Journal of Engineering and Applied Sciences 12 (13): 3292-3298, 2017
ISSN: 1816-949X

Media Introduction to Practical Tool using Android-Based Augmented Reality Technology

S.Si Hata Maulana
Digital Multimedia Engineering, Jakarta State Polytechnic, Depok, Indonesia

Abstract: Augmented Reality (AR) is one of the trends of technological development in Indonesia at this time. AR provides a virtual view in the introduction of a specific object. Correspondingly, digital multimedia engineering departement expects learning process on lab sessions can be aided by the introduction of AR technology in some practical tools. To help explain the role of the faculty in the names and functions of the tools used in the lab. The students also helped in understanding the names and functions of the tools who used. Seeing the development of the use of smart phones based on Android in the digital multimedia engineering departement both students and lecturer on average have it. Therefore, making the introduction media lab tool is based on Android. Luther used as product development methods with the concept stage, design, material collecting, assembly, testing and distributed. The media lab android-based tool that digital multimedia engineering departement can thrive in producing graduates who are competent in the use of working tools. So, as to answer the demanding needs of the industry continues to increase in terms of ability or skill in using the tool researches.

Key words: Augmented reality, practical tools, Luther android, learning process, Indonesia

INTRODUCTION

Digital multimedia engineering departement has required an increase in all the facilities at hand. Implementation of the learning process as a core objective it, requires more attention at the beginning of this establishment. The learning process consists of theoretical and practical, mutually influencing one another. Associated with it, this research aims to create a media introduction of practical tools to use Augmented Reality (AR) based on Android.

This study is one way to help the faculty role in explaining the names and functions of practical tools used and can help students make it easier to understand the name and function of the tool practical uses. A similar application with the media introduction this practical tools (Iswahtudi, 2014; Kurniawan, 2014; Galina and Rohman, 2015) is the basic idea to create media that support the quality lab.

Based on the above and by looking at the function of augmented reality technology that can visualize information interactively this study has raised the title of media introduction to practical tool with augmented reality technology based android. Application users can find out information about the names and functions of practical tools to installing the application on a smart phone. By using augmented reality technology is expected to help them in producing graduates who are competent and answer the needs of multimedia or digital media industry. Based on this background, this study has the formulation of the problem as follows: how to create a media introduction of practical tools with android-based augmented reality? Augmented reality technology is a merger between the virtual world and the real world or virtual, so in this study will generate an attractive multimedia products. The purpose of this study is as follows: make media introduction of practical tools with Android-based augmented reality technology based on these objectives the outcome of this research is a multimedia product called the "Virtual Lab".

"Virtual Lab" has one of its features is the info click like Fig. 1 this feature is intended to facilitate the user in

Fig. 1: Interface 'info klik'

knowing the information contained on practical tools. In connection with the outcome of this research is the "Virtual Lab" the contribution will be awarded are as a means of supporting attractive. Means of supporting facilities is one of the learning process that goes on Department of Information and Computer Jakarta State Polytechnic.

Literature review

Multimedia: The term originated from the multimedia theater, not a computer. Performances that use more than one medium often called multimedia performances. Multimedia performance includes video monitor, synthesized band and artwork humans as part of the show. Multimedia system started in the late 1980s with the introduction of hypercard by Aplle and the announcement by IBM in 1989 regarding the Audio Visual Connection (AVC) and the video adhapter card for PS/2. Since, the beginning, almost every supplier of hardware and software to jump into multimedia. In 1994, it is estimated there are >700 products and multimedia systems on the market (Suyanto, 2003).

How to communicate information (Binanto, 2010) modalities (way): Vision, hearing, touch, communication channels: conversations, sound effects, music, medium: animation and sound, image and text. When one of the main components are missing called mixed media not multimedia.

Why is it important multimedia (Binanto, 2010) represents the trigger (triggers) is readers get something 'more' than the topics, very effective in information disseminating. People retain (able to remember) from 20-30% is seen and heard, people remember 50% of what they hear and see (Binanto, 2010). Use of multimedia: education like tutorials, encyclopedia (example: microsoft encarta) (instructional) and then information is tourism, museums, art galleries and next about entertainment for games, art, performances and the other in medicine for example X-ray scanner, etc.

Characteristic: Presentation running serial, parallel and synchronization. Application of multimedia in a prominent company focused on marketing activities, especially promotional activities. Promotional activities include advertising, sales promotion, perjualan in person, public relations and direct sales including sales through the Internet. Excess exciting multimedia senses and attract interest because it is a combination of sight, sound and motion (Suyanto, 2003).

Excess multimedia is exciting the senses and interest because it is a combination of sight, sound and motion.

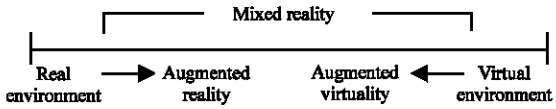

Fig. 2: Framework virtuality continuum

Research institutions and publishing computer, namely Coputer Technology Reseach (CTR) states that people only remember 20% of the visits and 30% of that was heard but people can mengignat 50% of that seen and heard and 30% of the visits, heard and done at once. Then multimedia is very effective. Multimedia became a powerful tool for teaching and education as well as to achieve competitive advantage of companies (Suyanto, 2003).

Multimedia make reading it dynamic by giving a new dimension to the words. Especially in the delivery of the meaning of words in multimedia applications could be the trigger that can be used to expand the scope of the text to examine a particular topic more broadly. This is achieved not only by providing more text but also by including sound, images, music, animation and video (Suyanto, 2003).

Augmented reality: Ronald T. Azuma defines augmented reality function as the incorporation of real objects and virtual in a real environment, run interactively in real time and there is integration antarbenda in three dimensions, namely integrated virtual objects in the real world (Azuma, 1997). Merging real and virtual objects is possible with the appropriate display technology interactivity is made possible through the device-specific input devices and a good integration requires an effective tracking.

Architecture augmented reality in 1994, milgram and formulate a framework kishino possibility of merging and melting the real world and the virtual world into a virtuality continuum (Binanto, 2010). In this framework, augmented reality is closer to the left side which explains that the environment is real and illusory objects. Instead augmented virtuality closer to the right side in the frame which explains that the environment is virtual and the real nature of objects. So, if there is a merger between augmented reality with virtual reality will be created mixed reality (Fig. 2).

Augmented reality has two very significant method developed in recent years that the marker-based tracking and markerless augmented reality. Augmented reality markerless method no longer requires the use of a marker to display digital objects. This method has some special techniques that face tracking, motion tracking and GPS based tracking. While augmented reality marker-based tracking still requires a code is a barcode marker or some

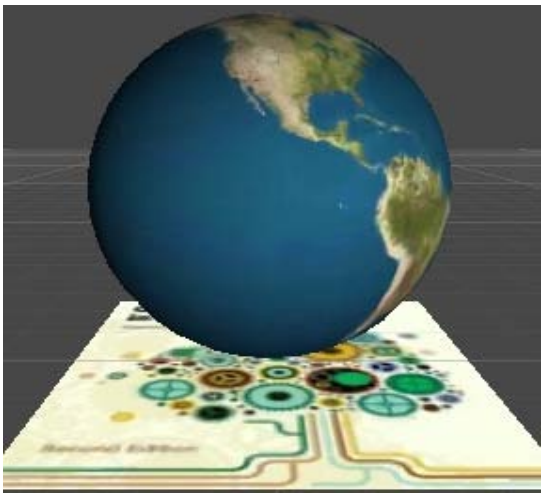

Fig. 3: Sample results marker based augmented reality tracking

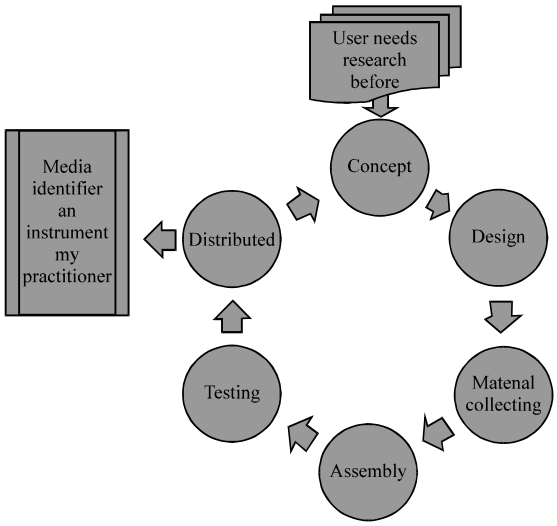

Fig. 4: Research flow chart

sort of code (Azuma, 1997). Augmented reality is a variation of Virtual Environments (VE) or more commonly called the Virtual Reality (VR). VE really enter the user in a virtual environment. When users sign in to virtual reality can not see the real world around him. On the contrary, augmented reality allows the user to see the real world, the virtual object composited with the real world. Therefore, augmented reality is to add a reality, rather than replacing them.

Augmented reality has the potential to be used at all levels of sensitivity like, smell, touch and hearing. AR can be used to replace the lost sensitivity or reduced as the level of blindness or weakness in sight and help users who have problems with hearing (Fuhrt, 2011) (Fig. 3).

Currently, in the world of information technology is growing rapidly. Almost all activities take advantage of technology, especially technology that is used is a multimedia technology. All fields using interactive multimedia technology to facilitate users in using the application. Marker function provides a virtual display of 3-dimensional objects on a screen monitor (Santoso, 2012). In augmented reality there are three methods used in the augmented reality marker-based tracking, markerless tracking and GPS based tracking. Based on marker tracking needed a marker (sign) to display digital elements. Markers are used usually in the form of black and white illustration of a square with a thick black border and white background. In markerless tracking no longer needed a marker to show the digital elements instead used several techniques to replace the function of the marker itself as face tracking this technique computers can recognize human faces in general by identifying the position of the eyes, nose and mouth of man. About 3D object tracking with this technique the computer to recognize all forms of objects that exist around such as cars, desks, televisions and others. Motion tracking this technique can capture the movement of the computer at this time motion tracking has begun to be used to produce films that try to simulate movement. And GPS (Global Positioning System) based tracking a technique that utilizes GPS and the compass that is in smart phones the application will retrieve the data from the GPS and compass and displays them in the form of the direction we want it in realtime even some applications in 3D.

Augmented Reality (AR) is now highly developed, AR is already able to be implemented in various platforms and devices in addition to the application of AR allows the use of interactive multimedia content including 3D visualization with minimum devices such as laptops and smart phones (Fig. 4).

MATERIALS AND METHODS

Due to the limited amount of equipment and difficulty of operation, the teacher can only teach the courses with an instructional video most of the time instead of using a real practical. As a result, students may not be able to fully understand its principle and operating procedure (Tarng *et al*., 2014).

In making the application the introduction of this android-based lab instruments, researchers used a method Luther multimedia development consisting of 6 stages. Therefore, it can be concluded that augmented reality technology can be defined as a computer-based interface that is simulated by the use of virtual computer to let the

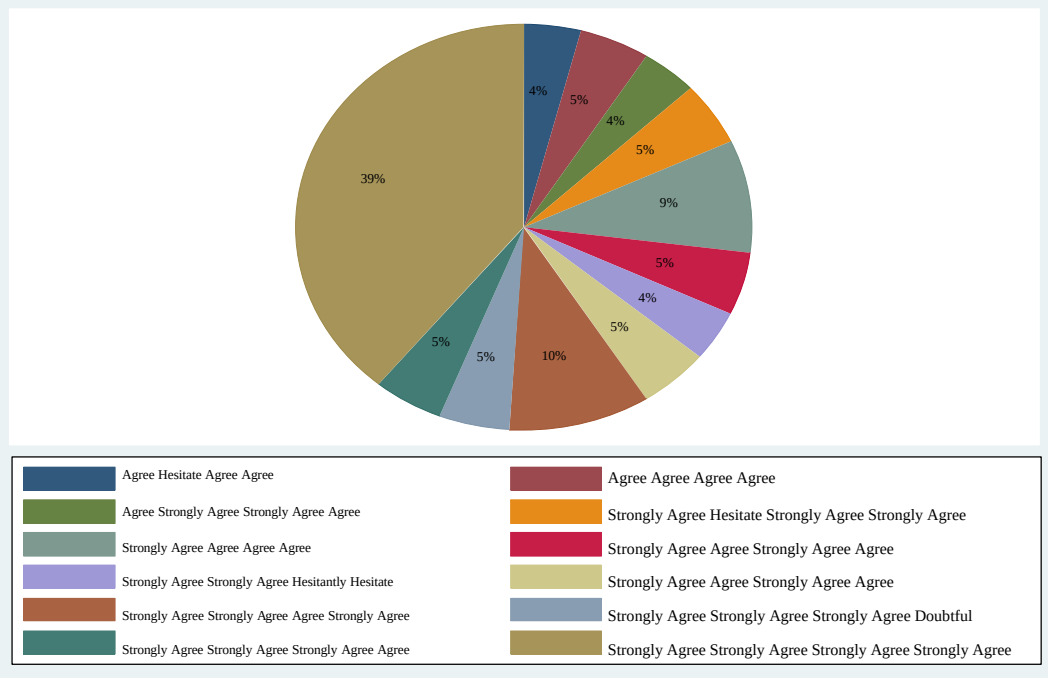

Fig. 5: Results answer P1-P5

users experience something that similar to the real world as well as the option to visualize, manipulate and interact with the system (Rahim *et al*., 2013).

RESULTS AND DISCUSSION

Needs analysis (concept): At this stage, it is part of the concept stage in Luther methodology used in this study. On the results of the questionnaire that was distributed to 21 respondents, shows some of the information needs of devices supporting the learning process that occurs when the lab activities. This is shown in Fig. 5 on the answers to the questions 1 through 5 were combined with the results of the dominance of 39% strongly agree, 43% agree and 18% undecided. It states that 82% expressed the need for learning support tools on lab activities is needed by students. More clearly the following questions to the respondents. Where questions 1-5 are as follows:

- Practice should be supported with appropriate equipment, sustainable
- Each practicum conducted by the job sheet or module that helps
- Preparation tool used contained in the job sheet or module
- The equipment provided should have clear instructions for use (beyond explanation lecturers and lab module)
- Use the instructions for use tools help students in understanding the use of the tool in question

It can be concluded that the results of the analysis of the opinions of respondents it would require adequate preparation in carrying out practical activities. This is followed by getting a picture of the real conditions on the target of the study is the laboratory informatics and computer engineering department of the polytechnic of Jakarta. On the question of 6-10 get the following results.

In Fig. 6 shows that the actual conditions at the target study still need the support lab activities. This looks at the dominance answers hesitate to 51.725%, disagree 24,137, 15,517% strongly disagree and disagree is 8621%. Thus as many as 39,654% real conditions stated goal of this study need the support in practical activities therein. Where questions 6 through 10 are as follows:

- PNJ especially laboratory JTIK used was poorly equipped
- PNJ particularly JTIK laboratories have used lab module or job sheet in carrying out practical activities
- Module practicum or job sheets that exist in the PNJ especially laboratory JTIK have included the preparation of the necessary tools
- Tools are available on the PNJ especially laboratory JTIK have clear usage instructions and complete

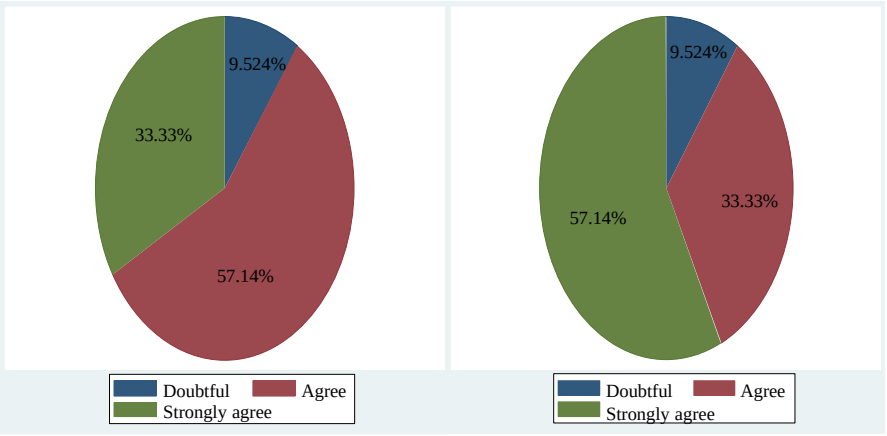

Fig. 6: Result question 11 and 15

Table 1: Result user requirement

Title	Media introduction to practical tool with android-based augmented reality technology
Audience	Students digital multimedia
Image	*JPEG
Audio	*Mp3
Animation	Animasi 3D handmade+asseting
Platform	Android min ICS 4.0
Marker	Logo PNJ
Modeling 3D	3 Lab equipment JTIK

Every student who organized the laboratory practicum in PNJ especially JTIK need instructions use laboratory tools to aid praktikumnya activities. Question 11. if the application is the introduction of laboratory tools applied with augmented reality technology (Augmented Reality/AR) showed that 57.14% of respondents approved the use of Augmented Reality/AR as a supporting device lab activities.

Question 15 technology augmented reality (Augmented Reality/AR) based mobile/android application will facilitate the implementation of the introduction of laboratory tools at the level of the student. This shows 57.14% of respondents agreed with the platform used to develop AR technology is android.

To answer the needs that obtained on the distribution of a questionnaire to a sample of students as potential users of the application, then here is the concept of application development or multimedia device in this study (Table 1).

Design: At this stage, the researchers made an application design tool practical introduction prodi TMD which will be associated with marker-based augmented reality technology. At this stage, the researchers mendesian layout of the front page and the page contents. The next process will be described in more detail in the discussion of the results later (Fig. 7-9).

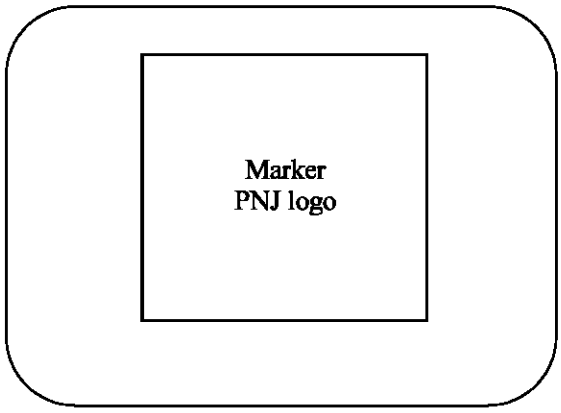

Fig. 7: Mock up 1

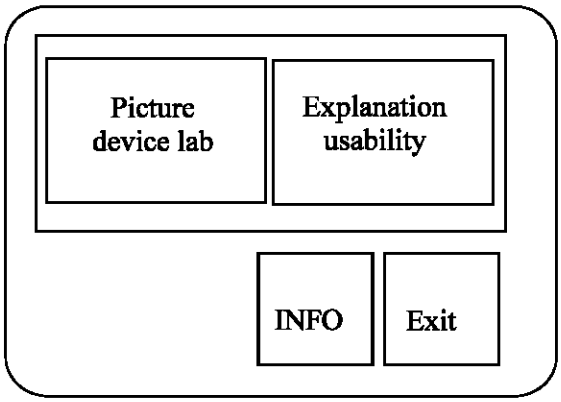

Fig. 8: Mock up 2

Material collecting: At the stage of collecting these materials researchers collected data related to the research and application made by the researchers. Data collected in the form of marker images: PNJ. jpeg, Clappern Board.

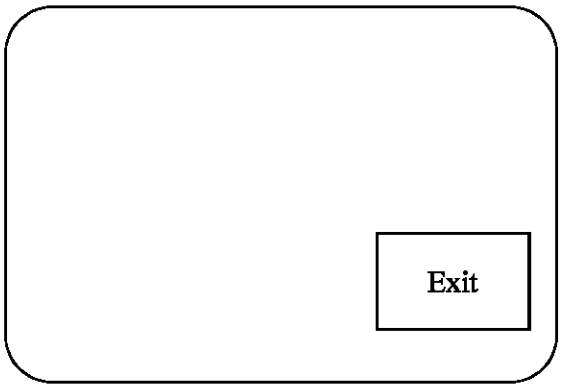

Fig. 9: Mock up 3

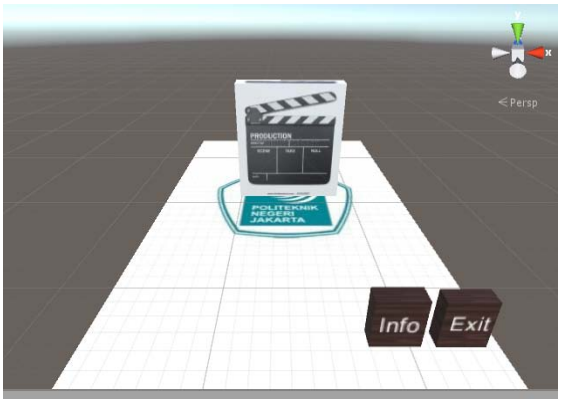

Fig. 10: Marker with clapper board

jpeg, Camera. jpeg dan Lamp. jpeg, animations (*.FBX,* .unity) audio and also the collection of information relating to this application requirements virtual lab.

Making (assembly): Stages of manufacture (assembly) this is a stage where the entire multimedia objects that exist in the previous phase is then collected and put together and then made applications in accordance with predetermined specifications in the stage concept and design. This stage researchers create 3D animations in unity which will be combined with the rest of multimedia objects which have been collected and then selected and made into one unified application. Researchers used software for AR 5.1.2f unity engine and adobe photoshop CS5 for a texture that is needed in the manufacturing process (Fig. 10).

Testing (testing): At this stage, the researchers tested the use of information and functionality presented JTIK lab equipment and ensure their application running properly.

Distribution (distribution): This stage is the stage where it is distributed multimedia applications. This stage is also the stage of evaluation and implementation of multimedia applications do. The evaluation is done by spreading questionnaire to assess whether these applications can be used to assist the introduction of practical tools on departement digital multimedia. Distribution is done by division android based applications. Luther 6 stages in its use to produce applications/specific products up until the stage of implementing them. Therefore, after the phase or phases until the distributed very important to consider the results of the previous phase of testing to see a response or feedback from stakeholders. In the event that this can be done by re-deploy the final questionnaire which aims to test the products to a particular user. In Fig. 4, looks between concept phase are distributed and arrows with dotted line it is intended if in the previous testing phase to produce negative feedback or dissatisfied stakeholders the product produced.

CONCLUSION

Using augmented reality technology requires a basic 3D modeling and animation as well as understanding of the use of AR engine like unity. Luther method greatly assist researchers in making the initial concept of multimedia development produk. Virtual lab has successfully developed the technology of augmented reality marker base.

ACKNOWLEDGEMENT

This research will be continued in next part about respon and result at testing and distribution stage's from Luther methodology.

REFERENCES

Azuma, R.T., 1997. A survey of augmented reality. Presence Teleoperators Virtual Environ., 6: 355-385.

Binanto, I., 2010. Multimedia Digital-Basic Theory and its Development. CV Andi Offset, Yogyakarta, Indonesia,.

Fuhrt, B., 2011. Handbook of Reality. Springer, New York, USA. isBN:978-1-4614-0063-9, Pages: 746.

Galina, L. and F.E. Rohman, 2015. The augmented reality Technology Utilization Markerless as a media introduction of building android-based. Master Thesis, University Kanjuruhan Malang, Malang, Indonesia.

Iswahtudi, C., 2014. Multimedia lecture diktat: Informatics engineering. AKPRIND Institute of Science and Technology, Yogyakarta, Indonesia.

Kurniawan, T.M., 2014. Mobile augmented reality diponegoro University Majoring in computer systems based on android (MARSISKOM). J. Comput. Syst., Vol. 4,

Rahim, N., N.A. Hamid, W.M.W. Isa, S.D.M. Satar and A. Rozaimee, 2013. A survey on components of virtual'umrah application. Intl. J. Multimedia Appl., 5: 17-20.

Santoso, M., 2012. ARkanoid: Development of 3D game and handheld augmented reality. Intl. J. Comput. Eng. Res., 2: 1053-1059.

Suyanto, M., 2003. Multimedia Tools to Increase Competitive Advantage. CV Andi Offset, Yogyakarta, Indonesia,.

Tarng, W., Y.H. Cheng, C.M. Lin, C.Y. Lee and H.H. Liou, 2014. Design of a virtual laboratory for analyzing nanoscale magnetic materials. Intl. J. Multimedia Appl., 6: 17-32.