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An Application of Augmented Reality for Introduction Batak Traditional House Architecture

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Abstract

Indonesia has a wealth of the nation in the form of a variety of physical types of architecture, which more often referred to as the Nusantara Architecture. Modern perceptions make people understand that buildings are composed of natural materials, and without planting, foundation means that the structures are primitive. In this research, the media designed to introduce; Batak architecture based on Augmented Reality (AR) Application to enter the physical appearance of Karo Batak, Toba Batak, and Simalungun Batak Architecture. Architectural physical appearance includes the presence of the roof, construction techniques, connection techniques, spatial planning, and compiler materials. The results of this research are the augmented reality application. For further development, it is expected to use a more appropriate introduction method or use another more complete Augmented Reality API.

Keywords: *Application Augmented Reality, Traditional House Architecture*

1. Introduction

Indonesia has a variety of physical forms of architecture, often referred to as Nusantara architecture. The diversity of physical architectural styles has become an identity in each region. It is starting from the appearance of the roof, construction techniques, connection techniques, spatial planning, and even the various constituent materials[1]. The identity of each region has its peculiarities. The development of the modern era today, people tend to have the perception that the physical appearance of the Nusantara architecture is ancient and outdated. The understanding of contemporary society has an impact on the wealth of the Indonesian people that Nusantara's architecture is increasingly marginalized or forgotten as the identity of the Indonesian nation[2].

Many young people do not know the physical form of the Nusantara architecture. The observations and interviews carried out are supported by the results of the distribution of questionnaires about community knowledge about how far they are familiar with the physical appearance of the Batak Karo, Toba, and Simalungun architecture. The results of the distribution of questionnaires to 64 correspondents with a range of values from 0 to 100 get the following results: 43 Correspondents do not understand the variety of decoration on three kinds of Batak architecture. 45 The correspondent did not understand the stacked beam construction system in the Simalungun Batak architecture. 48 The correspondent did not understand the function and location of the fireplace in the Karo Batak architecture. Based on the questionnaire, people are less familiar with Batak architecture, which has three different physical forms. Three material types of Batak architecture are Karo, Toba, and Simalungun[3].

The construction technique in traditional houses only uses a tie technique, so that it can be said as an excellent solution to minimize buildings damaged/collapsed due to the earthquake. Besides, the foundation of a traditional house is only by putting a lump of stone on the ground, then plac ing a bamboo or wooden column on it. The

connective connection technique allows the building to will be swayed during an earthquake. In contrast to the dead connection technique (by using nails), it will not influence following the ground movement so that the house will be exposed to horizontal acceleration, which is almost the same as the ground movement. This connective technique is more flexible because it is tied using rattan or palm fiber, while the "Purus" -hole joint technique can also be earthquake resistant because the hole or cook a that connects the beam and column has a slight gap. The gap that allows there is little room for the building to sway during an earthquake.

Today's society can hardly separate from gadgets and smartphones[1], [3]. Thus, this study aims to develop an application for the introduction of Nusantara traditional houses with Augmented Reality (AR) technology in increasing the enthusiasm of the younger generation to recognize the diversity of physical forms, particularly Batak architecture. Augmented Reality (AR) technology is a technology that can combine virtual and real-world by utilizing smartphone devices by highlighting smartphone cameras on existing image objects. Thus, obtaining information about the object want to know. The purpose of this study was to design an introduction to the media of Batak architecture in Indonesia based on Augmented Reality (AR) to introduce the physical form of Batak Karo, Toba, and Simalungun architecture to the younger generation.

2. Literature Review

Architecture is interpreted as the creation of an atmosphere, use marriage, and image. Architecture is not seen in the luxury of materials, technology, and price. Image is a picture that gives the impression that can be captured by someone. The image is more spiritual, the degree and dignity of the people who inhabit the building (Mangunwijaya, 1992). Archipelago Architecture built as a knowledge that is based on and based on philosophy, science, and architecture knowledge, and thus, all knowledge that developed and inherited from anthropology, ethnography, and cultural geography placed as secondary knowledge Nusantara architecture is another architecture from European architecture. So, it can say that archipelago architecture is equivalent to classical European architecture. Because the two have very striking differences and cannot compare, which is superior between European and Archipelago architecture [4]

The Karo Batak Traditional House has two typologies based on the roof of the house, which is an ordinary house and a Raja's house. Karo House is rectangular with two terraces (Ture) as the main door. The main entrance is the door leading to the upstream (Ture Julu) and the door leading to the downstream (Ture Ginger). This Karo Batak traditional house on the trapezoid-shaped roof part of the front of the triangular-shaped roof called the face of the house (let us go or Lambe-Lambe), and the trapezoid-shaped part of the wall supported by boat-shaped wallboards (kitchens) which located on several poles. This Karo traditional house intended for eight families (Jabu), who is a lineage. The division of space in this traditional Karo house based on the function and position of each family. The inside of the Jabu used to ordinary people. The nobility has similarities that do not have physical barriers that separate the space of one family with another. The inside of Waluh Jabu consists of one large room, which divided into eight rooms with a size of approximately 4.00 x 4.00 m2. Part of the space in the traditional Karo house that has a fireplace in 4 points[4].

Simalungun Traditional Bolon House has a rectangular shape and has a model like a house on stilts with a height of about 1.75 m. Simalungun traditional house roof constituent materials made from sago palm arranged with conventional

techniques to make it look neat. The sago palm is made to be sorted beforehand through technical rules. The roof mounting technique that is the left side of the palm fiber must be installed on the left if the right side of the palm fiber must connect on the right. If we do not follow the technique, a roof leak will occur. The structure of the Simalungun Batak traditional house on the top/head-shaped buffalo head, and a necklace that hung around a buffalo neck. The Batak Simalungun traditional house is considered by the local people to be the main house. Rectangular with a length of 2.5 - 3 times the width of the building and a height of 1.5 - 2 times the width of the building. Simalungun Batak traditional house has two doors that face East and West while the traditional home of Simalungun facing East is the same as the direction of the rising sun[3].

Research on Augmented Reality (AR) widely carried out research [5], [6] proposes the marketing of markerless augmented reality technology as an introduction media for android-based university buildings, and wherein this study researcher used two methods, namely Marker Based Tracking and Markerless Augmented Reality methods. There is also research on AR to develop an Augmented Reality-based school profile application as a school profile information media, using a waterfall model development model consisting of analysis, design, implementation, and testing[7].

Research [8] utilizes augmented for shopping transactions by combining AR technology with Barcodes. The purpose of doing this research is to create an interactive means of delivering specifications and prices of goods on mobile technology, especially Android. Combining Augmented Reality technology with Barcodes on mobile technology is expected to help consumers in getting more information when choosing goods to be purchased and comparing them with other goods in an electronics store so that consumers are not mistaken in buying the items needed[8], [9].

While research [2], [10]incorporates AR technology into the catalog of home sales so that this house catalog becomes more real with the presence of 3D objects in the house. Input source, then this application will track and detect the marker (marker) using the tracking system after the marker is detected, the 3D house model in the catalog will appear above the marker as if the house model is real. Furthermore, the method or stages in this study using the Prototype Model, where this system can later develop again. Prototype stages started from Listen to Customer, Build / Revise, Customer Test-Drives Mock-Up[11]-[12].

In this research, the application that will develop is an augmented reality application for the introduction of the architecture of the traditional houses of the Batak Toba, Karo, and Simalungun using the android mobile platform. The purpose of doing this research is to create an interactive means of delivery of Batak traditional houses on mobile technology, especially Android, which expected to help the community in obtaining information and education on traditional Batak houses.

3. Methods

This research is a research that will carry out on an ongoing basis at this stage of the study carried out until the modeling stage. The method in this study is as shown in Figure 1.

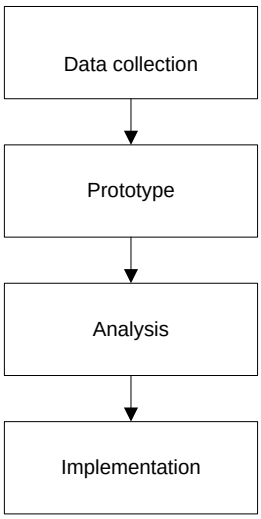

Figure 1 Research Methodology

Based on the above stages, researchers searched for information related to traditional Batak houses, especially Toba Batak, Karo, and Simalungun. Determination of the scope and objectives of research and literature studies conducted to determine the scope of research. Then the data was collected related to the traditional house of Batak Toba, Karo, and Simalungun. Data collection was carried out by direct observation and interviews at the location of traditional houses. The locations visited were Kabanjahe (Batak Karo traditional house), Samosir (Batak Toba traditional house), and Pematang Raya (Batak Simalungun traditional house). The next process is modeling augmented Batak architectural form. The application developed using Augmented reality technology using unity and Vuvoria tools. At this stage, the application interface design carried out, which will then evaluated to implement in further research.

4. Result and Discussion

The system architecture built using the Vuforia SDK. In the Vuforia SDK requires several essential components to work correctly. These components include: camera, converter, tracker. The performance of the video background renderer is very dependent on the device used. Application Code initializes all the components and performs three crucial stages in the application code, such as Query state object on the new target detected or marker, Update application logic every new input entered, Render graphic added (augmented). The downloaded assets contain an XML configuration - config.xml - which allows developers to configure several features in the trackable and binary files that contain a trackable database.

4.1. Marker

The application interface recognizes the Batak architectural form, which used to detect existing marker images to display information and augmented reality content in the form of digestive objects in three dimensions—the process of reading the marker (Figure 2). The user points the Android smartphone's camera towards the image as the application's marker tracking the database to find the appropriate object to display on the smartphone screen. If between the marker image and the image in the database match, the object that has marked in the marker image displayed, then the camera renders to access the object. Then the application display augmented reality content and information under the marker image that viewed and adjusted to the database on the device database.

4.2. Application Design

The system is built based on Android, in its application made a marker media in which there are several markers with a predetermined pattern where each marker identified coordinates and bring up 3D objects. The object to raised is the Batak traditional house object; each marker brings up a Batak traditional house object. The design of this system. In Vuforia, the image that used as a marker must be converted first in the Vuforia database to be *.unitypackages extension and contains an XML configuration - config.xml - which allows the developer to configure some features in the trackable and binary files containing the trackable database using on-line Target Management System that there is a Vuforia website.

The main menu display of the application consists of Button Toba, Karo, Simalungun, About, and Exit. Button Toba serves to get to the Toba Batak Traditional House page, while Karo serves to get to the Karo Batak Traditional Home page, Simalungun serves to get to the Simalungun Traditional House page; About functions go to the application's brief profile page, and the Exit is the button to exit the application. The default display of this application is landscape (Figure 2).

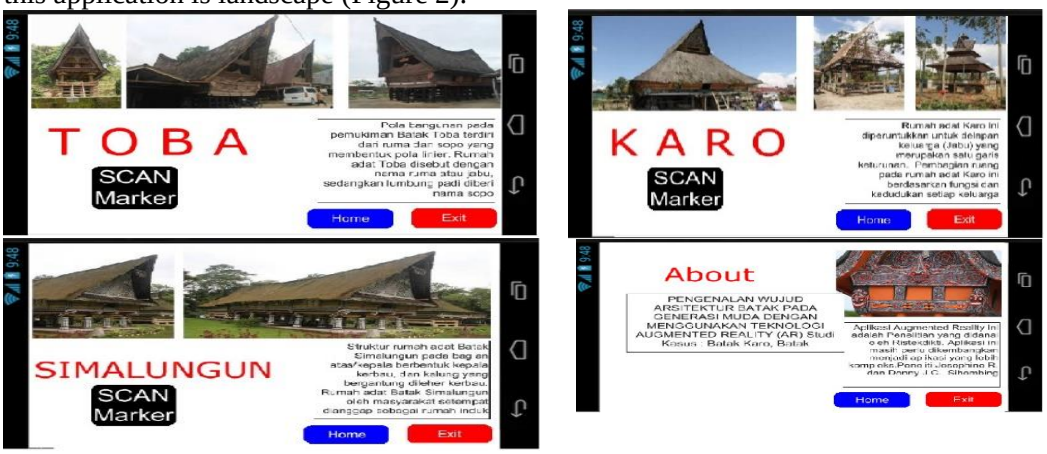

Figure 2 Application Design

5. Conclusion

Today's society can hardly separate from gadgets and smartphones. Thus, this study aims to develop an application for the introduction of Nusantara traditional houses with Augmented Reality (AR) technology in increasing the enthusiasm of the younger generation to recognize the diversity of physical forms, particularly Batak architecture. This application has been designed as simple as possible so that application users can run this application efficiently. It hoped that this application would be a unique attraction for application users to be more interested in recognizing the traditional Batak house architecture. For further development, it is expected to use a more appropriate introduction method or use another more complete Augmented Reality API.

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