

,_default.groups.name.manager r_,_253-262_LAST_746-2389-2- EDIT.pdf

by Rohman Dijaya

Submission date: 29-May-2023 11:52AM (UTC+0700)

Submission ID: 2104287244

File name: ,_default.groups.name.manager_,_253-262_LAST_746-2389-2-EDIT.pdf (806.33K)

Word count: 4594

Character count: 24552

Application of Augmented Reality to Replicate Couples Sit in Wedding Ceremony

Achmad Ariq Rivaldhi¹, Rohman Dijaya²

^{1,2}Informatics Department, Faculty of Science & Technology, Universitas Muhammadiyah Sidoarjo, Indonesia

Article Info

Article history:

Received May 27, 2021
Revised August 16, 2021
Accepted August 31, 2021
Published December 26, 2021

Keywords:

Augmented Reality
Couples sit in
Replication
Wedding Ceremony

ABSTRACT

In Indonesia, the bride and groom do pre-wedding photos like a tradition before marriage with couple sit in wedding ceremony. The splendor of the wedding ceremony made many vendors interested in running a wedding party business. These vendors provide services and goods related to wedding parties, such as wedding organizers, bridal, party decorations (couples sit in of wedding ceremony), as well as photo and video documentation. To give more virtual wedding nuance experience to customer, augmented reality was applied. This research develop application of augmented applying to replicate couples sit in of wedding ceremony. Augmented reality (AR) technology adopted to promote couples sit in of wedding ceremony. Moreover, combines wedding ceremony nuance and augmented reality make consumers who want to find 3D wedding background desired.

Corresponding Author:

Rohman Dijaya,
Informatics Department, Faculty of Science & Technology,
Universitas Muhammadiyah Sidoarjo,
Jl. Raya Gelam No. 250 Candi, Sidoarjo, Indonesia
Email: rohman.dijaya@umsida.ac.id

1. INTRODUCTION

Marriage is an obligation for every individual as regulated in every religious teaching. In every religious teaching, marriage has a sacred meaning, which basically aims to form a happy family [1]. Indonesia has a wide variety of cultures and customs. In particular, wedding customs in Indonesia are unique [2]. The wedding party is one of the special ceremonies that are held on a large scale for the upper class. The splendor of the wedding ceremony made many vendors interested in running a wedding party business. These vendors provide services and goods related to wedding parties, such as wedding organizers, bridal, party decorations, as well as photo and video documentation. Among the photo and video vendors, photo and video vendors also offer pre-wedding photo services. In Indonesia, the bride and groom do pre-wedding photos like a tradition before marriage with couple sit in wedding ceremony. Through pre-wedding photos, they can express their respective identities, so that they apply themes to pre-wedding photos that match their interests, hobbies, and favorites [3]. Photos and videos of the nuances of the couple sit in wedding ceremony have not fully provided a more visual experience and limited interaction. An initial promotion tool is needed with technology that allows potential customers to have a visual experience that photos and videos don't have. Prospective customers can feel and interact with the object of the couple sit in of the wedding ceremony virtually.

Technologies that enable virtual experiences, one of which is Augmented reality (AR) that superimposes virtual world computers that are generated graphically in the real world seen by users. Compared to VR which is composed of artificial and virtual objects only, AR technology allows users to feel more sensations and reality because it is based on the real world [4]. Over the last few years, AR technology has become more accurate and has reduced the latency generated by image processing which greatly improves user immersion in the augmented world [5]. Merging of real and virtual objects is possible with suitable display technology, interactivity is possible through certain input devices and good integration requires suitable tracking [6]. Augmented Reality application about medicinal plants that can display 3D objects of these medicinal plants by applying Augmented Reality technology [7]. Marker-less Virtual Reality possible every object or entire room can be used as an object. Marker-less in Virtual Reality is a technology that is

more sophisticated than Virtual Reality or Virtual Reality that uses markers. Without a marker, the user can easily use a room without being bound to the markers that have been made on the application [8].

In many realities, our society is a photographic society, both because of conditions and due to coincidences. This statement relates to the current condition of society, which is so closely related to photography, especially photo-photographing activities, and that it seems as if everyone is a photographer and photo model. Almost in every place and time people can take pictures. This can be so because currently photography is something that is easy, cheap, fun, and can be reached by all people [9]. Outdoor augmented reality (AR) lies in the variety of uncontrollable environmental conditions that may exist, in particular large-scale fluctuations in natural lighting and wide variations in possible backgrounds or objects in the scene [10]. If Augmented Reality content remains innovative and engaging, customers will inevitably adopt AR technology as a new and exciting twist to use digital solutions [11]. Based on problem of wedding vendor to transfer couples sit in of wedding ceremony to prospective customers this research was developed. The aim of this research to replicate of couples sit in of wedding ceremony by applying augmented reality. This research shows that technology may not have been widely used, combines wedding ceremony nuance and augmented reality. Because so far, the wedding background shown to consumers is in the form of 2D not 3D images. Moreover, consumers who want to find 3D wedding background designs using augmented reality.

2. RELATED WORK

Wedding Background AR is an application that has an attractive design that is very much needed by customers who want to get married. Next in this section will discuss Augmented Reality reviews, 3D models as a promotion and further exploration related to mobile applications with Augmented Reality created.

2.1. Augmented Reality

Augmented Reality Technology, or AR for short. Using this technology to link information content, making it possible to connect things in the real world that are difficult to get actual experience with the entity. After the real world and the virtual world have overlapped, virtual and real things can exist in the same space. When implementing augmented reality technology, not only can real world content be displayed effectively, but also virtual world content can be displayed. After two different contents are superimposed, they can complement each other and have original flaws. The content is completed effectively [12].

Using augmented reality technology to simulate things in reality and turn things into reality can change people's perceptions of the objective world. First, the use of augmented reality technology simplifies people's cognition and understanding of the objective world. Through virtual creation, not only the imagination of people's liberation is realized, but people's imaginations can also be better played, and the abstraction can be in the form of certain image content, breaking through time constraints [13]. visualization via AR can lead to better understanding compared to traditional 2D paper [14].

Augmented reality is one of the most modern information visualization technologies, Augmented reality technology is often used for: social interactions (communication, entertainment, and games); education; tourism; buy or sell and presentations [15]. AR as a strategic concept that integrates digital information or objects into the subject's perception of the physical world, often combined with other media, to expose, articulate, or show benefits to consumers to achieve organizational goals [16]. Augmented Reality (AR) interfaces have been studied extensively over the last few decades, with a growing number of user-based experiments. Since the early 1960's, more sophisticated and portable hardware has become available, with registration accuracy, graphics quality, and device size largely aimed at satisfactory levels, which has led to rapid growth in the adoption of AR technology [17].

2.2. Promotion 3D Model

AR is the first application that is starting to be widely used. AR, where 3D virtual objects are integrated into a real 3D environment in real time. AR is to "virtualize" virtual images into real space, creating fully virtualized space around the user's eyes to replace the real space. To make users see the world that has a real environment and is generated by computer graphics in real scenes [18]. The development of technology is now being adjusted to facilitate human work in various fields. The change is triggered when technology develops rapidly to be able to improve the quality of human life, its role is also increasingly being noticed and felt by various sectors such as telecommunications, business, administration, entertainment [19].

One of the main challenges in the field of Computer Vision is the reconstruction of objects or 3D views from a single 2D image. Although there are many important examples [20]. an increasing need for visualization techniques suitable for various application areas. It becomes more important for a wider audience

to get a better understanding of existing AR visualization techniques [21]. AR technology can see the real world, with virtual objects added to the real world. So, the user sees virtual objects and real objects at the same place. Delivering information by utilizing three-dimensional visualization techniques is very interesting because it can display a 3D model of an object before it is built. Augmented Reality is developing, and many applications and libraries are used to develop Augmented Reality. Examples of ARToolkit, Flartoolkit, Goblins, and others. Delivering information by utilizing this three-dimensional visualization technique is very interesting because it can present a three-dimensional view. model of an object before it is built in real terms [22].

2.3. Unity 3D

Unity is a software that has the main function to create games. In Unity, there are various features that are ready to be used in making interactive 2D or 3D games. Unity has a lot of advantages in it. For example, multiplatform, many package support and a free version is available for students. Unity is the same as other game-making software, Unity also supports several programming languages, namely C#, Java Script, Boo [23].

3. METHOD

Several research methods that can be used are the Vaughan method, the Luther method, the Villamil Molina method, and the Dastbaz method, the Godfrey method, and the Sherwood-Rout method. From several choices of available multimedia development methods, Luther's method is considered the most suitable for AR-based research [24]. The research method flow used describes a systematic and sequential approach to software development that will be used in researching this scientific work. Among them are data collection, needs analysis, multimedia product design, and evaluation. The stages of the Luther method are as follows:

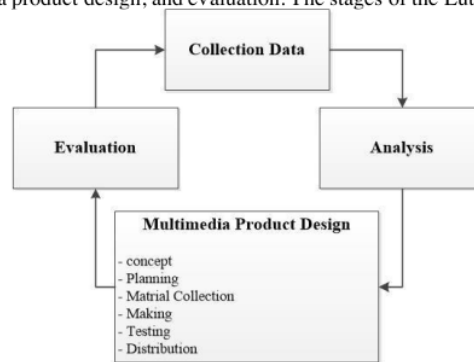


Figure 1. Research Methods

3.1. Collection Data

This data collection is to collect any data, materials and information that support the making of this application.

1. Literature Review

Study is carried out to support the research process, literature study is carried out from several references such as the web, journals and books that are relevant to this research. To read and study studies or research theories to add references to this research.

2. Observation

Observations are carried out by interviewing and questionnaires to find out what the prospective buyer isa problem can be drawn along with its solution.

3.2. System Analyze

Needs analysis in making this application includes the data that has been collected, then determines what the system must do as well as what kind of characters and specifications the system must have for making applications for both input and output.

3.3. Multimedia Product Design

The design method in this study uses the Multimedia Development Life Cycle (MDLC) - Luther (1994), this method consists of concept, design, collection of materials, manufacture, testing, distribution.

1. Concept At this stage the target user will be determined, the purpose of the application to be built along with the specifications to be.
2. Design At this design stage the program specifications, appearance, and other material requirements for the program are determined.
3. Material collection at this data collection stage is to collect all data, information and object to design and build applications and collect other materials according to the needs of the application to be made.
4. Making At this stage of manufacture, all multimedia objects and materials needed by the application will be created.
5. Testing At this testing stage, testing the application by running the program carried out by the maker and teammates and you can see whether there is an error or not. At this stage, conclusions can be drawn for the next step, namely evaluation.
6. Distribution At the distribution stage, it will be carried out if the program created has met the concerns of the prospective buyer, and the appropriate target has been determined at the concept stage, and the application is suitable for use by the user.

3.4. Evaluation

At this stage it is carried out after going through the design process and with the evaluation stage conclusions and ideas for further development of this research can be drawn.

4. RESULTS AND DISCUSSION

In the results and discussion stage, the author gets a solution in the form of using an Augmented Reality technology to provide information about wedding background rental services for weddings. With the help of Augmented Reality, consumers can also find out what a 3-dimensional design looks like before seeing the aisle installed in the consumer's home directly. Augmented Reality can be a learning media as well as visually interesting information media. This Augmented Reality application is called the AR Platform. The AR Courthouse is also equipped with several features, such as the availability of 2D and 3D design menus as well as an explanation of information from the AR Platform application. With the development of this application, the author hopes to increase the results of the aisle rental to consumers to get results. Not only that, but the author also explains the application system process as follows.

4.1. System Process

1. The user is given a catalog containing multiple sets of background images filled with markers and then the user uploaded and installed applications.
2. Prospective tenants can see 3d models by scanning the background of the marker marker on the brochure using the application.
3. Marker detected will show 3d models background models selected for tenants.
4. Potential tenants who already feel strongly about background design that they want to use for a wedding, so their prospective tenants will ask for more information.

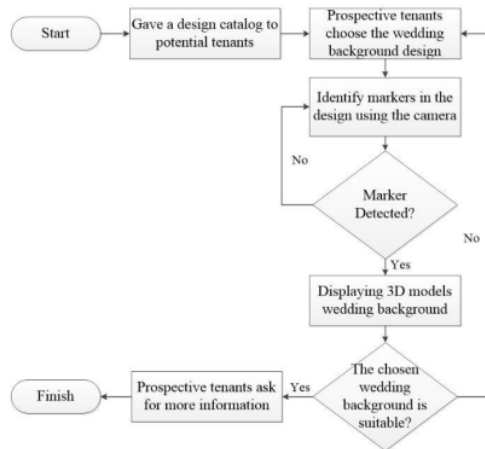


Figure 2. Flowchart System

4.2 Usecase Diagram

Illustrates the functions that exist in the system. This diagram focuses more on the features of the system from the point of view of an outside party, in this case the application user.

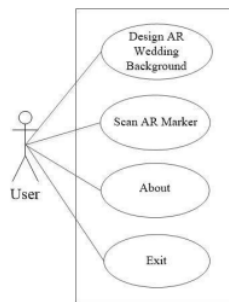


Figure 3. Usecase Diagram

In the picture above illustrates the features that can be accessed by users. Users can access all the menus contained in this application. Namely the AR background design menu, the AR scan menu, the about menu, and exit or exit the application.

4.3. Activity Diagram

Describes user activity when entering the AR wedding background menu. The user can enter this system by scanning the marker in the main menu.

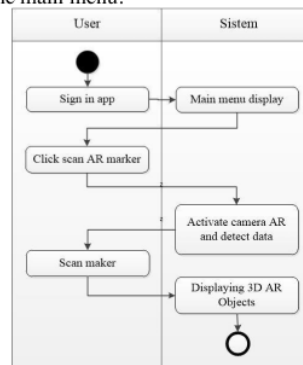


Figure 4. Activity Diagram

4.4. Software Implementation

At this stage, an explanation of several things related to the Couple Sit in AR application will be carried out, namely the implementation of the 3-dimensional model, the implementation of the marker and the implementation of the GUI (Graphic User Interface).

4.4.1. 3 Dimensional Model Implementation

In developing the application, the author uses a wedding background design to be used as a 3D object. The stages in making this 3 Dimensional object use Blender as a supporting tool. By combining several features in Blender, the author is able to make a simple wedding aisle background design into a 3D shape. As seen in the following Figure.



Figure 5. 3D Object View

4.4.2. Marker Implementation

The author uses Photoshop software to create a marker image design with a size of 724px x 363px, the image consists of 2 markers with each different design adjusting to 3D objects.

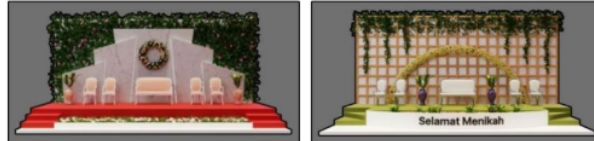


Figure 6. Marker

4.4.3. Graphic User Interface

In the application design stage, it is necessary to create an interface to make it more interactive and attractive. The following is the interface on the AR Wedding application..

1. the main menu pages

In the main menu display of the Couple Sit in AR application there are 4 options, namely Design, Scan AR, About and Exit. As shown in the following picture.

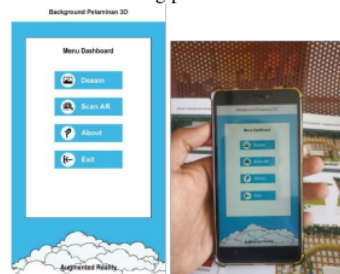


Figure 7. Main Menu Page

2. Design

On the design menu there is a choice of wedding background designs and specifications that can be seen by the user. As shown in the following picture.

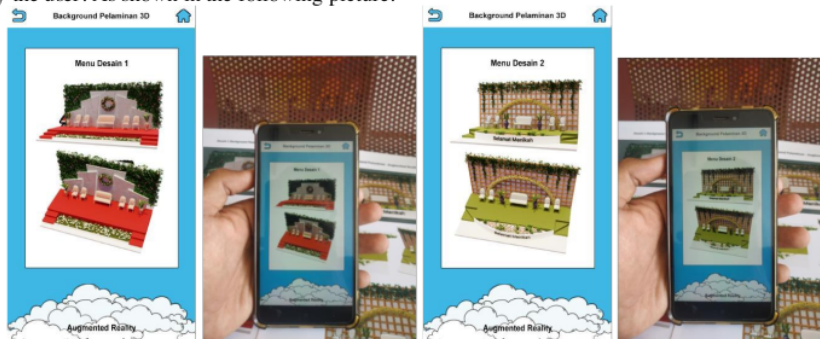


Figure 8. Menu display design 1 and 2

3. Scan AR

In the AR scan menu, there is a 3D wedding background object on the marker. The camera phone can read the marker and see in detail the shape of the wedding background. As shown in the following image.

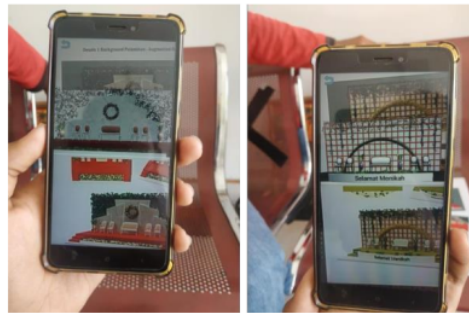


Figure 9. Scan AR Objects 1 and AR Objects 2

4. About Menu

On the about menu, there is a brief explanation of the 3D wedding background application and is easily understood by the user as shown in Figure 12.

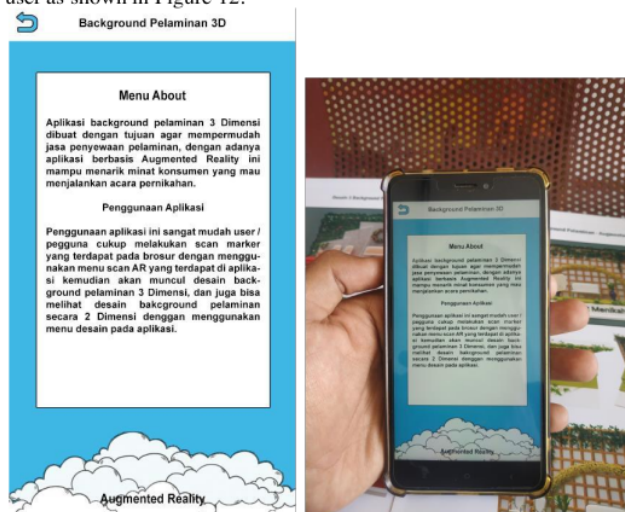


Figure 10. Display menu about

4.5. Testing

In the AR Couples sit in application, tests were carried out with three smartphones with different android versions, and there were 3 tests carried out, namely Blackbox Testing, Object Distance and Object Tilt Angle as shown in the following table.

Table 1. Device Testing

Device	Android Version	Camera Resolution
Advan G2	2.0 Marshmallow	13 MP
Xiaomi Note 4 Pro	7.1 Nougat	13 MP
Xiaomi Mi 6X	9.0 Pie	13 MP

1. Black box Testing

The testing phase using black box testing this method is only used to focus on the functions of the application. Black box testing stages by running all the menus contained in the application with the aim of showing the performance of this application well, as shown in the following table.

2. Distance Testing

Table 2. Black box testing

No	Page	Process	Results	Note
1	Main Menu	Device Available Internet Network	The Application displays the 3d object data from the database server on the design button page	OK
2	Main Menu	Device Available Internet Network	The application cannot fetch anything from the database server	OK
3	Main Menu	Pressing the "Design" Button	Application to the wedding background design page	OK
4	Main Menu	Pressing the "AR Scan"	The application goes to the scan marker page	OK
5	Main Menu	Pressing the "About" Button	Application to page about	OK
6	AR Scanner	Device Doesn't Have Camera	App show error device does not have camera	OK
7	AR Scanner	Pressing Back Button Tombol	The application displays the main menu page	OK

At this stage, the device camera is tested based on a certain distance to be able to detect objects. This test is carried out with a distance of 20 cm to 60 cm. as shown in the following table.

Table 3. Marker reads object against distance

Android Version	Camera Distance				
	20 cm	30 cm	40 cm	50 cm	60 cm
6.0 Marshmallow	OK	OK	OK	-	-
7.1 Nougat	OK	OK	OK	OK	-
9.0 Pie	OK	OK	OK	OK	-

3. Device Camera Angle Testing

The next step is to test the device's camera based on a certain tilt angle so that it can detect objects. This test is carried out with a maximum slope angle of 900, with an angle of 00 which is perpendicular to the marker as shown in the following table.

Table 4. The marker reads the object against the angle of inclination

Android Version	Title Angle				
	0°	20°	45°	70°	90°
6.0 Marshmallow	OK	OK	OK	-	-
7.1 Nougat	OK	OK	OK	OK	-
9.0 Pie	OK	OK	OK	OK	-

5. CONCLUSION

The wedding party is one of the special ceremonies that are held on a large scale for the upper class. The splendor of the wedding ceremony made many vendors interested in running a wedding party business. These vendors provide services and goods related to wedding parties, such as wedding organizers, bridal, party decorations, as well as photo and video documentation. Among the photo and video vendors, photo and video vendors also offer pre-wedding photo services. Photos and videos of the nuances of the couple sit in wedding ceremony have not fully provided a more visual experience and limited interaction. An initial promotion tool

is needed with technology that allows potential customers to have a visual experience that photos and videos don't have. Prospective customers can feel and interact with the object of the couple sit in of the wedding ceremony virtually. Based on problem of wedding vendor to transfer couples sit in of wedding ceremony to prospective customers this research was developed.

The AR Platform application is designed using Flowchart Diagrams, Use Case Diagrams, and Activity Diagrams with user entities. The Couple Sit in AR application is made using Unity3D software with the Vuforia Engine configuration, where the application can track markers. So that it can display 3D objects. At the system testing stage, it is carried out using the blackbox testing method, distance testing and tilt angle testing. The results of this test indicate that the application function runs as desired, and the smartphone specification factor greatly affects application performance when scanning markers to display 3-dimensional objects. Based on the results of the analysis, implementation and research testing of 3D Wedding Background application development using Augmented Reality, several conclusions can be drawn. In this research replicate of couples sit in of wedding ceremony by applying augmented reality. This research shows that technology may not have been widely used, combines wedding ceremony nuance and augmented reality. Because so far, the wedding background shown to consumers is in the form of 2D not 3D images. Moreover, consumers who want to find 3D wedding background designs using augmented reality. For the future research marker-less virtual reality and Kinect sensor will be added to improve performance of virtual experience.

6. REFERENCES

- [1] N. R. Dewi and H. Sudhana, "Hubungan Antara Komunikasi Interpersonal Pasutri denganKeharmonisan dalam Pernikahan," *J. Psikol. Udayana*, vol. 1, no. 1, pp. 22–30, 2013, doi:10.24843/jpu.2013.v01.i01.p03.
- [2] R. Windriani, M. B. Pranoto, and Y. Khumaeroh, "Jombie Jombie - Game Berbasis Android Untuk Mengenalkan Tradisi , Adat Dan Budaya Pernikahan IndonesiaJournal Jombie Jombie – Android Based Game To Introduce Tradition , Custom and Wedding Culture of Indonesia," *-Proceeding Appl.Sci.*, vol. 1, no. 2, pp. 1197–1203, 2015.
- [3] W. Lukito, I. R. Mutiaz, and Y. A. Piliang, "Pre-Wedding Photography," pp. 170–182.
- [4] D. H. Youm, S. H. Seo, and J. Y. Kim, "Design and development methodologies of Kkongalmon, alocation-based augmented reality game using mobile geographic information," *Eurasip J. Image Video Process.*, vol. 2019, no. 1, pp. 1–11, 2019, doi: 10.1186/s13640-018-0395-2.
- [5] A. Montero, T. Zarronandia, P. Diaz, and I. Aedo, "Designing and implementing interactive and realistic augmented reality experiences," *Univers. Access Inf. Soc.*, vol. 18, no. 1, pp. 49–61, 2019,doi: 10.1007/s10209-017-0584-2.
- [6] A. K. A., P. Studi, T. Informatika, and F. Teknik, "Melek IT," vol. 2, no. 1, pp. 65–74, 2016.
- [7] R. Dijaya, N. M. Maulidah, and D. Abdullah, "Flashcard computer generated imagery medicinal plant for orthopedagogic education," *MATEC Web Conf.*, vol. 197, pp. 1–6, 2018, doi: 10.1051/mateconf/201819715005.
- [8] R. Dijaya, A. N. Fadilah, E. A. Suprayitno, M. Suryawinata, and C. Taurusta, "Virtual reality markerless based on 3D for the representation of heart and circulatory system," *J. Adv. Res. Dyn.Control Syst.*, vol. 10, no. 6 Special Issue, pp. 1721–1725, 2018.
- [9] P. Ermawati, "Orientasi Fotografi Pengunjung Anjungan Wisata Di Kawasan Mangunan: KajianFungsi Foto Potret Di Media Sosial Instagram," *spectā J. Photogr. Arts, Media*, vol. 2, no. 2, pp. 105–122, 2019, doi: 10.24821/specta.v2i2.2551.
- [10] J. L. Gabbard, J. E. Swan, and D. Mix, "The effects of text drawing styles, background textures, andnatural lighting on text legibility in outdoor augmented reality," *Presence Teleoperators Virtual Environ.*, vol. 15, no. 1, pp. 16–32, 2006, doi: 10.1162/pres.2006.15.1.16.
- [11] A. Bachelor, D. Programme, and B. I. Technology, "Augmented Reality for wedding," 2019, [Online]. Available: https://www.theseus.fi/bitstream/handle/10024/170514/Bumba_Mädälina.pdf?sequence=2&isAllowed=y.
- [12] E. E. Cranmer, M. C. tom Dieck, and P. Fountoulaki, "Exploring the value of augmented reality for tourism," *Tour. Manag. Perspect.*, vol. 35, no. March, p. 100672, 2020, doi: 10.1016/j.tmp.2020.100672.
- [13] W. Lu, M. Wang, and H. Chen, "Research on Intangible Cultural Heritage Protection Based on Augmented Reality Technology," *J. Phys. Conf. Ser.*, vol. 1574, no. 1, 2020, doi: 10.1088/1742- 6596/1574/1/012026.
- [14] A. Jakl et al., "Enlightening Patients with Augmented Reality," pp. 195–203, 2020, doi: 10.1109/vr46266.2020.00038.
- [15] S. V. Karaarslan, "Application of augmented reality technologies in archaeology," *English Artic.*, vol. 2018, pp. 181–200, 2018, [Online]. Available: http://www.arkeotekno.com/pg_305_application-of-augmented-reality-technologies-in-archaeology.
- [16] P. A. Rauschnabel, R. Felix, and C. Hinsch, "Augmented reality marketing: How mobile AR-apps can improve brands through inspiration," *J. Retail. Consum. Serv.*, vol. 49, no. March, pp. 43–53, 2019, doi: 10.1016/j.jretconser.2019.03.004.
- [17] A. Dey, M. Billingham, R. W. Lindeman, and J. E. Swan, "A systematic review of 10 Years of Augmented Reality usability studies: 2005 to 2014," *Front. Robot. AI*, vol. 5, no. APR, 2018, doi: 10.3389/frobt.2018.00037.
- [18] T. K. Huang, C. H. Yang, Y. H. Hsieh, J. C. Wang, and C. C. Hung, "Augmented reality (AR) and virtual reality (VR) applied in dentistry," *Kaohsiung J. Med. Sci.*, vol. 34, no. 4, pp. 243–248, 2018, doi: 10.1016/j.kjms.2018.01.009.
- [19] M. Azhar, "Learning Experience through Augmented Reality of Maintenance Practice Learning Experience through Augmented Reality of Maintenance Practice Zain binti Retas Polytechnic Tun Syed Nasir . Nor Dina binti Sakaria Polytechnic Tun Syed Nasir . Polytechnic Tun S," no. July, 2020.
- [20] A. Johnston, "Single View 3D Reconstruction using Deep Learning," 2020.

- [21] S. Zollmann, R. Grasset, T. Langlotz, W. H. Lo, S. Mori, and H. Regenbrecht, "Visualization Techniques in Augmented Reality: A Taxonomy, Methods and Patterns," *IEEE Trans. Vis. Comput. Graph.*, no. September, 2020, doi: 10.1109/TVCG.2020.2986247.
- [22] M. B. Firdaus, J. A. Widiars, and J. Y. Padant, "Augmented reality for interactive promotion media at Faculty of Computer Science and Information Technology Mulawarman University," *J. Phys. Conf. Ser.*, vol. 1341, no. 4, 2019, doi: 10.1088/1742-6596/1341/4/042017.
- [23] U. Rio, S. Erlinda, and D. Haryono, "Implementasi Model Mobile Augmented Reality e-Booklet untuk Mempromosikan Object Wisata Unggulan Provinsi Riau dengan metode 3D Object Tracking," *INOVTEK Polbeng - Seri Inform.*, vol. 1, no. 2, p. 177, 2016, doi: 10.35314/isi.v1i2.137.
- [24] E. W. Hidayat, A. N. Rachman, and M. F. Azim, "Penerapan Finite State Machine pada Battle Game Berbasis Augmented Reality," *J. Edukasi dan Penelit. Inform.*, vol. 5, no. 1, p. 54, 2019, doi: 10.26418/jp.v5i1.29848.

ORIGINALITY REPORT

7%

SIMILARITY INDEX

6%

INTERNET SOURCES

6%

PUBLICATIONS

5%

STUDENT PAPERS

PRIMARY SOURCES

- 1 M B Firdaus, J A Widians, J Y Padant. "Augmented reality for interactive promotion media at Faculty of Computer Science and Information Technology Mulawarman University", Journal of Physics: Conference Series, 2019
Publication 3%
- 2 jurnal.stkipppgritulungagung.ac.id
Internet Source 2%
- 3 eprints.umsida.ac.id
Internet Source 2%

Exclude quotes On

Exclude matches < 2%

Exclude bibliography On