Knowledge E
enriching | engaging | empowering

Conference Paper

Augmented Reality Implementation for Device Recognition Learning Computer Network

Iwan Setiawan Wibisono*, Sri Mujiyono

Teknik Informatika, Universitas Ngudi Waluyo, Indonesia

ORCID ID
Iwan Setiawan Wibisono: https://orcid.org/0000-0002-6820-497X

Abstract.
Augmented reality incorporates two-dimensional or three-dimensional virtual objects into a virtual reality environment, projecting these virtual objects in real time. This research aimed to increase the knowledge and skills of Hidayah Vocational High School students' understanding of the various types of network devices with an augmented reality application and developed tutorial videos on steps for creating a new atmosphere. This research model used the waterfall method. The android app that was developed went through product feasibility test stages carried out by lecturers and teachers and was declared fit for use. Then the product was tested on SMK Hidayah class XI students and declared "good." Based on the data above, it can be concluded that the android-based application in the form of a 3D Visualization Design of a Computer Network can be used to understand computer introduction material.

Keywords: Augmented Reality, Android App, Computer Network.

Corresponding Author: Iwan
Setiawan Wibisono; email:
iwansetiawan@unw.ac.id

OPEN ACCESS

1. Introduction

With the advancement of the world of computer technology today, virtual reality technology has emerged, commonly called Virtual Reality (VR). Virtual Reality can help users to interact with an environment that is simulated by a computer. In contrast, Augmented Reality is an amalgamation of virtual objects, two-dimensional or three-dimensional, into a natural three-dimensional environment, then projecting these virtual objects in real time.(1) (3) (5)

In general, learning and understanding computer network concepts can only be understood by students of Vocational High School (SMK) majoring in Computer and Network Engineering (TKJ). Nevertheless, in Reality, students' understanding of computer networks has not yet reached the desired goal because the school is faced with the problem of limited or incomplete practice tools.In this study, several theoretical reviews

will be used, which will later be used as a reference. The following is a comparison of previous research:

1. According to Awang Harsa K et al. in 2016, a research entitled Augmented reality-based spatial learning using the Augmented Reality Marker method.

2. According to Meyti Eka Apriyani1, Robie Gustianto. Vol 7, in 2015, this research is entitled Augmented Reality as a tool to identify ancient animals with 3D animation using the single marker method.

3. According to Fivtatianti hendjani Vol 2, in 2018, this research was entitled learning media for elementary school natural science with the application of a single augmented reality marker.

4. According to Diana, Alandika Dwi Rama, and Rosa Fitriasari Vol 7 in 2020, this research entitled the use of augmented Reality as a medium for introducing Bengkulu's typical flora with the Android-based single marker method.

Based on the problems above and previous research, the purpose of this research is to create a system that can package the introduction of various types of network equipment with Augmented Reality applications that display 3D objects and video tutorials from the material contained in the module to create a new atmosphere in understanding computer network.

2. Method

2.1. Design Concept

This study has the aim of designing a learning media that is more attractive and efficient usingAR by utilizing the camera features of an Android smartphone. This research will produce a 3D-based computer network recognition application design.

2.2. System Design Method

The method used by researchers in this final project is the waterfall method, the SDMC (Software Development Life Cycle) model of the waterfall. The waterfall model provides a sequential software life flow approach from the analysis, design, coding, testing, and support stages. (1) (2) (4)
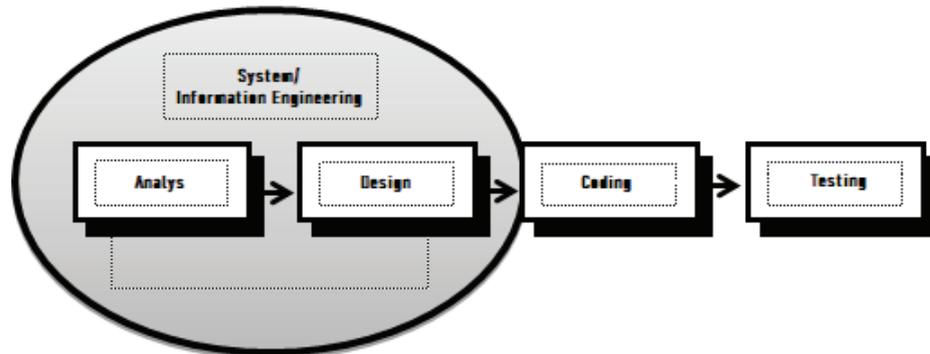
Figure 1: System Design.

2.3. Marker Design

Marker (marker) is hardware supporting augmented reality applications that function as a liaison interface between modules and augmented reality applications. In general, the process of making markers for augmented reality applications consists of several stages:

    a. Designing a marker display with design software

    b. Upload markers to the vuforia website

2.4. System design

To describe the system's design using a use case diagram. In the use case diagram of the Augmented Reality application, there is a use case carried out by the user; first, the user will open or run the application, then the user can select several menus available in the application. On the start menu, the user will track the image, then the results of the tracking image, and the user will get 3D modeling objects and video tutorials.

3. Result and Discussion

After conducting the analysis and design discussed in Chapter III, the next stage is the system implementation stage. The implementation phase is the process of realizing the system model that has been designed previously. In making this Augmented Reality application, first install all the software that will be used, such as Autodesk 3ds Max Design 2018, Unity 3D 2018, Adobe Photoshop CS6, and other supporting software.
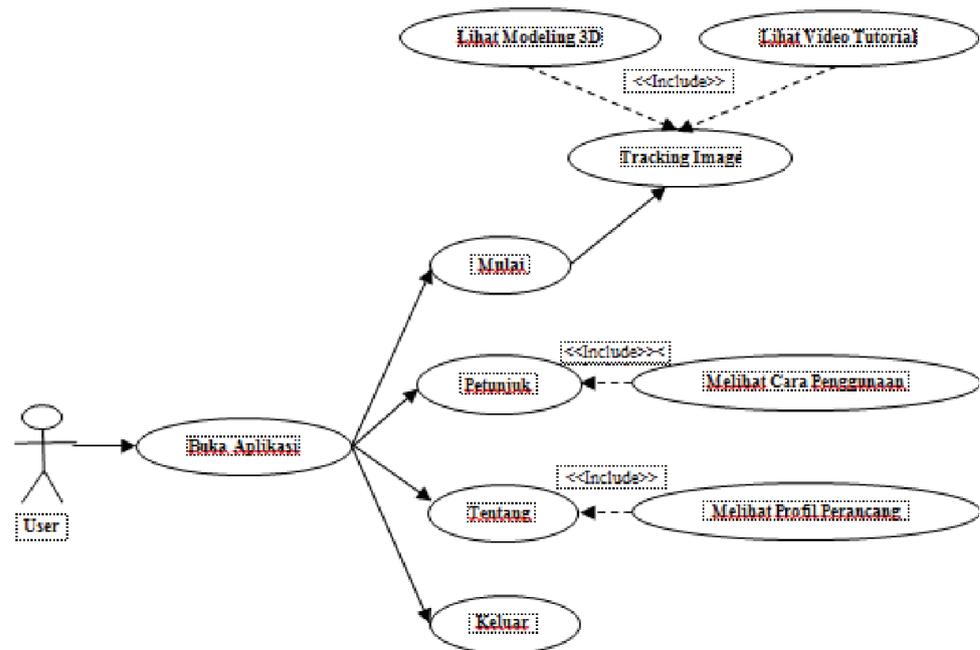
Figure 2: Use Case Diagram.

3.1. Presenting the Results

3.1.1. 3DModelingResults, Markers, and Outputs in Applications.

Making 3D models for augmented reality applications using the 3DS MAX 2013 application. Meanwhile, the marker design process on the computer network introduction module page uses the Adobe Photoshop CS6 application. The page module consists of 23 pages, with 11 pages used as markers for augmented reality applications. For output on the application, there are screenshots of the application running on the smartphone.

After the image design process , the marker is complete , and then the next step is to upload all the images that will be used as a brand to the vuforia website (https://developer.vuforia.com).

3.1.2. Application Design Results in Unity Software

The augmented reality application, it is divided into four scenes. These are the application menu scene, the start scene, the tutorial scene, and the augmented reality scene, as shown in Figure 3.

To be able to use smartphones, applications created using Unity must be built first for applications. In Figure 4, the minimum fire level used is 9 with the Android 5.0 Lollipop
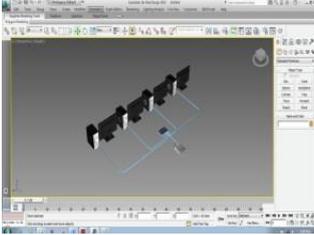
Results of 3D objects, markers and the output of the application	Information
	Local Area Network 3D Objects(LAN), on this 3D object creationusing Autodesk 3ds max. Fourcomputers are connected to the Hub and then connected to the Modem.
	In making markers, local Area Network (LAN) markers were designed using adobe photoshopCS6. Picturethis as whatlater in-tracking or looking for a camera to process. This imagehas five ratings.
	This is the result of combining 3D objects and markers in an application that has been created, and a tracking image is carried out on page 3 of the module Using an Asus smartphone pad phone S.

Figure 3: Use Case Diagram.

Figure 4: Application Page Interface Display.

operating system. This is because not all users use Android, which has a good camera

that is currently developing. After the application is built, it will generate an *.APK file with a size of 195MB, which can be installed on an Android smartphone.
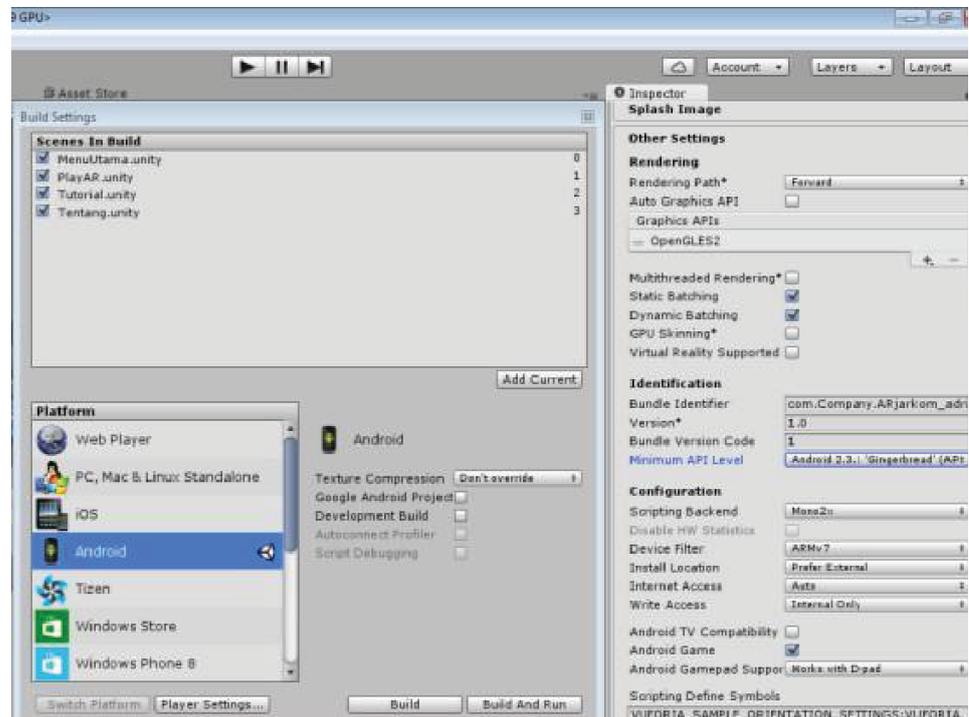

Figure 5: Overview of the file system on Android.

4. Conclusion

The conclusions that can be drawn from making the Jarkom Augmented Reality application, using the help of Augmented Reality technology are 1) make the Jarkom Augmented Reality application using Unity 5.2.1f1 and Android SDK assets; 2) When running the Jarkom Augmented Reality application, it is essential to pay attention to the length of the model load process; 3) The system can consider markers with a similar shape or pattern as the same marker; 4) The system cannot recognize marker; 5) s that are blocked from getting direct light. So the more significantly the light enters the camera, the better the camera detects the marker; and 6) When running applications on several smartphones, there are differences in the quality of the display of 3D objects. This is due to the difference in screen density and smartphone specifications.

Acknowledgments

References

[1] Ramli AR, Bahrudin IA, Ali A, Ismail A. Integrating augmented reality in storage technology learning module (ARStore). Research and Innovation in Technical and Vocational Education and Training. 2021;1:134–141.

[2] Ariav AF. Pengembangan aplikasi monitoring kendaraan bermotor (kbm). 2020.

[3] Buchori A, Setyosari P, Dasna IW, Ulfa S. Mobile augmented reality media design with waterfall model for learning geometry in college. International Journal of Applied Engineering Research. 2017;12:3773–3780.

[4] Creighton RH. Unity 3D game development by example: A seat-of-your-pants manual for building fun, groovy little games quickly. Birmingham, UK: Packt Publishing Ltd.; 2010.

[5] Diana D, Rama AD, Asa RF. Pemanfaatan augmented reality sebagai media pengenalan flora khas bengkulu dengan metode single marker berbasis Android. Pseudocode. 2020;7:51–58.

[6] Amila A, Hasibuan EK, Sinurat LR. The effectiveness of mini-CEX towards clinical competency achievement in neurological examination of clinical practice nursing students. Indonesian Nursing Journal of Education and Clinic (INJEC). 2018;2:208–215.

[7] Joshi Y, Poullis C. Portal to knowledge: A virtual library using marker-less augmented reality system for mobile devices. Optical Architectures for Displays and Sensing in Augmented, Virtual, and Mixed Reality (AR, VR, MR). 2020;11310:321–338.

[8] Guntur MI, Setyaningrum W, Retnawati H. Can augmented reality improve problem-solving and spatial skill? Journal of Physics: Conference Series. 2020;1581:012063.

[9] Janosik SM. Rancang bangun multimedia pembelajaran berbasis adventure game dengan pendekatan visualization, auditory, kinestethic untuk meningkatkan pemahaman siswa pada mata pelajaran jaringan dasar smk Kelas X. NASPA Journal. 2016;42:1.