Implementation of Markerless Augmented Reality Technology Based on Android to Introduction Lontara in Marine Society

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Abstract. Local language learning had been leaving by people especially young people had affected technology advances so that involved lack of interest to learn culture especially local language. This research aims to design and implement augmented reality on introduction Lontara on mobile device especially android. Application of introduction Lontara based on Android was designed by Vuforia and Unity. Data collection method were observation, interview, and literature review. That data was analysed for being information. The system was designed by Unified Modeling Language (UML). The method used is a marker. The test result found that application of Augmented Reality on introduction Lontara based on Android could improve public interest for introducing local language particularly young people in learning about Lontara because of using technology. Application of introduction of Lontara based on Android used augmented reality occurred sound and how to write Lontara with animation. This application could be running without an internet connection, so that its used more efficient and could maximize from user.

Keyword: Augmented Reality, Markerless, Android and Lontara

1. Introduction
Recent years, Augmented Reality (AR) was an important field of research. AR was a merger of objects which exist in virtual to reality within two as well as three dimensions that can be touched, seen and heard. AR gave great opportunities in science and technology because this disciplines emphasized directly on training [1]. Through AR technology, someone could get a sensation of exploration and learn with different and unique ways because he directly involved in Augmented Reality.

Local language learning had left by people. Only definite people were still looking up and defending local culture value. Currently, people particularly young people had influenced of technology advances, so that involved lack of interest to learn culture especially local language. With the advent of smartphone based on Android, so that involved lack of interest to learn by the book. Therefore required application based on Android which could be learning and companion media [2].

Augmented Reality (AR) was a term for the environment which combines reality and virtual with made by computer so that the boundary between reality and virtual became very thin. AR had one of the advantages was that could implement extensively in various media. As the technology develops, used of technology AR on learning process of student in primary school was expected to stimulate student in order not to quickly bored, more understand material and improve student’s comprehension with supporting program of local learning especially introduction of Lontara by educational institutions, primary school, in order to make class be interest, simple, creative and interactive. So required learning media which be interactive and interest in introduction Lontara [3].
2. Method

2.1. Markerless Augmented Reality

Augmented Reality had two methods of target recognition were used for marker and markerless. The marker was an image with unique pattern which could be taken by the camera and recognized by AR application. The marker could be the photo of a real object or artificial image with the unique pattern. This marker used a marker recognize technique or fiducial marker. Markerless was a tracking method where AR used an object in reality as a marker. AR with the markerless method used tracking technique with nature feature. This technique used edge, corner detection and texture from image or object. The marker had sustained several times evolution, among others:

- Barcode.
- QR Code.
- Printed AR Marker.
- Natural Printed AR Marker.
- Real Life Marker as Human Face [4].

The marker which natural printed AR and human face was a markerless category. On Vuforia, Marker called image target.

![Picture 1: Evolution of Marker](image)

Image target can be tracking and ideal image target by AR system compares: Features with a complicated pattern, for example, outlook image, group of people image, collage, etc. The contrast was good. There isn’t repetition pattern, for example, grass field, plaid. The color graph was 8 or 24 bit with PNG or JPG format, its size lack of 2 MB, and must RGB or grayscale. One of many Augmented Reality methods currently involved was Markerless Augmented Reality method. Through this method, the user didn’t need to use a marker which is boxy and black to show digital elements. Like recently involving by greatest Augmented Reality company in the world, Total Immersion. They had made various of markerless tracking technique as their pledge technology like Face Tracking, 3D Object Tracking and Motion Tracking [5]. Face Tracking: With using algorithms which they developed, the computer could recognize human face generally with recognizing eye, nose, mouth, human position then would ignore other objects around like home, tree, and others object. 3D Object Tracking: 3D object tracking could recognize all of the surrounding shape’s object, like the car, table, television, etc. Motion Tracking: On this computer, technique could capture motion. Motion tracking had used extensively for producing movies which stimulate motion. For example on Avatar movies where James Cameron used this technique for making that movie and using in real time. GPS Based Tracking: It recently began popular and considerable to develop on smartphone application (iPhone and Android). By using GPS features and compass which exist on the smartphone, this application would take data from GPS dan Compass then show in shape direction which we want in real time, in fact, there is some application show it in 3D [6].
2.2. Lontara

Lontara was a script for peoples of South Sulawesi. Lontara took from Java and Malay language was lontar or palm tall (Borassus Flabellifer). Therefore Lontara was a script which wrote in leaf tall. The tradition also had done by people of Sunda, Java, Bali in writing script by their lontar. There was also an opinion that epistemology said Lontara composed from two words by raung (leaf) and talak (lontar). Word of raung talak sustained evolution became Lontara. There was a unique lontar, like audio or tapes. Its text was written one line on a narrow leaf lontar which roll up, can be only written when the roll was turned back. Articles on roll moved in front reader up, from left to right. One of Lontara gulung was La Galigo, an original epic by people of Bugis, estimated which written on the 14th century before Islam. This opus had numbered 6.000 pages, with five syllables. Background of location of La Galigo’s stories was in luwu which kingdom considered as location where people of Bugis came up. Lontara (someone called Lontaraq or Lontarak) was genuine Lontara of people of Bugis, Makassar, and Mandar on South Sulawesi. Actually, still there was an old letter of Makassar, its age older than Lontara. But then the sustainability was Lontara. There was an opinion that this Lontara different with another script in Indonesia like Bali, Jawa, Lampung, Sunda. According to philology Lontara had a relationship with pallawa’s script from India. But there was an opinion said this script came from pallawa. Besides their script, people of Bugis used their dialect which called “Bahasa ugi”. Meanwhile, another people in South Sulawesi was Saqdan Toraja, not having a tradition of writing, only having a tradition of oral.

According to history, Lontara was introduced by Sabbannarak or Syahbandar of Gowa’ Kingdom, Daeng Pammate. When Kingdom of Gowa ordered by King of Gowa IX, Daeng Matanre Karaeng Manngutungi who called Karaeng Tumapakrisik Kallonna, Daeng Pammate got two positions in this kingdom were Sabannarak besides Tumailalang (minister of home affairs). At the time, Karaeng Tumapakrisi Kallonna gave a command to Daeng Pammate for creating script which using for writing. In 1538, Daeng Pammate succeeded writing Lontara consist of 18 letters and also old Makassar letters. Finally, this Lontara was modernized so that its word became 19, due to influence Arabic Language. Lontara was traditional script people of Bugis. The form of Lontara according to humanist, Prof Mattulada (Alm) came from “sulapa eppa wala suji”. Wala Suji came from word of Wala which mean separator, fence, keeper, and Suji which aim princess. Wala Suji was a bamboo fence in ritual events which form part of Ketupat. Sulapa eppa was mystical trust of classic Bugis which symbolized an order of the universe, fire-water-wind-sail. This Lontara in general used to write a rule of procedure of government and society. One of the scripts which the most famous on Bugis was La Galigo.

![Picture 2: Lontara](image.png)

Design of digital application of Lontara was an application which could show object virtually with available size on 36 adjusted with a marker which had been inputted to library vuforia SDK.

![Picture 3: Architecture Design of System](image.png)
On this picture described that android phone camera would highlight object where eventually if a marker was recognized that showing image object 2D/3D for trying virtually. As for design marker which used can show in picture 4.

![Picture 4: Design of view of Lontara]

Lontara came out if we were clicking one of a button on the form of Lontara’s menu and there was also Indonesian language and sound button. This Augmented Reality marker didn’t use many forms, when the program was running, the first page showed logo, after that showing main interaction page which showing view of behind camera, when camera detected marker, then coming up a virtual object on a screen.

2.2.1. Icon view on the main page

The following was icon view of implementation application of Augmented Reality which recognized Lontara on a smartphone screen.

![Picture 5: Icon View of AR Lontara]  ![Picture 6: The First View when running]

After camera active, highlight that camera to marker, if user click button start that would come out three menus of word choice, the way of writing Lontara and button out. And if user click button of a word that would come out word choice of Lontara.

![Picture 7: Output Choice Menu of Lontara]
If user clicks one of Lontara that came out 3D Lontara, the button of audio and back. Further, if user click one of choice menu way of writing a word of eating would come out in this animation view wrote a word of “KA”.

The application which used to :. Blender and Unity 3D. Blender was used to describe the 3D object and Unity 3D was used to make virtual reality application.

3. Result and Discussion

This research used to experiment with software which builds with using Black Box method.

| Table 1: Experiment Results of Range of Marker |
|----------------------------------------------|
| No   | Range of Marker | Achieved Result | Experiment Result |
|------|-----------------|-----------------|-------------------|
| 1.   | < 30 Cm         | ![NKA](image1)   | [ x ] Accepted    |
|      |                 |                 | [ ] Unaccepted    |
| 2.   | < 30 Cm         | ![NKA](image2)   | [ ] Accepted      |
|      |                 |                 | [ x ] Unaccepted  |

| Table 2: Experiment Result of Radiance of Marker |
|-----------------------------------------------|
| No   | Radiance of Marker | Achieved Result | Experiment Result |
|------|---------------------|-----------------|-------------------|
| 1.   | With Radiance       | ![NKA](image3)   | [ x ] Accepted    |
|      |                     |                 | [ ] Unaccepted    |
| 2.   | Without Radiance    | ![NKA](image4)   | [ ] Accepted      |
|      |                     |                 | [ x ] Unaccepted  |
Based on this experiment table, Black Box overall could be taken the conclusion that marker could be recognized if range between marker and phone was 30 cm – 69 cm, meet the functional requirements however on recognizing the process of an object which determined still there was deficiency so that needed repairing on an object before highlighting.

4. Conclusion
From this experiment, result could be concluded that there were companion media like practice application of Augmented Reality on Lontara based on Android application which could be improving interest to introduce local language especially young people in learning Lontara because of using technology besides the printed book and the application could give benefit in the learning process about Lontara. Application of introduction of Lontara used Augmented Reality could be media to introduce for knowing kinds of Lontara, there were voice and way to write Lontara with animation with introduction media can be used without an internet connection, so that its used more efficient and could be maximized by the user.

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