International Journal of Allied Research in Engineering and Technology (IJARET)
Volume.13, Number 5; May-2022;
ISSN: 2836-5631| Impact Factor: 5.52
https://zapjournals.com/Journals/index.php/ijaret
Published By: Zendo Academic Publishing

INTERACTIVE CULTURAL EXPERIENCE: ACEHNESE TRADITIONAL CLOTHING RECOGNITION USING AUGMENTED REALITY

[1]Mustaqim, S. T. Pd, and [2]N. Kurniawan,

Article Info

Keywords: Acehnese traditional clothing, Indonesia, Augmented Reality, markerless AR, cultural recognition

Abstract

This research aims to address the lack of reference information on traditional Indonesian clothing, particularly focusing on Acehnese traditional clothing, which possesses diverse motifs and patterns across different districts in Aceh, Indonesia. The dearth of knowledge regarding the various traditional Acehnese attire highlights the need for interactive and engaging media platforms to introduce and preserve this cultural heritage effectively. In response to the rapid growth of information and communication technology, this study proposes the utilization of Augmented Reality (AR) technology to create an innovative cultural recognition medium for Acehnese traditional clothing.

The significance of AR technology in diverse fields, such as gaming, entertainment, education, and healthcare, is well-established. However, its application in cultural recognition media remains relatively unexplored. This research addresses this gap by leveraging markerless AR technology, which offers advantages over traditional marker-based AR technology. By utilizing markerless AR technology, this application aims to overcome limitations and enhance the interactive experience for users while exploring and learning about Southeast Acehnese traditional clothing.

The research entails the development of an AR-based application that showcases 3D representations of Acehnese traditional clothing, specifically from the Southeast Aceh region. Through this application, users will have the opportunity to immerse themselves in a virtual environment that accurately reflects the richness and diversity of Acehnese cultural attire. By presenting information through an interactive and engaging medium, the application seeks to captivate the audience's interest and foster a deeper appreciation for Acehnese traditional clothing.

[1] *Master Student Department of Information Technology, Universitas Malikussaleh, Aceh, Indonesia*
[2] *Department of Information Technology, Universitas Malikussaleh, Aceh, Indonesia*

The outcome of this research is expected to contribute significantly to cultural preservation and recognition efforts, providing a novel and accessible platform for individuals to explore and appreciate the beauty of Acehnese heritage. Furthermore, this study paves the way for future applications of AR technology in cultural preservation and educational endeavors, extending its potential impact beyond the scope of traditional clothing to various other aspects of cultural heritage.

1. Introduction

There are many traditional clothes owned by Indonesia, but the reference information is still lacking. Likewise, with references to traditional Acehnese clothing. [1] Aceh is one of the provinces in Indonesia that has several traditional clothes that have different motifs/patterns from each district owned, such as Aceh Tenggara, Aceh Tamiang, and central Aceh. [2] [3] Such conditions lead to a lack of knowledge about the many traditional Acehnese traditional clothes. So we need media that can introduce these traditional clothes interestingly and interactively.

The development of information and communication technology is growing rapidly in all fields, one of which is Augmented Reality technology which has been widely available and used in the game industry, entertainment, education, and even in the medical field. However, in cultural recognition media, the use of Augmented Reality technology is still very little. The existence of markerless Augmented Reality technology can overcome the shortcomings of marker-based Augmented Reality technology [4] [5] [6].

Based on these problems, the application of Augmented Reality still lacks cultural recognition. Therefore, an application will be built that utilizes Augmented Reality technology to introduce Acehnese traditional clothing, which displays 3D objects of Aceh traditional clothing, namely Southeast Aceh.

It is hoped that the application of the introduction of Acehnese traditional clothing based on Augmented Reality can create a media for the introduction of Acehnese traditional clothing that is more interactive and interesting.

2. Literature Review

Nanggroe Aceh Darussalam (NAD) is a province in Indonesia located at the western tip of the island of Sumatra. This province earned the nickname Veranda of Mecca because of its cultural customs, which were strongly influenced by Islamic culture from the Arabian peninsula. One of the cultures in the customs of Nanggroe Aceh Darussalam which breathes Islamic culture, for example, can be found in the style of dress. Aceh's traditional clothing for both men and women is an acculturation of Malay culture and Islamic culture so it is very unique and a pity to miss. Acehnese traditional clothes for men are called Linto Baro, while those for women are called Dara Baro. Both of these clothes have characteristics in each part [7] [8].

Augmented reality is a technology that combines two-dimensional or three-dimensional virtual objects into a real three-dimensional environment and then projects these virtual objects in real time [9]. Augmented reality displays information in the form of labels or virtual objects that can only be seen with a cellphone camera or with a computer. The system in augmented reality works by analyzing real-time objects captured in the camera. Augmented Reality allows users to see three-dimensional virtual objects projected onto the real world [10] [11] [12] [13] [14].

Unity is not designed for the design or modeling process, because Unity is not a tool for designing. If you want to design, use another 3D editor like 3dsmax or Blender. The scripting features provided support for 3 programming languages, JavaScript, C++, and Boo. Flexible and Easy Moving, rotating, and scaling objects only need a line of code. In the making of Augmented Reality using unity 3D, we add Vuforia as a plug-in from Augmented Reality itself and unity 3D as its SDK [15] [16] [17] [18].

Qualcomm's Vuforia SDK is a library that is used to support Augmented Reality on Android. Vuforia analyzes images using marker detectors and generates 3D information from markers that have been detected via the API. In order to obtain a key point on the marker image, the marker will be converted to a grayscale image [19] [7]. Grayscale is a pixel color that is in the range of black and white gradations. This image format is called a degree of gray because there is a gray color between the minimum color (black) and the maximum color (white) [9] [4] [20].

3. Method

The research flow chart can be seen in Figure 1.

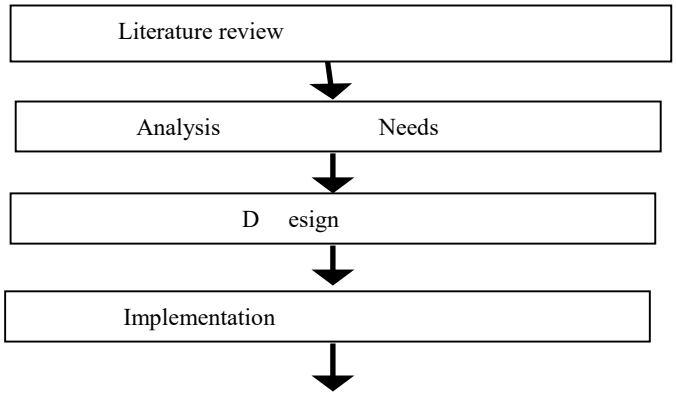

Fig. 1: Research flowchart

From Figure 1 it can be explained that the image is a research flow chart consisting of several points, namely the literature study, which needs analysis. design, implementation and analysis, and testing. Each point is interconnected in the completion of the research so that the research flow is more focused.

The following is an *Augmented Reality* program *Flowchart :*

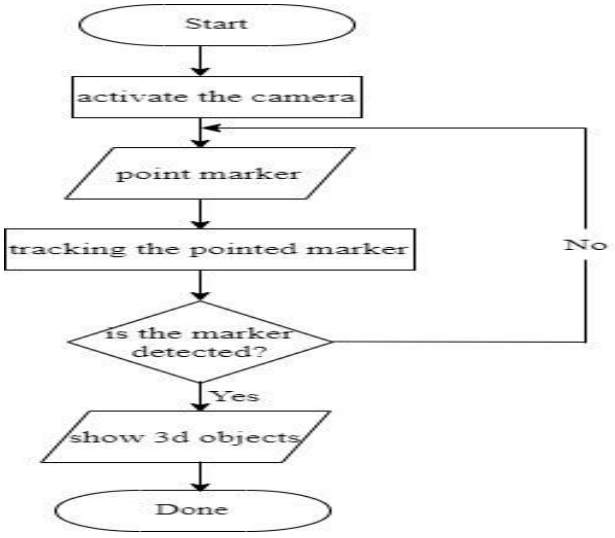

Fig. 2: *Augmented Reality* Program *Flowchart*

Based on Figure 2, the Augmented Reality program flowchart, can be explained the program processing steps starting from directingmarkers to displaying 3D objects from the detected markers.

4. Result and Discussion

The following is an overview of the design of the application system for the introduction of Aceh traditional clothing. The model developed uses object-oriented development with UML (Unified Modeling Language) tools.

4.1 Usecase Diagram

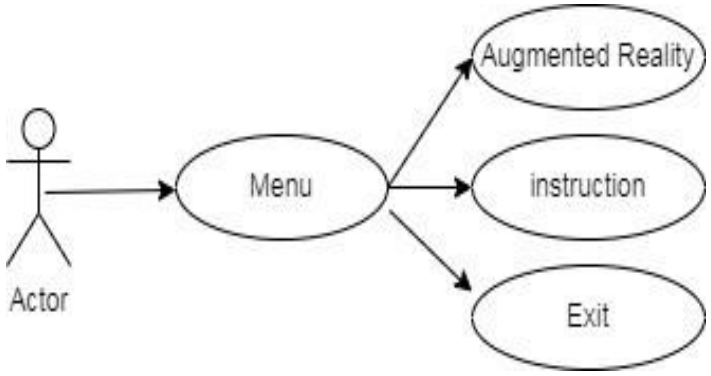

Fig. 3: Usecase Diagram

In the Usecase diagram of the android-based Aceh traditional clothing introduction application, there is one actor, namely the user who can access the main menu.

4.2 Activity Diagrams

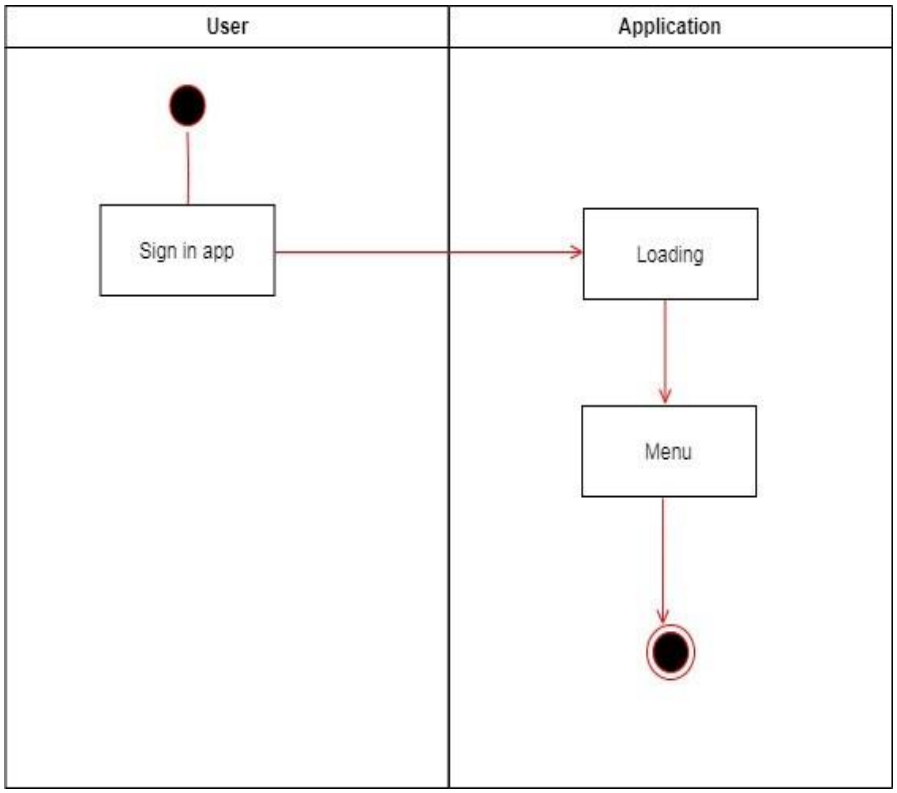

Fig. 4: Main menu activity diagram

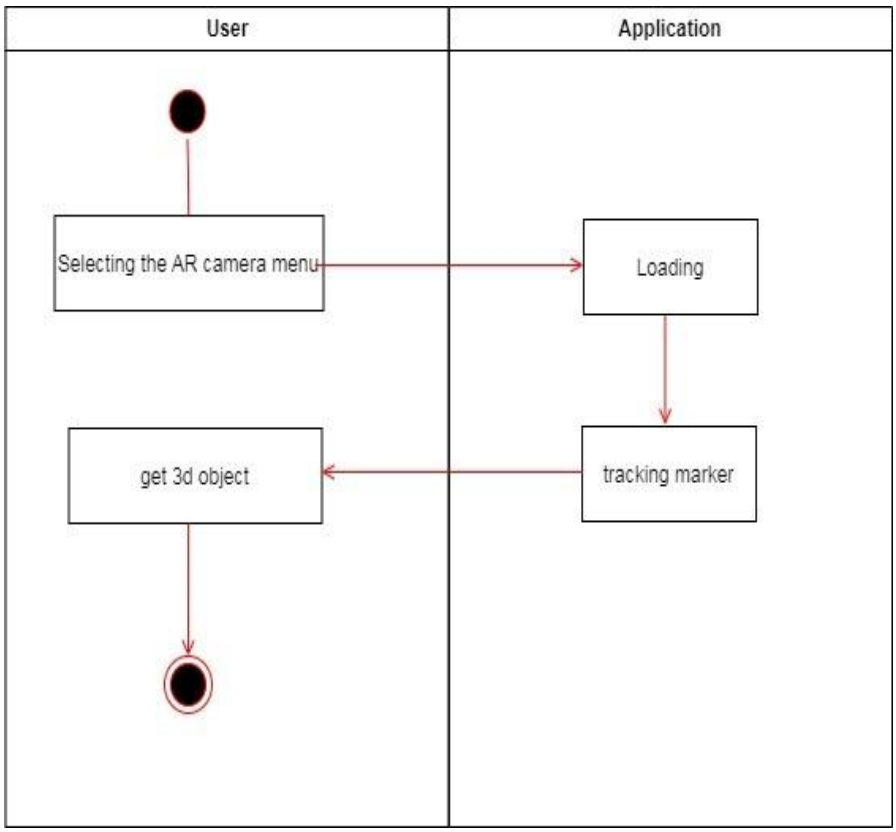

Fig. 5: Augmented Reality Activity Diagram

4.3. Sequence Diagram

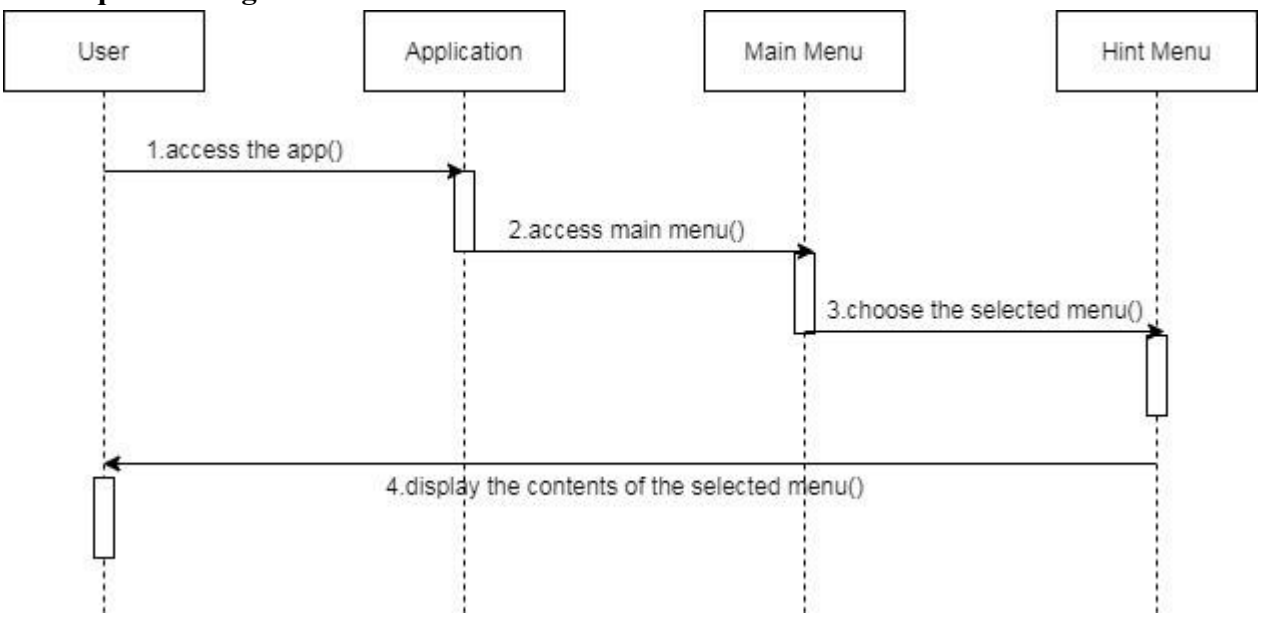

Fig. 6: Sequence Diagram

The Splash Screen page is the main display that appears when the application is run. On this page, there is an AR Camera button, where the button is directing the user to the introduction page of Aceh traditional clothing.

Fig. 7 and Fig. 8: Splash Screen page and main menu

The AR camera menu page is a page that displays any 3D objects in the application. Figure 9 shows one of the 3d objects of southeast Aceh traditional clothing. The Home button on this AR camera page directs the user to return to the main page.

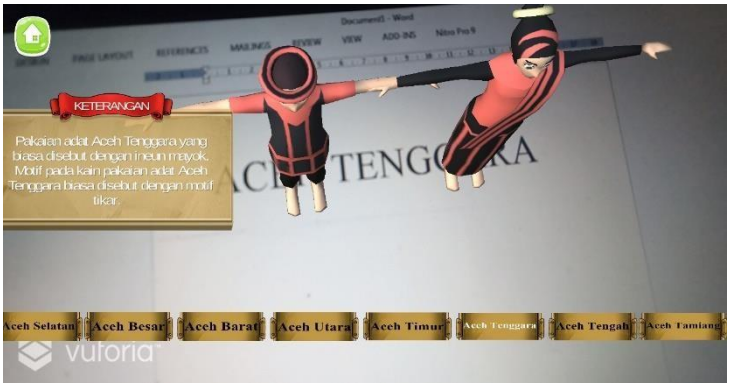

Fig. 9: Southeast Aceh marker detection results

Testing markers on AR cameras must use predetermined markers, if the user uses other markers, then the AR camera cannot display objects. Marker testing on \AR cameras was tested based on distance, angle, and lighting. In the distance test, the minimum distance and maximum distance are calculated, in the angle test the marker angle is calculated, and in the light test the amount of light is calculated at the test place, it cannot be too dark or too bright. The camera used for the distance, angle, and lighting testing process is the Oppo A5s 3 GB RAM smartphone camera with a camera resolution of 1080 x 2280 pixels, a Screen Size of 5 inches, and 16 MP + 5 MP camera effective pixels dual. The marker detected by the camera is Times New Roman writing on paper that has been printed with the same light-level resolution in one room. Distance testing is done using a measuring tape (meter), angle testing is done using an arc, and lighting testing is done using a Lux meter.

Table 1: Recapitulation of Distance Testing

No.	Distance	Result
1.	Minimum Distance	5 cm
2.	Maximum Distance	80 cm

Table 2: Recapitulation of Angle Testing

No.	Angle	Result
1.	Minimum Angle	0
2.	Maximum Angle	75

5. Conclusion

Based on the test results, it can be concluded that the system design has been carried out using Unified Modeling Language (UML) diagrams include use case diagrams, activity diagrams, and sequence diagrams. This system is built using the C++ language using the Unity application and the vuforiSDK platform. Then the test results have been obtained on the Southeast Aceh traditional clothing recognition application, namely, the minimum distance that can display 3d objects is a distance of 5 cm and the maximum distance that can be detected is 80 cm. And the minimum angle of inclination detected is an angle of 0°, while the maximum angle of inclination detected is an angle of 75°.

References

A. Ihsan, N. Fadillah, and C. R. Gunawan, "Acehnese traditional clothing recognition based on augmented reality using hybrid tracking method," *Indones. J. Electr. Eng. Comput. Sci.*, vol. 20, no. 2, pp. 1030–1036, 2020, doi: 10.11591/ijeecs.v20.i2.pp10301036.

M. M. Mukti Qamal, Fajriana, "Metode Naïve Bayes Untuk Menentukan Rekomendasi Tempat Wisata Terbaik Di Aceh," *Techsi*, vol. 13, pp. 81–91, 2021.

Nurdin *et al.*, "Detection System of Aceh Ethnic Music Types Based on Sound Using the Hubbard Stratonovich Transformation Method," *J. Phys. Conf. Ser.*, vol. 1363, no. 1, 2019, doi: 10.1088/1742-6596/1363/1/012076.

K. Dewi and A. Sahrina, "Urgensi augmented reality sebagai media inovasi pembelajaran dalam melestarikan kebudayaan," *J. Integr.*

dan Harmon. Inov. Ilmu-Ilmu Sos., vol. 1, no. 10, pp. 1077–1089, 2021, doi: 10.17977/um063v1i102021p1077-1089.

R. Ennis *et al.*, "J p t e o," *J. Clean. Prod.*, 2018.

G. De Magistris *et al.*, "Dynamic control of DHM for ergonomic assessments," *Int. J. Ind. Ergon.*, 2013, doi: 10.1016/j.ergon.2013.01.003.

I. Mustaqim, S. T. Pd, and N. Kurniawan, ع دب معنملا دمحم ينيسحلا في ةدحو نم رقم ر بسالحا ا للآ في ليصتح و تا هاج سعلما ز
ت يونا في ةدحو نم رقم ر بسالحا للآ في ليصتح و تا هاج رثأ مادختسا ينقت ت عقاولا سعلما ز [7] ") Augmented Reality (
Fourth Int. Conf. Comput. Commun. –48, .2016 تنب اهم) Augmented Reality (دادعإ بلاطلا ة بلاط ثابلاطلما تلحرلا ثلا
2018 ",ين *Control Autom.*, vol. 31, no. June, pp. 36

M. S. Kahar, "Analisis motivasi belajar dalam pelaksanaan praktikum fisika," *J. Form.*, 2018, doi: 10.30998/formatif.v8i1.2304.

N. Elmqaddem, "Augmented Reality and Virtual Reality in education. Myth or reality?," *Int. J. Emerg. Technol. Learn.*, vol. 14, no. 3, 2019, doi: 10.3991/ijet.v14i03.9289.

A. Nugroho and B. A. Pramono, "Aplikasi Mobile Augmented Reality Berbasis Vuforia Dan Unity Pada Pengenalan Objek 3D

Dengan Studi Kasus Gedung M Universitas Semarang," *J. Transform.*, vol. 14, no. 2, p. 86, 2017, doi: 10.26623/transformatika.v14i2.442.

R. Dijaya, N. M. Maulidah, and D. Abdullah, “Flashcard computer generated imagery medicinal plant for orthopedagogic education,” 2018, doi: 10.1051/matecconf/201819715005.

I. Stamelos *et al.*, “Towards a Remote Warehouse Management System,” in *Advances in Intelligent Systems and Computing*, 2021, vol. 1231 AISC, doi: 10.1007/978-3-030-52575-0_28.

T. Morimoto *et al.*, “XR (Extended Reality: Virtual Reality, Augmented Reality, Mixed Reality) Technology in Spine Medicine: Status Quo and Quo Vadis,” *Journal of Clinical Medicine*, vol. 11, no. 2. 2022, doi: 10.3390/jcm11020470.

M. Andriani, H. Irawan, and N. Rizqa Asyura, “Improving Quality Using The Kano Model in Overcoming Competition in The Service Industry,” *Int. J. Eng. Sci. Inf. Technol.*, vol. 1, no. 4, 2021, doi: 10.52088/ijesty.v1i4.145.

A. F. Ramadhan, A. D. Putra, and A. Surahman, “Aplikasi Pengenalan Perangkat Keras Komputer Berbasis Android Menggunakanaugmented Reality (Ar),” *J. Teknol. dan Sist. Inf.*, vol. 2, no. 2, pp. 24–31, 2021.

M. J. Sousa and Á. Rocha, “Digital learning: Developing skills for digital transformation of organizations,” *Futur. Gener. Comput. Syst.*, vol. 91, 2019, doi: 10.1016/j.future.2018.08.048.

Y. Zhang, M. J. Cassidy, and B. Bienen, “A plasticity model for spudcan foundations in soft clay,” *Can. Geotech. J.*, 2014, doi: 10.1139/cgj-2013-0269.

A. Bashier and A. Dahlan, “The money demand function for Jordan: An empirical investigation,” *Int. J. Bus. Soc. Sci.*, 2011.

Nurdin, D. Hamdhana, and M. J. Setiawan, “Sistem Pendeteksi Pola Lafadz Allah Dan Muhammad Pada Citra Al-Qur’an Menggunakan Metode Peirce,” *e-Journal Techsi Tek. Inf.*, vol. 9, no. 2, pp. 78–90, 2017.

A. Ayoub and Y. Pulijala, “The application of virtual reality and augmented reality in Oral & Maxillofacial Surgery,” *BMC Oral Health*, vol. 19, no. 1, 2019, doi: 10.1186/s12903-019-0937-8.