Augmented Reality Implementation as a Product Introduction Development Scheme in Logistics

Angga Wahyu Wibowo[1], I Ketut Agung Enriko.[2], and Yasmin Anindita Azzahra[3,]

[1,3] Department of Electrical Engineering, Politeknik Negeri Semarang, Indonesia
[2] PT. Telkom Indonesia (Persero) Tbk, Indonesia

Abstract—*Industrial evolution in the field of computer technology and multimedia is growing rapidly, especially the sophistication of augmented reality technology which has been used as an introduction medium by various companies. The method in this study uses the waterfall technique. This application is built on a mobile device using Unity 3D software which is implemented in the form of a three-dimensional model for product marketing both in warehouses and places for promotion. This digital marketing strategy supports business people in increasing target market satisfaction. By presenting augmented reality technology through three-dimensional visualization, it is hoped that it can add alternative interactive product introduction media so that consumer needs can be seen clearly through smartphones*

Keywords—Augmented Reality; Product, Logistics.

1. Introduction

The development of innovative technological advances from time to time is always based on the fulfilment of human needs and needs in various fields, one of which is in the field of information systems. This encourages the potential sophistication of Augmented Reality technology as a medium for product introduction and digital marketing. *Augmented Reality* can provide new things to a wide audience with a significant impact on a company. This technology can visualize virtual objects and display them in the real world in real-time. The application of introducing three-dimensional visualization in Augmented Reality as a product marketing strategy can provide an effective way for companies to reach consumers easily and quickly.

Augmented Reality technology innovation helps make it easier for the target market to see the physical product in detail. As the AR overlay moves, the user can see the information depicted from a different perspective. The user will scan the marker (marker) then a three-dimensional object will appear from the user's device, making it easier for consumers to assess and consider product quality. In other words, companies will save on personal performance, which previously used conventional methods to introduce and offer products, now switch to using Augmented Reality technology as digital marketing.

2. Literature Review
2.1. Augmented Reality

Augmented Reality is a visual technology that combines two-dimensional and or three-dimensional virtual objects into a real environment and then projects these virtual objects in real-time (Roedavan, 2014). Augmented Reality is a concept of combining Virtual Reality (VR) or Virtual Environments (VE) with world reality so that virtual objects are two-dimensional (2D) or three-dimensional (3D). According to the tracking integration results, the results are displayed interactively via the input device.

The tracking method used in Augmented Reality technology is divided into two, namely marker-based tracking and markerless. Both methods have something in common in visualizing objects with the effect of the detection distance indicator.

2.2. Marker-Based Tracking

Marker-based tracking is a simple method of detecting the calibration of marker patterns to render three-dimensional objects or animations and display these virtual objects.

2.3. Markerless Based Tracking

Markerless based tracking is an Augmented Reality algorithm method that uses pattern recognition, colour, and other features for implementation. The application of the markerless method uses 3D object tracking, face tracking, motion tracking, and GPS.

2.4. Digital Marketing

Promotion and marketing activities not only function as a communication tool between companies and consumers but also as a tool to influence consumers in purchasing activities according to their wishes and needs. (Rangkuti, 2009). Digital marketing technology in the field of business and trade is a factor supporting the success of a product which is a variable in the marketing mix that is very important for companies to implement in product marketing. In this case, it is necessary to have promotional

innovations so that the value of the interest in a product increases. The existence of high brand awareness and engagement will foster the experience of interacting with products through new and inventive media compared to conventional media. The ability of digital marketing technology to connect marketing promotions with physical experiences will turn static brochures into digital experiences to reach consumers without the need for physical and face-to-face contact.

The main purpose of promotion and marketing is as persuasive communication to inform potential customers about the existence of the product. In addition, from the company's point of view, it can build a good product image through promotions so that it will attract public attention.

2.5. Unity 3D Software

Unity 3D is a software game engine and Integrated Development Environment (IDE) for building interactive three-dimensional (3D) games. Unity CEO, David Helgason stated Unity is a toolset used to build games, Unity technology executes graphics, audio, physical, interaction and network. Unity is a MultiPlatform-based application that can operate on many operating systems and can publish to many file type formats. Unity Technologies receives fund protection from Sequoia Capital, WestSummit Capital, and iGlobe Partners. Unity has been used by developers with hundreds of games released for both iOS and Android. To support the development of applications made with Unity, conversion support is required such as mobile android, iPhone, Blackberry, Windows, Linux, Flash, and Webplayer. In addition, it is also necessary to support file extensions, 3ds, obj, and fbx. Unity allows calling custom functions written in C/C++ directly and java indirectly in C# scripts.

3. Research Methods

This research is a multimedia development research in the application of Augmented Reality technology with the waterfall cycle method. The stages that are passed are identifying the requirements (requirements), designing the marker display and designing a 3-dimensional shape (design), processing the design into a prototype product (implementation), the prototype that has been built must be tested for quality (testing), and the last is the maintenance stage if an error occurred in the application (maintenance).

3.1 Requirements Identification

Augmented reality (AR) is designed for industries that can take advantage of products from multiple points of view. Therefore, users of this AR technology-based interactive feature can be used by a wide audience to help consider product quality. The needs in this study are taken from industrial needs which provide a proposal needed in logistics. Identification in addition to the user, also identification of the appropriate technology used. The

proposed technology uses augmented reality based on Marker Based Tracking. This stage is very important to determine user needs and the needs of the technology used.

3.2 Protoype Design

After analyzing user needs and the needs of the technology used. The author designs a 3 (three) dimensional shape and designs the markers used. This marker is used to target objects from augmented reality applications. In designing markers and objects the author designs in the form of a storyboard. This storyboard is used to explain the shape of the object before the object is built. The design results can be seen in Figure 1
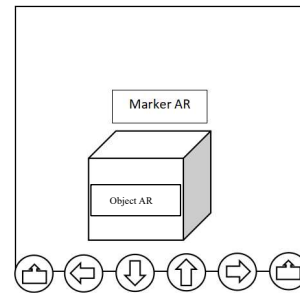

Fig. 1 Storyboard Design

3.2 Implementation

The development of the application of Augmented Reality technology as an alternative to product introduction in logistics in the development of this product introduction facility uses a multimedia development method that begins with the determination of the concept and design of the flow and ends with the distribution stage. (Lurther 1994). At this stage, the author begins to make 3-dimensional object shapes and markers. In its manufacture, the author uses Blender and Unity 3D. The design of the marker interface and its AR objects can be seen in Figure 2.
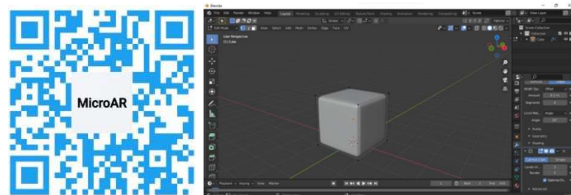

Fig. 2 (a).Marker Design (b). 3D Object Creation

3.2 Testing

The quality testing phase is carried out by directing the application camera to the target barcode that has been created. The test is carried out by adjusting the distance between the camera and the barcode, the test is carried out by adjusting the level of light intensity, and the test is carried out with different tilt angles. This is done so that it

can be implemented in buildings that allow layouts, different light intensities, and in directing the application to barcode objects that have different points of view. Therefore, it is necessary to do testing to produce a good application quality. In Figure 3, the author conducted a test by bringing the camera closer to the target barcode. The author tries with several angles. Several distances have also been tested. At a distance of 1 cm, 5 cm, 10 cm, 15 cm, 20 cm, 25 cm, 30 cm, 35 cm, 40 cm, 45 cm and 50 cm. The light intensity is tested in a room that has light intensity levels of 0-9 watts, 10-19 watts, and 20-30 watts. And the tilt angle between camera and object is 180°, 170°, 160°, 150°, 140°, 130°, 120°, 110°, 100°, 90°, 80°, 70°, 60°, 50°, 40°, 30°, 20°, 10°, and 0° degrees. The application implementation flow chart can be seen in Figure 4
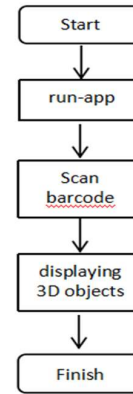

Fig. 3 (a) (b). 3D Object View

Fig. 4 System flowchart

3.4 Maintenance

The author maintains the application from several bugs or errors. It needs to be done and is very common if an error occurs. This maintenance is also carried out according to the wishes of the user. This process is expected to produce a good application by the wishes of the user.

4. Result and Discussion

The test is carried out by testing the level of application reliability at the high and low light intensity in the room. And at the distance between the camera and the target barcode. The results can be seen in table.

Table 1
Augmented reality test results camera distance to target marker

Distance	Results
5 cm	Showing object
10 cm	Showing object
15 cm	Showing object
20 cm	Showing object
25 cm	Showing object
30 cm	Showing object
35 cm	Showing object
40 cm	Showing object
45 cm	Showing object
50 cm	Showing object

Table 2
Test results of light intensity augmented reality

Distance	Results
0-9 watt	Showing object
10-19 watt	Showing object
20-30 watt	Showing object

Table 3
Test results of augmented reality tilt angle

Distance	Results
180°	Not showing object
170°	Not showing object
160°	showing object
150°	showing object
140°	showing object
130°	showing object
120°	showing object
110°	showing object

100°	showing object
90°	showing object
80°	showing object
70°	showing object
60°	showing object
50°	showing object
40°	showing object
30°	showing object
20°	showing object
10°	Not showing object
0°	Not showing object

In table 1. the author tested it with several distances. This application can display 3-dimensional objects ranging from a distance of 0 cm - to 50 cm. This can help the user in implementing it into a room or warehouse. If used in a warehouse, the user can use it to find out what items are in the box. If the marker that has been made is pasted on the cardboard. These results indicate that the application is quite good in implementation to the user. If used indoors, it can be used to present the user's superior products to consumers.

In table 2 the authors tested the level of light intensity. This light intensity starts at 0-9 watts. At an intensity of 0-9 watts. Applications can display objects well. At an intensity of 10-19 watts used

In table 3 the authors tested the level of the slope of the angle. The tilt angle in question is the position of the AR application camera with the marker object. With this level of inclination, it is hoped that the best position for displaying 3-dimensional objects is expected. The test results show that the slope data of 180°, 170, 10°, and 0° cannot display the object because the slope of the angle is very difficult for the application to reach the barcode target This proves that the application is quite good at reading the target marker even though at a certain angle it cannot read the target marker

5. Conclusion

Based on the results of testing and analysis regarding the implementation of Augmented Reality technology as a medium for product introduction and promotion, it can be concluded that collaboration between forms of personal selling promotion and technological advances will increase the company's potential to introduce its products to a wide audience in an innovative way. The use of this media can be a benchmark for companies for promotional strategies that can increase the attractiveness of the product itself. Visualization of objects resulting from scanned markers (markers) will appear at the same time (real-time) so that product information is more detailed. Seen from several angles, light intensity, and distance show that this application is very good to use.

6. Future Work

The implementation of Augmented Reality technology in the product introduction strategy still requires

technology development ideas that allow it to be improved. There are several possible suggestions for future development, including:
1. Increase the number of variations of 3-dimensional objects to enrich the objects to be used.
2. Adding product information features that are displayed to add information for application users

References

1. Ariawan Djoko Rachmanto, M. Sidiq Noval. (2018, Mei). Implementasi Augmented Reality Sebagai Media Pengenalan Promosi Universitas Nurtanio Bandung Menggunakan Unity 3D. *Jurnal Teknologi Informasi dan Komunikasi, Volume IX*, 1-9. doi:ISSN : 2087-2372

2. Made Dewi Asih Astita, Adian Fatchur Rochim, Kurniawan Teguh Martono. (2015, October). Aplikasi Augmented Reality Denah SMP Negeri 36 Purworejo Menggunakan Mobile Android. *Jurnal Teknologi dan Sistem Komputer, Vol.3, No.4*, 1-5. doi:e-ISSN: 2338-0403

3. Nurul Bahiyah, Petrus Sokibi, Imam Muttaqin. (2020). Aplikasi Pengenalan Produk Menggunakan Augmented Reality dengan Metode Marker. *Jurnal Sistem Cerdas, Vol 03-No. 2*, 1-8. doi:eISSN : 2622-8254

4. Rachel Chrysilla Tijono , R. Rizal Isnanto, Kurniawan Teguh Martono. (2015, October). Penerapan Teknologi Augmented Reality Sebagai Sarana Promosi Produk "Sarana Sejahtera Wilson's Office Chairs" Berbasis Android. *Jurnal Teknologi dan Sistem Komputer, Vol.3, No.4*, 10. doi: (e-ISSN: 2338-0403)

5. O. Bimber and R. Raskar, Spatial Augmented Reality Merging Real and Virtual Worlds. A K Peters Ltd, 2005.

6. K. T. Martono and R. Kridalukmana, "Mobile Augmented Reality Jurusan Sistem Komputer Universitas Diponegoro Berbasis Android (MARSISKOM)," *J.Sist. Komput.*, vol. 4, pp. 17-24, 2014.

7. Rumajar, R. (2015). E-Journal Teknik Elektro dan Komputer, Vol.4, No.6 (2015), ISSN: 2301-8402. Perancangan Brosur Interaktif Berbasis Augmented Reality , Vol.4, No.