and Aminurraasyid Bin Yatiban. "The Roles of Non-Governmental Organisations (NGOs) in Assisting Refugees: From Malaysia Context." *Malaysian Journal of Social Sciences and Humanities (MJSSH)* 5, no. 5 (2020): 89-94. https://doi.org/10.47405/mjssh.v5i5.401

[13] Daponte, Pasquale, Luca De Vito, Francesco Picariello, and Maria Riccio. "State of the art and future developments of the Augmented Reality for measurement applications." *Measurement* 57 (2014): 53-70. https://doi.org/10.1016/j.measurement.2014.07.009
[14] Adhani, Nur Intan, and Dayang Rohaya Awang Rambli. "A survey of mobile augmented reality applications." In *1st International Conference on Future Trends in Computing and Communication Technologies*, pp. 89-96. 2012.
[15] Barnes, Colin, Geoff Mercer, and Tom Shakespeare. "Exploring disability, Cambridge." *Polity* (2010): 1-11.
[16] Evans, David, Jane Coad, Kiera Cottrell, Jane Dalrymple, Rosemary Davies, Christine Donald, Vito Laterza et al. "Public involvement in research: assessing impact through a realist evaluation." *Health Services and Delivery Research* 2, no. 36 (2014). https://doi.org/10.3310/hsdr02360
[17] Furht, Borko, ed. *Handbook of augmented reality*. Springer Science & Business Media, 2011. https://doi.org/10.1007/978-1-4614-0064-6
[18] Li, Yiqi, Jieun Shin, JIngyi Sun, Hye Min Kim, Yan Qu, and Aimei Yang. "Organizational sensemaking in tough times: The ecology of NGOs' COVID-19 issue discourse communities on social media." *Computers in Human Behavior* 122 (2021): 106838. https://doi.org/10.1016/j.chb.2021.106838
[19] Corlett, Richard T., Richard B. Primack, Vincent Devictor, Bea Maas, Varun R. Goswami, Amanda E. Bates, Lian Pin Koh et al. "Impacts of the coronavirus pandemic on biodiversity conservation." *Biological Conservation* 246 (2020): 108571. https://doi.org/10.1016/j.biocon.2020.108571
[20] Kaneko, Yoshiki. "Dual Structure in the State-NGO Relationship." *The State and NGOs: Perspective from Asia* 25 (2002): 178. https://doi.org/10.1355/9789812307156-012
[21] Abd Muin, Mohd Adib, Mohd Sollehudin Shuib, Azizah Che Omar, Amirul Haqeem Abd Ghani, and Normaizatul Akma Saidi. "The Challenges of the Industrial Revolution 4.0 in Islamic Social Entrepreneurship in the Covid-19 Era." *Journal of Advanced Research in Applied Sciences and Engineering Technology* 28, no. 2 (2022): 235-246. https://doi.org/10.37934/araset.28.2.235246
[22] Hameed, Hassan. "Quantitative and qualitative research methods: Considerations and issues in qualitative research." *Maldives National Journal of Research* 8, no. 1 (2020).
[23] Baburajan, Vishnu, João de Abreu e Silva, and Francisco Camara Pereira. "Open-ended versus closed-ended responses: a comparison study using topic modeling and factor analysis." *IEEE Transactions on Intelligent Transportation Systems* 22, no. 4 (2020): 2123-2132. https://doi.org/10.1109/TITS.2020.3040904
[24] Thomas, Daniel J. "Computer-aided medicine revolution." *ITNOW* 58, no. 4 (2016): 40-41. https://doi.org/10.1093/itnow/bww107
[25] Omar, Azizah Che, Nurulnadwan Aziz, and Mohd Adib Abd Muin. "User Experience on BM Year 2 Mobile-based Learning Application for Alpha Generation." *International Journal of Interactive Mobile Technologies* 15, no. 6 (2021): 65-76. https://doi.org/10.3991/ijim.v15i06.20639
[26] Aziz, Nurulnadwan, Azizah Che Omar, Ariffin Abdul Mutalib, Siti Zulaiha Ahmad, and Mohd Adib Muin. "Uncovering the needs for a hybridized interaction design model for sign language learning through experts' feedback." In *Journal of Physics: Conference Series*, vol. 1529, no. 4, p. 042102. IOP Publishing, 2020. https://doi.org/10.1088/1742-6596/1529/4/042102
[27] Omar, Azizah Che, Nurulnadwan Aziz, Mohd Adib Abd Muin, Subashini A. Annamalai, and Muhamad Amar Mahmad. "Development and Expert Review of iZakat Kedah Mobile Application." *International Journal of Interactive Mobile Technologies* 16, no. 20 (2021). https://doi.org/10.3991/ijim.v15i20.23715
[28] Wang, Dan, Khoo Terh Jing, and Zhangfei Kan. "Exploring the application of digital data management approach for facility management in Shanghai's high-rise buildings." *Progress in Energy and Environment* 13 (2020): 1-15.
[29] Yee, Ha Chin, Khoo Terh Jing, and Loh Jia Xuan. "Barriers to green building implementation in Malaysia: A systematic review." *Progress in Energy and Environment* 24 (2023): 11-21. https://doi.org/10.37934/progee.24.1.1121