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# AUGMENTED REALITY MARKER LESS IN CULTURAL HERITAGE OF MENARA KUDUS ANDROID BASED

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## ABSTRACT

*Kudus has a slogan Gusjigang "Bagus Ngaji Dagang". This is because Kudus is one of the cities that is granted 2 Sunan namely Sunan Kudus and Sunan Muria. One of Sunan Kudus's remains is the Holy Tower. Where to be one of the protected cultural heritage by the government. Many cultures in the city of Kudus make the city of Kudus become one of the religious tourism destinations. As technology evolves, the cultural blend of the sacred Tower is packed into a three-dimension combined with augmented reality technology. With the marker less method, the preservation of the culture of the Tower of the Holy became one of the world's cultural heritage.*

**Key words:** marker less, Menara Kudus, Augmented Reality.

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## 1. INTRODUCTION

Kudus is a small town located in central Java province because it only has 9 districts only. Indonesia has a wide variety of cultural heritage that must be preserved. So also in Kudus district, has a variety of cultural heritage. The cultural heritage as well as one of the relics of the “Wali Songo” is the Kudus Tower. The harmony of the Holy region with the growth of the Islamic culture of his society was fully appreciated by Lombard. In his work, it is asserted

that the Holy City whose name refers to al-Quds (the Arabic name for Jerusalem) is a religious city, a holy city, and has a great, beautiful mosque [1].

The mention of the Holy City by the term al-Quds, the holy city as conveyed by Lombard is also bound with spiritual teachers who assist the Demak rulers in their efforts to spread Islam. Sunan Kudus is the central figure of Kudus community development. Sunan Kudus resides in Kudus precisely in the Kauman area and founded Al-Aqsa Mosque or Al-Manar Mosque and is known by the name of the Mosque of the Tower of Kudus in 1549 AD This mosque is unique in shape because it has a similar tower of temple building in Figure 1.

Preserving and publicizing the cultural heritage of the Tower of the Holy to be known by the wider community starting from the introduction of culture, the introduction of religious tourism to the introduction of the traditions that are in it. During this time the Tower of Kudus visited santri from across the archipelago in a religious tour of wali songo. To increase local and foreign tourists, the introduction of cultural heritage is packed in the latest technology.



**Figure 1** Environment of the Holy Tower

One of the emerging multimedia technologies today is Augmented Reality or better known as Reality Added in Indonesian. Augmented Reality is a technology that combines two-dimensional and or three-dimensional virtual objects into a real environment then projecting these virtual objects in real time [2]. Can also be interpreted that Augmented Reality abbreviated with AR is the embodiment of objects in the virtual world into the real world either in two dimensions or three dimensions.

The utilization of AR in the effort to introduce AR Tower of Kudus is very efficient in terms of storage space and certainly has several other advantages. By utilizing this AR, we only need a smartphone and applications based on Android so that when the image of the building is detected by the smartphone camera that has been installed AR Menara Kudus applications can display 3D images of religious tower tourism complexes thoroughly as well as in detail. So in addition to more practical in terms of media or storage space, with this technology becomes more interesting public attention to the form of buildings that appear similar to the original along with more complete information.

With the technology, researchers combine the technology to introduce the cultural heritage of the Tower of the Holy in an interactive and interesting form. Therefore, this research takes the theme of Tower-based Cultural Heritage Marker less Augmented Reality.

## 2. RELATED RESEARCH

In general, the analysis of the spread of Islam in the Kudus area is mostly done by experts. This is evident from the many studies on the genealogy of the Holy region focused on the Mosque of the Tower of the Holy. In his research saw that the Tower Mosque is a historical heritage building that has a very high architectural value because it involves many aspects of culture among them Hinduism, Javanese, and Islam. As a cultural heritage of ancestors that many have the value and meaning of religious and historical make the Mosque Tower of Kudus as one of the famous attractions in the Holy City [3].

Journal of product promotion media and 3D-based training. The discussion is to display detailed information of cigarette products from the pack and cigarette itself in the form of 3D Object. From the latest product types to the old products that are still produced where the 3D form will be displayed through a maker that will bring up 3 different 3D Objects. With the construction of this application is expected to help minimize expenses from the company and increase the attractiveness of the promotion of marketing products today [4].

Go green is an effort to reforest the earth that is currently experiencing Global Warming. This is a lot done by all parties, to reduce global warming. Go green is also done on residential Mountain View Resident developers. In marketing, the dwelling still uses catalogues and paper leaflets. With the development of Augmented Reality method, it is expected to reduce the use of frequently used paper catalogues. Augmented reality is the incorporation of real and virtual objects in real environments, runs interactively in real time, and there is integration between the three dimensions, the virtual object integrated into the real world. The purpose of 3D-Catalog is to be used by everyone who is interested in the dwelling. With 3D-Catalog consumers are expected to be more interested, because it directly displays 3-dimensional dwelling plan. The data taken are the plans that are marketed in residential Mountain View Resident. 3D-Catalog can be used with marker facilities that can be shown visually or print. The methods used in 3D-Catalog use Marker less Augmented Reality. With this method consumer no longer need to use a marker to display digital elements. Expected with 3D-Catalog this can increase consumer interest towards the dwelling [5].

Technological developments affect society lifestyles in various ways; for example, students and lecturers commonly have Android-based mobile phones but do not make maximum use of them. An Android-based RC4 cryptographic algorithm simulation application developed for educational purposes in a university setting. This development is an Android-based device by helping students to learn. Based on analysis of the results, it was concluded that the developed RC4 simulation application has met the criteria of validity, effectiveness, and practicality[6].

Rabbit is one of the animal groups that is included in herbivore livestock that has been known by people besides of goat, cow, buffalo etc. Most countries in this world have rabbit livestock because the rabbit has a high body adaptation energy that can make them live in most of the world. Some of the advantages of rabbit breeding are from the side of economic profits. Because of that, this research presents an animation of the way to breed rabbit well and true, because rabbit breeding is one of the beneficial activities or hobbies. Through media information which uses animation, the process of information delivery will be easier to understand than oral or written from. Therefore, how to breed rabbit well and true, that will serve as a three-dimensional form [7].

### 3. METHODS

Marker less is an augmented reality method that does not require a marker as a reference for placing a 3 Dimensional object. There are 3 patterns, face tracking, 3D object tracking, and motion tracking. The making of marker less itself is assisted by Kudan SDK which Kudan supports SLAM (Simultaneous Localization and Mapping) technology and provides database generation facility in Unity Editor. This augmented reality SDK uses a high-performance Kudan CV engine that offers low memory footprint. The design of marker less pattern is shown in figure 2 The work process of marker less design is:

- Camera, ensuring that each frame is captured and forwarded efficiently to be tracked.
- Image Converter, a single pixel format converter that converts between camera formats to formats suitable for OpenGL rendering and for tracking.
- The tracker contains a computer vision algorithm that detects and tracks real-world objects in video camera frames.
- Video Background Renderer to render camera images stored in a state object.
- Target Resource created using online management system.
- The application code, for application developers, must initialize all the above components and perform three steps in the application code that is to ask the state object about the newly detected target or the latest state of this element. Then update application logic with new data input. The latter renders the graphical display embedded.

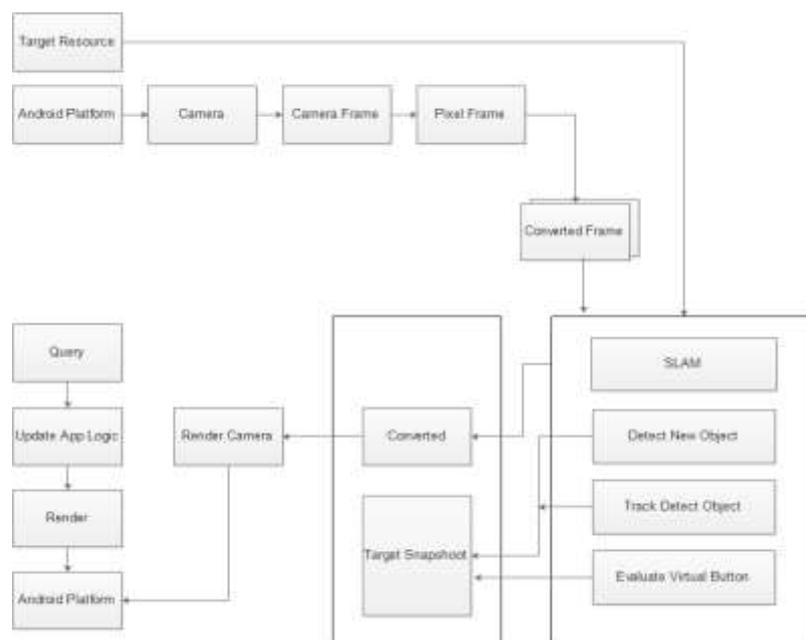


Figure 2 Flow of Marker less Augmented Reality Application

### 4. RESULT

Display the application after the install on the smartphone on each page 3D AR Marker less 3D application menu as a medium of information based on android religious tourism is as follows.

#### 4.1. Splash Screen and Loading Page views

At the beginning of opening the application, it will open is the opening page before entering the main menu. Can be seen in Figure 3

## 4.2. Main Page Menu Display

In the main menu, the view contains 4 sub menus, namely: AR Camera, gallery, profile and info. Can be seen in Figure 4.



Figure 3 Splash Screen and Loading Page views

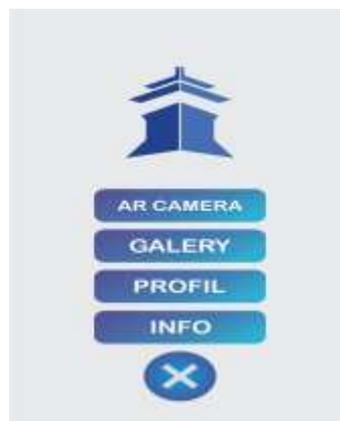


Figure 4 Display Home Page

## 4.2. AR Camera Display Complex of the Holy Tower

3D View AR Complex The holy tower accompanied by a brief description of the object can be seen in Figure 5.



Figure 5 AR Camera Complex of the Holy Tower

### 4.3. AR Camera Display of the Holy Tower

AR 3D View of the Holy Tower accompanied by a short description of the object. Can be seen in Figure 6.



Figure 6 AR Camera Tower of the Holy

### 4.4. Display AR Camera Mosque Tower Mosque Complex

AR 3D View Mosque Complex accompanied by a short description of the object. Can be seen in figure 7.



Figure 7 AR Camera the Mosque of the Tower of the Holy Mosque

### 4.5. View AR Camera Complex Tomb of the Tower of the Holy

3D View AR Dining Complex accompanied by a short description of the object. Can be seen in figure 8.



Figure 8 AR Camera Tomb complex of the Tower of the Holy

#### 4.6. Views of the Palace Tower Complex Gallery

The gallery menu is a menu that will display the gallery menu of the Holy Tower Complex along with a brief explanation.

#### 4.7. Views of the Tower of the Tower Gallery

The gallery menu is a menu that will display the gallery menu of the Holy Tower along with a brief description. Can be seen in Figure 9.



Figure 9 Gallery of the Holy Tower Compound

### 5. CONCLUSIONS

From the results of research and discussion can be drawn conclusion as follows: In this research managed to build the application of Augmented Reality Marker less 3D as an information media of religious tourism based on interactive android Menara Kudus using multimedia development method of MDLC (Multimedia Development Life Cycle) for an introduction. And the second implementation of interaction using the application button further facilitate the user, all the buttons function according to function and the application runs smoothly on the Android smartphone device and is expected to be used for tourism promotion in Kudus District. In the application, the user must be considered the distance and focus of the camera. In order for the camera to detect better but the farther, the camera focus will interfere with application performance. 3D objects created include the buildings according to the constraints of the problem. Then accompanied by information about the Holy Tower. At the las this application is stored in the form of apk file (android package file), so that can be directly installed on the smartphone android.

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