APPLICATION OF BASIC BALINESE DANCE USING AUGMENTED REALITY ON ANDROID

[1]NI PUTU SINRIA FRANZA, [2]A.A.K. OKA SUDANA, AND [3]KADEK SUAR WIBAWA

[1,2,3]Information Technology Department, University of Udayana, Bali, Indonesia

E-mail: [1]sinriaf@gmail.com, [2]agungokas@unud.ac.id, [3]suar_wibawa@yahoo.com

ABSTRACT

Balinese dance is a regional culture in Bali that must be preserved. Balinese dance can be conserved by using Augmented Reality technology. Augmented Reality technology is a combination of two-dimensional or three-dimensional virtual objects into a real environment. This Android-based applications combine with technology of Augmented Reality can be a media application to learn basic Balinese dance movement which can access by the users of smartphone. Augmented Reality technology is able to make the application of learning basic Balinese dance movements become more interactive and interesting. This application uses vuforia which is capable to play sound and display 3D objects of picture basic balinese dance as a marker, into a real environment. The result of this research is a book which contains information and images related to basic movements of Balinese dance which functioned as a marker. This Android-based application capable to display object dancer in 3D with the position and movement of Balinese Dance above the marker and play sound which contain information about the movements of Balinese dance. This application can be used as a media to introduce Balinese culture to other countries. Balinese dance in this application also helps to maintain the culture of Bali which has became an interesting attraction for tourists both local and foreign.

Keywords: *Balinese Dance, Augmented Reality, Vuforia, Android.*

1. INTRODUCTION

Augmented Reality (AR) is one of the interesting multimedia technologies. Augmented Reality is able to combine the virtual objects in two dimensions (2D) or three dimensional (3D) into a real environment. This technology is projecting these objects in real time [1].

The development of Augmented Reality technology has attracted the attention of the public. Education and learning is one sector which has been developed in the form of Augmented Reality Applications. This technology can be a media learning to introduce the cultural wealth of the region.

Augmented reality technology which presents and conserves regional culture, one of them is applied in DewataAR application. DewataAR application takes an object of temple in Bali. DewataAR takes Tanah Lot Temple to be an object of its Augmented Reality technology because Tanah Lot is one of the temples which becomes tourist destination. DewataAR creates 3D and video of Tanah Lot Temple. Marker of DewataAR application is made in to a brochure. The brochure contains image target which just can be accessed by DewataAR application [2].

Another Augmented Reality application which has goal to conserve Balinese culture is Story book of Jayaprana and Layonsari application. This application tells about a legend between Jayaprana and Layonsari. The marker of this application is depicted on a book. 3D animations are added on the application, that's why the application is so interesting [3]. DewataAr and Jayaprana Layonsari applications become an inspiration to make an application about Balinese culture.

Balinese Dance is one of Balinese heritage that has been inherited since hundreds years ago. The main objective is the Balinese dancers to dance with every movement and a series of soulful expression. The beauties of Balinese dance movements seen in the abstract and beautifully accordance with the rhythm and tempo of the dance music. Balinese dance can be included as part of the Hinduism ceremony and could be an interesting entertainment for a show in some events. The advance of the technology is now able to facilitate the public to know and learn the culture of the area, especially the Balinese Dance with an application. Applications

basic movements of Balinese Dance can be an alternative learning for people, especially children [4].

Implementation of these media applications learning basic movements of Balinese Dance will be supported with Augmented Reality technology in 3D display. Augmented Reality technology is used in applications in order to attract and increase the interest of the public, especially the children to learn the basic movements of Balinese Dance. This application is based on Android to be easily used on the user's smartphone. Using this application helped by the textbooks as the source markers for 3D displays as well as basic motion information of Balinese dance on smartphones.

2.   LITERATURE REVIEW

2.1   Augmented Reality (AR)

Augmented Reality is a technology that combines two-dimensional or three-dimensional virtual objects into a real environment. Three-dimensional is viewing then projecting the virtual objects in real time. Three-dimensional usually abbreviated as 3D or called the space of the object that has length, width, and height [1].

Another sense of Augmented Reality (AR) is a technology which enables interactive of three-dimensional virtual image appears on the real world [5]. Merger of real and virtual objects are possible with the appropriate display technology, interactivity is made possible across the specific input device [6].

The purpose of Augmented Reality is to improve the user's perception of the environment by merging the sensing, computing and displaying technology. Augmented Reality has a characteristic combining the real world with virtual worlds, interactive in realtime. Interactively in real time is the Augmented Reality system should be run at interactive frame so it can be placed for the information in real time and enable an interaction by the user [7].

2.2   Vuforia

Vuforia is a software platform that has a feature to track and identify images and other markers. Creations and managements of marker in vuforia are done online in a web based tool vuforia target manager. User if vuforia just need to upload the target or marker to vuforia's target

manager web. The target or marker will be managed by vuforia and gives rating of each target or marker. Range of the rating is about 1 to 5. The target or marker which has rating 4 or 5 is better to use it because it is easier to manage by the online database, so if marker has big rating, it will be more easy to detect by the camera to be the marker [8][9].

2.3   Markerless

Markerless is the marker which is detected when use Augmented Reality without special marker or marker barcode which color is black white. Markerless can be RGB picture format or grayscale which to be target image [10].
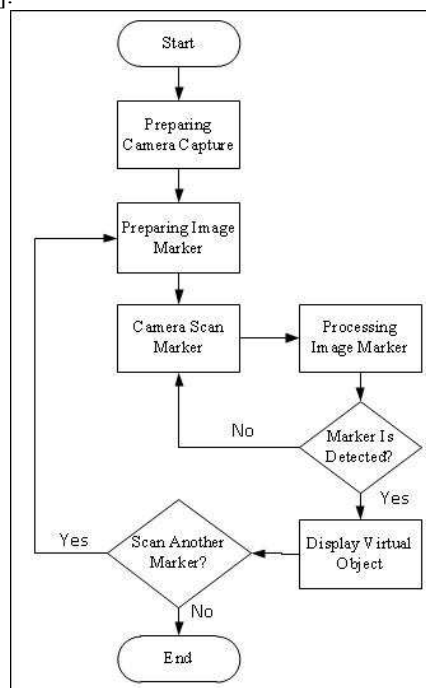

Figure 1: Flowchart of The Marker Detection Process

Markerless form is like an image which can be detected with the process, it is shown in figure 1. Detection marker process starts by preparing camera capture and image marker. The camera is from the smartphone scan marker and then smartphone processing image marker. If the marker can't be detected, the camera will repeat to scan the marker. The result of processing image marker by the smartphone is virtual object display.

2.4   Balinese Dance

Balinese dance is one of the Balinese cultures which must be preserved. Balinese dance is coherence of abstract movements which

matches with the rhythm and tempo of the music dance. Balinese dance has basic movement [4]. Basic movement of Balinese dance will be explained on the table 1.

Tabel 1. Basic Movements of Balinese Dance

1	Agem Kanan	Basic movement where the body leans to the right side and the knees bents, position of right hand equal with the eyes. And left hand on a line with the breast.
2	Agem Kiri	Basic movement where the body leans to the left side and the knees bents, position of left hand equal with the eyes. And right hand on a line with the breast.
3	Tapak Sirang Pada	The position of foot looks like letter "V"
4	Nuding	One of hands is pointing out with two fingers.
5	Nabdab Gelung	One of hands touches head's accessory.
6	Nabdab Gelang Kana	One of hands touches the bracelet.
7	Miles	Rotating one of the heels to the inside.
8	Tanjek	Toe by one foot
9	Gandang Arep	Walk slowly and go forward.
10	Gandang Uri	Walk slowly and go backward
11	Mungkah Lawang	Open hands slowly and lead to the face.
12	Luk Nerudut	Coincide hand movement.
13	Luk Naga Satru	The hand rotate inside
14	Luk Ngelimut	Movement of hand with the opposite direction.
15	Ulap-ulap	Waving hands in front of face.
16	Ngegol	The movement of hip shaken.
17	Nyalud	Folds hands movement
18	Dedeling	Angry face.
19	Tetangisan	Sorrow face.
20	Seledet	Eye movement sideways or leer.
21	Kenyung Manis	Smile face.

3. APPLICATION DEVELOPMENT

The way to make basic movement of Balinese Dance Applications can be seen in the flowchart in the figure 2.
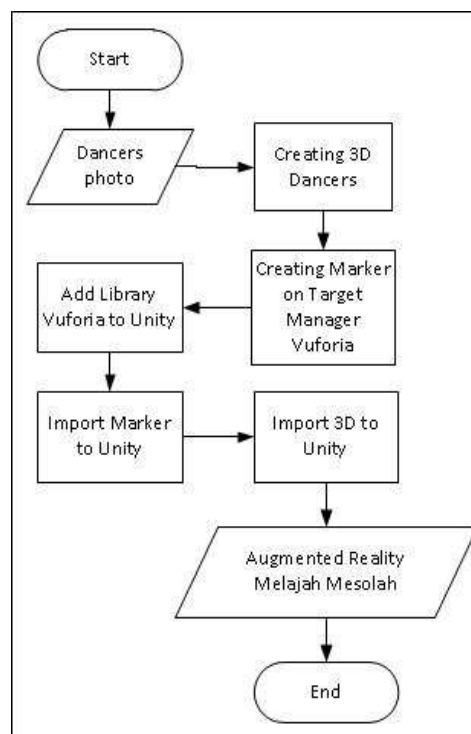

Figure 2: Flowchart of The Process Making Balinese Dance Application

The first way is to collect the photo of the dancers in the various Balinese basic dances. Then, make the 3D of the Balinese basic dance by following the display of the dancer's photos. Processing the marker in the vuforia target manager, add the vuforia library in to unity, import the 3D object and the marker in to the unity.

Make an easy detected marker is one of the adversity of making balinese dance aplication. The main focus to create marker is many different features and suitable contrast of the dancer photos. Dancer photos has been taking in several time to get easy detected marker. The photos is edited to get a compatible contrast. To create an easy detected marker, the photos which used to be a marker must have at least 4 or 5 rating after processed by vuforia target manager.
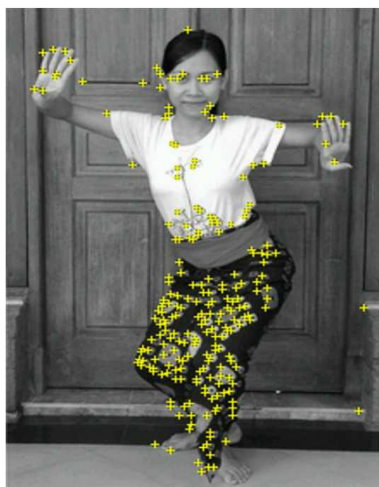
Figure 3: Analyzed Image Result

This marker contains 21 images of basic movement of Balinese dance. The result of the marker analysis is between 4 and 5 rating. The analyzing of the image result can be seen in the figure 3.

4.   RESULT AND DISCUSSION

4.1   Splash Screen Display

First display which can be seen by the users when use the Basic Movements of Balinese Dance Application is the splash screen display as be shown in the figure 4.
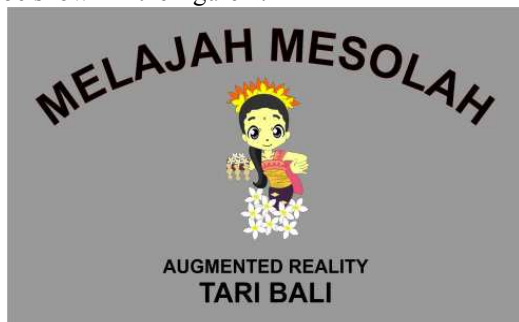

Figure 4: Splash Screen Display of Balinese Dance Application

4.2   Menu Display

Then the users will be seen in the menu display like the picture in the figure 5.

Figure 5: Menu Display of Balinese Dance Application

The users can find three buttons in the menu display. First, play button which takes place in the middle of the display. Second, tutorial button which can find in the bottom left corner. Last, exit button which placed in the top right corner. When the users press the play button, the application will display the main display.

4.3   Main Display

Main display is the display which is activated the camera of the smartphone intends to detect the marker.

Figure 6: Main Display of Balinese Dance Application

Main display is shown in the figure 6. The exit button placed in the top right corner and menu button is in the top left corner. Marker book of Basic Movements of Balinese Dance Application becomes the object of the real time visual in the figure 6.

4.4   Detected Marker Display

When the users use the Basic Movement of Balinese Dance Application, 3D display of basic movement of Balinese dance will appear on the top of the marker by using the camera of the smartphone to detect marker which have been made by vuforia target manager and have been imported in unity.

Figure 7: 3D Front View of Balinese Dance Application

Figure 8: 3D Back View of the Balinese Dance Application

In the figure 7 and 8, there is the marker which have been detected and display 3D of balinese dance basic movement.

4.5   Result of Aplication Test

Basic Movements of Balinese Dance Application is tested by some students especially female students and the general public. In the figure 9 and figure 10 is the documentation of the application user.

Figure 9: Tester of the Balinese Dance Application

Figure 10: Students Who Tested Balinese Dance Application

Testing the application and filling the questioners was done by 30 female randomly which from different ages. The tester of this application is a woman who can't dance Balinese dance before. The result of the questioners after the audience tested the Basic Movements of Balinese Dance Application is showed in the tabel 2.

Tabel 2: Result of the Balinese Dance Application Tested

Statement	Percentage (%)			
	Need Improve	Fair	Good	Excellent
Interesting of application display	0	0	60	40
Easy using the application	0	0	76,7	23,3
Application run well	0	0	73,3	26,7
Application is helpful to learn balinese dance	0	16,7	60	23,3

The users of Basic Movements of Balinese Dance Application, mostly give a good opinion (60% - 70%) about this application. The users who test this application very enthusiastic and try to apply in all of the marker, and it works very well. The most interesting part from the users is when they try to detect the marker by the camera phone, the 3D always shows a movement of the marker was detected.

5.   CONCLUSION

This Application is made by using Augmented Reality Technology. Marker making is supported by web based tool Vuforia. The purpose of Basic Movements of Balinese Dance Applicationis is to make the people who want to learn Balinese dance. In another hand, it can give knowledge to the foreigners who want to learn Balinese dance. The audiences are interested with the application. They are very enthusiastic when 3D appears and moves on the marker. When 3D visualization is playing, the view can be changed into back view, front view, or top view.

REFERENCES:

[1]   Oliver, Ramesh. *Spatial Augmented Reality*. Wellesley: A K Peters. 2005

[2]   Waruwu, A. F., Agung Bayupati, I P. & Darma Putra, I. K. G. .*Augmented Reality Mobile Application of Balinese Hindu Temples: DewataAR*. MECS. 2014

[3]   Putra Yasa G. A. *Pengembangan Aplikasi Augmented Reality Story Book Jayaprana Dan Layonsari.* Karmapati, Vol. 3 No. 5, 2014

[4]   Kantor Dokumentasi Budaya Bali. *Pendokumentasian Gerak-gerak Tari Bali*, Bali. 2000

[5]   Leila, Weidong. *Recent Trends of Mobile Collaborative Augmented Reality Systems*. London: Springer. 2011

[6]   Andriyadi, Anggi. *Augmented Reality With ARToolkit Reality Leaves a lot to Imagine.* Lampung : Augmented Reality Team. 2011

[7]   Olwal, Alex. *An Introduction To Augmented Reality*. KTH, Department of Numerical Analysis and Computer Science.2009

[8]   Vuforia. *Vuforia Target Manager*. Last accessed on 28/03/2016 via https://developer.vuforia.com/library/articles/Training/Getting-Started-with-the-Vuforia-Target-Manager. 2015

[9]   Vuforia. *Natural Features and Image Ratings*. Last accessed on 28/03/2016 via https://developer.vuforia.com/library//articles/Solution/Natural-Features-and-Ratings. 2015

[10] Madden, Lester. *Professionel Augmented Reality Browsers for Smartphones*. United Kingdom: Wiley Publishing. 2011