

PRESERVING TRADITIONAL INSTRUMENT ANGKLUNG USING AUGMENTED REALITY TECHNOLOGY

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Abstract

Indonesia is a country that have a rich and diverse culture among other countries in ASEAN . Cultural diversity requires a way to be maintained and preserved, as a way to transfer knowledge to the next generation as part of the identification of a nation . One of the important cultural elements that are discussed in this study as a way of preservation, is traditional musical instrument “Angklung” instruments. Angklung is a musical instrument made from bamboo that are played by vibrating or shaking. The output sound is an effect of collision between bamboo tubes to other bamboo instruments. These instruments are classified into types idiofon or musical instrument sound source derived from the bamboo material. Angklung is generally known from the area of West Java and since November 2010, UNESCO designated that angklung is one of the world's cultural heritage. Augmented Reality technology used in this study as an attempt to angklung preservation of traditional musical instruments, which is designed in the form of 3d models mixed with augmented reality technology, to provide visual overview and innovation to the product. This study aims to assist in the preservation of traditional musical instrument angklung and gives insight to the public about the musical instrument by using augmented reality technology.

Keywords: *Anglung, Augmented Reality, Preserving Traditional Instrument, Virtual Button*

Abstrak

Indonesia merupakan negara yang memiliki budaya dan seni lokal yang beragam sama seperti layaknya negara ASEAN, keanekaragaman budaya memerlukan cara untuk melestarikan untuk dipertahankan dan dengan memanfaatkan teknologi untuk kepentingan mentransfer pengetahuan kepada generasi penerus bangsa sebagai bagian dari jati diri bangsa. Salah satu unsur budaya yang penting yang dibahas dalam penelitian ini adalah upaya pelestarian instrumen alat musik tradisional angklung. Anglung adalah alat musik dari bahan bambu yang dimainkan dengan cara digetarkan atau digoyangkan . Suara yang dihasilkan adalah efek dari benturan tabung-tabung bambu pada bambu lainnya yang menyusun instrumen. Instrumen ini digolongkan ke dalam jenis idiofon atau alat musik yang sumber bunyinya berasal dari bahan dasarnya. Angklung umumnya dikenal berasal dari daerah Jawa Barat. Sejak November 2010, UNESCO menetapkannya sebagai salah satu warisan kebudayaan dunia, dengan kategori Masterpiece of Oral and Intangible Heritage of Humanity. Teknologi Augmented Reality digunakan dalam penelitian ini sebagai upaya untuk melakukan pelestarian alat musik tradisional anglung, yang di rancang dalam bentuk model 3d dipadukan dengan teknologi augmented reality, serta memberikan gambaran secara lebih visual dan inovatif. Penelitian ini bertujuan untuk membantu melakukan pelestarian alat musik tradisional angklung dan memberikan wawasan kepada masyarakat mengenai alat musik tersebut dengan memanfaatkan teknologi augmented reality.

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INTRODUCTION

Angklung is one of many traditional instrument varieties originate from Indonesia, specifically located from the western Javanese island. The major and fast changes has been made through

modernization and globalization around the world, it also made several impact to the country in various life area, such as education, industrial , cultural and arts. Ideas of preserving cultural heritage become important to keep the identity of a rich nation by its culture. The needs of an alternate way of preservation became crucial in order to secure intellectual property that has been handed down by our ancestors which will not fade, disappear and eroded by time.

Preservation is a way to protect cultural wealth through activities that minimize catastrophic damage , chemical and physical damage , also to prevent loss of information content . The main purpose of preservation is to prolong the existence of cultural property (The American Institute for Conservation of Historic and Artistic Work,2006,NEDCC).

The increment of gadget penetration growth in Indonesia, made mobile devices as an integral part of people's daily lives , gadget are easily owned by people from this country, from children to adults. This gives an opportunity for research and further development for a mobile application based. Today , there are more than 1.91 billion smartphone users worldwide , or nearly 25% of the world's population and this number are expected to grow (eMarketer ,2014).

The number of gadget users facilitate in this study gives advantage to integrate mobile technologies such as augmented reality application and angklung as an innovation to find alternative way of preservation by digitalizing in a form of a mobile application based .

Augmented reality abbreviated as AR is a new technology that blurs the line between what's real and what is computer generated by enhancing what we see, smell, hear and feel. It is said to change the way we see the world around us. It basically adds a layer of graphics and other sensory enhancements on the natural world as it exists in real time (Mayur Agrawal,2015)

Aside from software's main function for protecting the cultural heritage from a physical threat activity , this research is used to find a way of preserving national cultural heritage by integrating augmented reality technology . Additionally, as the traditional augmented reality technology has been planted into mobile devices, mobile augmented reality has been distributed in the type of smartphone application, drawing more attention (J. Kim, W. Cha and J. Yoo, 2011).

The result of this research would hopefully provide an alternative way of preservation by using augmented reality technology for the Indonesian traditional musical instruments.

LITERATURE REVIEW

Augmented Reality Technology

Augmented reality is a new emerging technology that was found through a process of longtime research in the field of computer vision , the beginning of augmented reality development was started by Prof. Azuma who at that time was doing research in the field of virtual reality , while the virtual reality has the concept of immersing into the virtual world , augmented reality concept instead erased the wall between virtual and reality where 3d object could be interacted in the real world. Users of this technology will find 3d object as present among the users . As an example of the use of augmented reality technology can be seen in the figure below.



Figure 2.1. The Use of Augmented Reality

In the figure 2.1 , is an example of the use of augmented reality application as a media campaign by researchers at the university (Budi Arifitama, 2014) , with a building object of the university , along with the brochure as a location marker , there are three actual components of the main interaction in augmented reality technology . First, smartphone / tablet contains the augmented reality application .Second, smartphone camera as a tool of a marker recognition. Thrid, marker as the location of the augmented reality. Those three component must work at the same time to trigger augmented 3d object.

Unity 3D Software Platform

Unity 3d is a game development application platform to make various 2d and 3d games , this application can be used for free through trial version provided by the Unity3D or paid version , unity also provide application development based augmented reality and virtual reality

Vuforia SDK

Vuforia SDK is a software developer kit which uses tool for making augmented reality , as for the features provided by vuforia is building a marker , ARCamera , Image Target and virtual button

Sketchup

SketchUp is a graphic software design developed by Trimble . graphics design can be used to make various types of 3D models , and models created can be placed on Google Earth or on display in the 3D Warehouse .

Software Design

Marker

Marker is one of many component in the development of applications based on augmented reality , the marker is a sign of the location for the appereance of 3-dimensional objects , while the marker is composed of two types of marker , namely markerless and pattern marker. In this study the marker that will be used is an pattern marker, pattern marker is usually in the form of two dimensional plane with black and white pattern as in the figure 3.1,
galdunifinal



Figure 3.1. Galduni Augmented Reality Marker

The figure above is a marker used in the application with the level of augmentation 5 out of 5 in total, the result shows that the marker is feasible and great enough to be used as a marker. Marker used in this study are black and white QRCode. Qr code is a marker in the form of black and white stripes barcode that can be easily read. Marker used must tend to have a contrasting colors to get the best ratings, poor marker would be difficult to detect the device or even not work. (Vipulkumar P. Chauhan and Dr. Manish M.Kayasth)

Qr code would make a great marker for the application development, by choosing the correct marker, would give faster and accurate recognition for the augmented reality object being used.

User Interface Design

The user interface software design only use one scene for augmented reality technology, the focus of the research is to find ways to preserve traditional instrument angklung. Scene of application design could be seen on the figure below

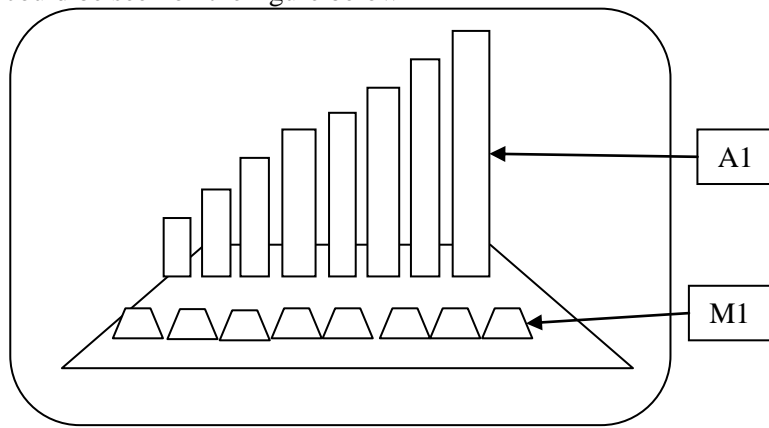


Figure 3.2. Galduni User Interface Design

The illustration in the figure 3.2, is an illustration of angklung design scene, while the design is simple to allow any users use the application at ease. The design application is divided into two, first is composed as component A1, which are the location of an angklung set, in accordance with each tones produced by the sound of angklung. The second is a set of virtual buttons on a predetermined marker, where each virtual button is placed right above the tone of the marker, when the user presses the tone on the marker, it will emit sound according to the tones chosen.

Implementation

In an effort to find a way for a preserve digitalization, the implementation phase will be used to integrate between a marker, a 3 dimensional object represented by angklung and embedded virtual button on a marker in the form of notational angklung instruments.

Virtual Button

Virtual Button is used as a form of interaction between users and application, by utilizing virtual button, users can feel the different interaction sensation while using the application. Virtual button is applied over the marker which has been created and placed, when a tone is pressed by the user, the audio tone will comes out according to its tone. The script to activate the virtual button in Unity3D is as shown below.

```
using UnityEngine;
using System.Collections;

public class skrip : MonoBehaviour, IVirtualButtonEventHandler {
    public GameObject Audio_Source;

    // Use this for initialization
    void Start () {

        VirtualButtonBehaviour[] vbs =
        GetComponentInChildren<VirtualButtonBehaviour>();
        foreach (VirtualButtonBehaviour item in vbs)
        {
            item.RegisterEventHandler(this);
        }

    }

    // Update is called once per frame
    void Update () {
    }
    #region VirtualButton

    public void OnButtonPressed(VirtualButtonAbstractBehaviour vb)
    {
        Audio_Source.GetComponent<AudioSource>().Play();
        Debug.Log("HeIIIIIIoooooooooooo");
    }

    public void OnButtonReleased(VirtualButtonAbstractBehaviour vb)
    {
        Debug.Log("Gooooooooodbyeeee");
    }

    #endregion //VirtualButton
}
```

Figure 4.1. Virtual Button Programming Script

Mock Up Angklung

Angklung 3D objects is placed above the marker , and are represented in accordance with the shape and tonality of each angklung object, as shown in the figure 4.3 , angklung object generally composed in a set from the smallest angklung to the biggest.



Figure 4.2. Galduni Main Scene



Figure 4.2. Galduni Angklung Implementation with Augmented Reality

Functionality Software Test

Functionality Software Testing is performed as the final stages to the development of applications, software testing are used as a mean of measurement if of whether the applications developed is feasible enough to be delivered. There are three outcomes of each component of the test such as failed, fairly and successfully as shown in table 1.

Table 1. Functionality Software Test List

No	Testing Component	Result
1	Virtual Button "Do" Note	Success
2	Virtual Button "Re" Note	Success
3	Virtual Button "Mi" Note	Success
4	Virtual Button "Fa" Note	Success
5	Virtual Button "Sol" Note	Success
6	Virtual Button "La" Note a	Success
7	Virtual Button "Si" Note	Success
8	Virtual Button "Do" Note	Success
9	Angklung Visualisation Test	Success
10	Audio Test	Fair
11	Moving Scene Test	Success

According to the result shown on table 1, from eleven testing list which has been tested, ten test is considered "Successful" and one considered "Enough".

CONCLUSION

Based from the results of the testing applications that have been tested, it can be concluded that the use of augmented reality technology could be used as an alternative way to preserve digitally for traditional angklung instrument. By preserving digitally using augmented reality, it would prevent the loss of cultural assets of a nation as it will not be physically damaged nor compromised by time.

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