Jurnal Mantik
Volume 3 Number 4, February 2020, pp. 85-91 E-ISSN 2685-4236
https://iocscience.org/ejournal/index.php/mantik/index

Multimedia Applications Introduction Indonesian Traditional Musical Instruments Using Augmented Reality Technology With Marker Method Based Tracking

Dendy Virgiawan[1], Mohammad Iwan Wahyuddin[2], Endah Tri Esthi[3]

[123]Informatika,Falkutas Teknologi Komunikasi dan Informasi, Universitas Nasional, Jl. Sawo Manila Kec Pasar Minggu, Jakarta Selatan, Indonesia

E-mail: dendyvirgiawan@gmail.com, iwan_wyd@yahoo.com, endahteh@gmail.com

ARTICLE INFO

Articlehistory:
Received: 11/01/2020
Revised: 14/01/2020
Accepted: 01/02/2020

Keywords:
Traditional musical instrument, Introduction Media, Augmented Reality, Marker-Based Tracking.

ABSTRACT

The use of Augmented Reality as a medium for the introduction of Indonesian traditional musical instruments to Overcome the lack of introduction of traditional musical instruments, as well as increase of the value of understanding and provide a more interactive experience. An Augmented Reality-based introduction that displays 3D objects from traditional musical instruments. This application is made for smartphones using the Marker-Based Tracking method is the which is a part of the Augmented Reality that can be used in a marker pattern that will be read through a media tool for Android-based devices. Based on testing three devices, the application can run well, this application has a minimum specification operating system Android 5.1 (Lollipop) with a minimum of 1 GB of RAM.

1. Introduction

Indonesia is a country that has a diversity of cultures. In the diversity of Indonesia is a country that has the richness and uniqueness that very much. Very much diversity it creates a variety of cultures in every region accompanied with a unique and distinctive features. And the development of information and communication technology itself has evolved very rapidly in all fields as well as being an integral part of life, one example is the technology*Augmented Reality* which has been widely used in industry *game*, Entertainment, education, the military, even in the medical field, but for the use of technology *Augmented Reality* The world of education is still very little use. *Augmented Reality* is a technology that can combine virtual objects are two-dimensional or three-dimensional real world by using tools *smartphone* by shining toward the camera *marker* that has been provided.

In a previous study, conducted research related to the introduction of Percussion Instrument Android-Based Augmented Reality created in 3D [1]. In another study, the use of Marker-Based Tracking method is also used in the introduction of the traditional musical instruments of Central Java, where it is displayed in the form of 3D objects [2]. Introduction of using Augmented Reality also carried out to study the introduction of piano [3].

The introduction of the 3D object that displays musical instrument design models were also performed on traditional musical instruments Bangka research method used is Marker-Based Tracking [4]. A similar study conducted by Meylisa Rasjid et al, in which, using an Augmented Reality technology to the method used is Marker-Based Tracking Kulintang introduction of musical instruments [5]. Then the introduction of Sundanese traditional musical instruments are also using research conducted using Marker-Based Tracking in Augmented Reality technology to display the 3D object Sundanese traditional musical instrument [6].

Based on previous research can be created the problem in this research is to apply the method of introduction of traditional Indonesian musical instrument that is more attractive and easy to understand, and to make a recognition method in the field of technology-based music *Augmented Reality* looks interesting to be learned by the user.

Accredited "Rank 4"(Peringkat 4/S4), DIKTI, No. 36/E/KPT/2019, December 13th 2019.

Jurnal Mantik
Volume 3 Number 4, February 2020, pp. 85-91 E-ISSN 2685-4236
https://iocscience.org/ejournal/index.php/mantik/index

The purpose of this research is to apply the application *Augmented Reality* as a media introduction of traditional Indonesian musical instrument that is more attractive and easy to understand, and build recognition application Indonesian traditional musical instrument using technology *Augmented Reality* based on Android.

2. Research methods

A. draft Application

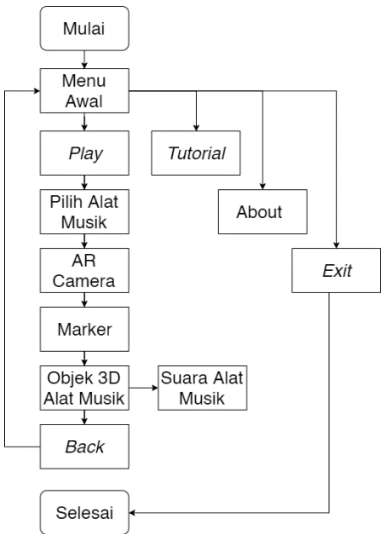

Image 1. *Flow chart* Application

Figure 1 is a flowchart applications, beginning with the start to open the application that will appear an initial menu, in this menu there are four buttons, the button Play, Tutorial, About, and Exit. When pressing the button the play button, the user straight to the menu Select Musical Instruments in which the user can choose a traditional Indonesian musical instrument amongAnklung, Degung, Dhumbuk, Gamelan Gong, Kendang, Dimples, Flute, Saron, and Sasando when clicked will display the AR Camera and navigate to Marker that has been provided and will display 3D objects musical instruments, declarations and the sound of a musical instrument selected , besides there are also the rotate button to rotate 3D objects, and if you want to go back to the start menu there is a back button. In the beginning there is a menu button tutorial, about and exit, there is a tutorial on the button the user guide using the application, whereas on the button there is the descriptive information about the author, and if the user wishes to exit the application already contained an exit button.

B. *Marker-Based Tracking*

Marker-based tracking is part of the Augmented Reality that can be used in a pattern picture marker that will be read through media tools such as webcams found in a laptop or computer, it could be a camera to capture the data from the study used several methods of testing applications, which results in a data contains results of testing based on predetermined parameters such as light intensity and detachment detection light so that when the tercscan marker can be read by the camera [7].

Augmented Reality has two methods, the Marker-Based Tracking and Augmented Markerless *reality*, Marker-Based Tracking using a marker in its application to display the objects created, while Markerless Augmented Reality is a method without using a frame marker as an object is detected [8]. With the Marker-Based Tracking the use of using pictures to be used as marker in order to identify and bring the camera dapet 3D objects that have been made [9].

Accredited "Rank 4"(Peringkat 4/S4), DIKTI, No. 36/E/KPT/2019, December 13th 2019.

Jurnal Mantik
Volume 3 Number 4, February 2020, pp. 85-91 E-ISSN 2685-4236
https://iocscience.org/ejournal/index.php/mantik/index

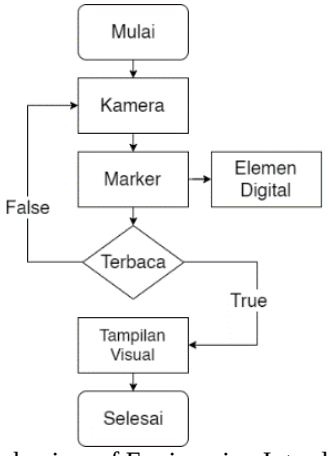

Figure 2. Mechanism of Engineering Introduction Marker

In figure 2, mechanism of introduction *marker* begins with the camera is directed towards the marker that has been associated with the 3D object and the marker when it will issue a visual display of 3D objects, if the marker is not legible then back to camera [10].

In this study, a 3D object that is used is a traditional Indonesian musical instrument of which is Anklung, Degung, Dhumbuk, Gamelan Gong, Kendang, Dimples, Flute, Saron, and Sasando, Researchers do not intend to use all the traditional musical instrument due to make a lot of data process. Display will appear that 3D objects and the sound of traditional Indonesian musical instrument so that the introduction of more attractive and easy to understand.

3. Results and Discussion

A. Device needs

In this study the authors use several hardware and software, the details are as follows:

1) hardware

Table 1. Hardware Specifications

Device	**Needs**
processor	8th Gen Intel Core i5
Graphic Card	Nvidia MX250
Hard Drive	Internal 1 TB
Random Access Memory (RAM)	8 GB

2) Software

Table 2. Software Requirements

Software
Unity 3d 2018.3.5f1 (64bit)
SketchUp 2017
Corel Draw 2019 (64bit)
Android Studio

B. *Story Board*

In designing the user interface application using the application's user interface writer shown in Table 3:

Accredited "Rank 4"(Peringkat 4/S4), DIKTI, No. 36/E/KPT/2019, December 13th 2019.

Jurnal Mantik
Volume 3 Number 4, February 2020, pp. 85-91 E-ISSN 2685-4236
https://iocscience.org/ejournal/index.php/mantik/index

Table 3. Story Board applications

design	Information
	The initial view there is the Play button, Help, About, and Exit on the Menu of all.
	Display Select Music after pressing the Play button, There are several options of traditional musical instruments such as anklung, Degung, Dhumbuk, Gamelan Gong, Kendang, Dimples, Flute, Saron, Sasando, and to return to the main menu there is a back button.
	Views anklung after selecting anklung in menu Choose Music, in this view are objects anklung 3D after marker on the scan, and then there is an explanation of anklung, as well as the buttons of music to listen to the voice anklung, button back to return to the menu select music, and there is a button turn left and right to rotate the 3D object.
	Views Saron after selecting saron in menu Choose Music, in this view are objects saron 3D after marker on the scan, and then there is an explanation of the saron and buttons of music to listen to the voice saron, button back to return to the menu select music, and there are buttons turn left and right to rotate the 3D object.

Accredited "Rank 4"(Peringkat 4/S4), DIKTI, No. 36/E/KPT/2019, December 13th 2019.

Jurnal Mantik
Volume 3 Number 4, February 2020, pp. 85-91 E-ISSN 2685-4236
https://iocscience.org/ejournal/index.php/mantik/index

	Views Sasando after selecting sasando in menu Choose Music, in this view are objects sasando 3d after marker on the scan, and then there is an explanation of sasando and buttons of music to listen to the voice sasando and button back to return to the menu select music, and there are buttons turn left and right to rotate the 3D object.
	Playing see Sharon in this view there is a 3D animated musical instruments Saron with the rotate button to rotate the 3D object and there is information on how to play with text and sound.
	Display the Help menu, there is a tutorial / how to use Indonesian Traditional Musical Instruments application, and to close the Help menu and return to the main menu there is a button Close.
	About menu display, there is information on the author, and to close the About menu and return to the main menu there is a button Close.

Accredited "Rank 4"(Peringkat 4/S4), DIKTI, No. 36/E/KPT/2019, December 13th 2019.

Jurnal Mantik
Volume 3 Number 4, February 2020, pp. 85-91 E-ISSN 2685-4236
https://iocscience.org/ejournal/index.php/mantik/index

Marker Display, a function to be read by the camera, and matched the vuforia database. Created using CorelDraw software in 2019.

C. device Y ang Used

At the trial of this application uses three different smartphone devices in terms of screen size, version of the android operating system, screen size and specifications.

Table 4. Specifications Smartphone.

Device	**Redmi Note 7**	**Asus Max Pro M1**	**Sasmsung S9 +**
Operating system	Android 9.0 (Pie)	Android 8.0 (Oreo)	Android 9.0 (Pie)
screen resolution	1080x2340 pixels	1080x2160 Pixels	1440x2960 pixels
chipset	Snapdragron 660	Snapdragon 625	Exynos 9810
RAM	4 GB	4 GB	6 GB

D. testing Applications

The assay results of Augmented Reality application using a different smartphone 3 as shown in Table 4.

Table 5. Testing Object, Sound, and Time Detection Applications.

Device	**criteria Testing**		
	3D objects	**Sound**	**time Detection**
Redmi Note 7	succeed	succeed	± 2 Seconds
Asus Max Pro M1	succeed	succeed	± 5 Seconds
Samsung S9 +	succeed	succeed	± 3 Seconds

On the device redmi Note 7 3D objects successfully displayed, the sound of musical instruments successfully issued and has a detection time of less than 2 seconds, then the Asus Max Pro M1 3D objects successfully displayed, the sound of musical instruments successfully issued and has a detection time of approximately 5 seconds, and Last in the Samsung S9 + 3D objects successfully displayed, the sound of musical instruments successfully issued and has a detection time as redmi Note 7 ie less than 2 seconds.

Table 6. Testing Angle and Light

Corner	**Light**	**Information**
0 ° - 35 °	Light	Well
36° - 60 °	Light	Very good
61 ° - 90 °	Light	Not good

Tests carried out to identify the angle *marker* to display an optimal 3D object shape, the angle of 0 ° - 35 ° with a bright light, the display of 3D objects is good, whereas if the angle 36° - 60 ° with light having excellent display 3D objects, and if the angle 61 ° - 90 ° with a bright light, the display of 3D objects have a poor outcome.

Table 7. Detection Distance

Device	**Redmi Note 7**	**Asus Max Pro**	**Samsung s9 +**

Accredited "Rank 4"(Peringkat 4/S4), DIKTI, No. 36/E/KPT/2019, December 13th 2019.

Jurnal Mantik
Volume 3 Number 4, February 2020, pp. 85-91 E-ISSN 2685-4236
https://iocscience.org/ejournal/index.php/mantik/index

		M1	
distance Minimal	± 8 cm	± 10 cm	± 4 cm
distance Oprtimal	± 21 cm	± 22 cm	± 23 cm
distance Maximum	± 104 cm	± 89 cm	± 97 cm

Table detection distance using a device redmi Note 7 has a capture range of about 8-104 cm with optimal distance ± 21 cm, as well as using the Asus Max Pro M1 has a range of capture around 10-89 cm with optimal distance ± 22 cm, while using the Samsung S9 + has a capture range of about 4-97 cm and optimal capture distance ± 23 cm.

4. Conclusion

Based on these results it can be concluded that the application in the form of*mobile* This can be implemented as a media introduction of traditional Indonesian musical instrument that is more attractive and easy to understand, and media recognition *Augmented Reality* This is packaged in an attractive form that can display 3D object makes the object look more real by the user.

5. Reference

[1] M. Fathoni, E. B. Cahyono, S. Kom, and W. A. Kusuma, "Alat Musik Perkusi Augmented Reality Berbasis Android" J. Tek. Inform. Univ. Muhammadiyah Malang, vol. 1, no. 1, pp. 1–17, 2012.
[2] R. A. Setyawan and A. Dzikri, "Analisis Penggunaan Metode Marker Based Tracking Pada Augmented Reality Alat Musik Tradisional Jawa Tengah," Simetris J. Tek. Mesin, Elektro dan Ilmu Komput., vol. 7, no. 1, p. 295, 2016.
[3] I. S. Nugraha, K. I. Satoto, and K. T. Martono, "Pemanfaatan Augmented Reality untuk Pembelajaran Pengenalan Alat Musik Piano," J. Teknol. dan Sist. Komput., vol. 2, no. 1, pp. 62–70, 2014.
[4] F. P. Juniawan, D. Y. Sylfania, H. A. Pradana, and L. Laurentinus, "Pengenalan alat musik tradisional Bangka dengan Marker-Based Augmented Reality," J. Ilm. Teknol. Sist. Inf., vol. 5, no. 2, p. 89, 2019.
[5] M. Rasjid, R. Sengkey, and S. Karouw, "Rancang Bangun Aplikasi Alat Musik Kolintang menggunakan Augmented Reality berbasis Android," J. Tek. Inform., vol. 7, no. 1, pp. 1–6, 2016.
[6] I. Satrian, L. Budiati, and S. N. Ayda, "SEMEN (Sundanese Instrument) : Aplikasi Pengenalan Alat Musik Tradisional Sunda berbasis Augmented Reality" e-Proceeding Appl. Sci., vol. 4, no. 2, pp. 708–713, 2018.
[7] M. Sofiudin, T. M. Akhriza, and D. W. Widarti, "Aplikasi Pembelajaran Berbasis Augmented Reality Pada Buku Pengenalan Alat Musik Modern Untuk Anak," J. Tek., vol. 11, no. 1, p. 1050, 2019.
[8] D. H. F. Punuindoong and H. Meidia, "Rancang Bangun Aplikasi Pembelajaran Chord dan Melodi Gitar Berbasis Augmented Reality," J. Ultim. Comput., vol. 9, no. 1, 2017.
[9] I. P. J. Aristana, I. K. Rinartha, Y. Negara, and I. N. R. Hendrawan, "Aplikasi Permainan Alat Musik Perkusi Tradisional Rindik Bali dengan Augmented Reality Berbasis Android," Eksplora Inform., vol. 1, no. 1, pp. 1–10, 2015.
[10] B. Arifitama, "Preserving Traditional Instrument Angklung Using Augmented Reality Technology" Jurnal.Umj.Ac.Id, vol. 2, no. 1, pp. 309–315, 2016.

Accredited "Rank 4"(Peringkat 4/S4), DIKTI, No. 36/E/KPT/2019, December 13th 2019.