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PROTOTYPE OF AUGMENTED REALITY TECHNOLOGY BASED ON SMARTPHONE FOR CHILDREN READING MEDIA

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ABSTRACT

Background: This study aims to determine the performance of the prototype of Augmented Reality technology on smartphones in visualizing the children reading media. Objective: Research along with the development of a prototype application conducted using experimental research methods with prototype software development model. Smartphone camera resolution samples used is 5 Mega Pixel, 8 Mega Pixel, 16 Mega Pixel. As well as eleventh images marker is used as the target sample in the testing process. Prototype application performance in visualizing the reading media tested with blackbox testing model based on object-making aspects of the distance, the angle of the object, and object lighting conditions. Results: The percentage of success in the prototype application read the image marker and display a visualization of 3D objects based on the three types of smartphone cameras are respectively 68.37%; 62.50%; 70.45%. Conclusion: Based on the blackbox test results known that the performance of the prototype of Augmented Reality technology on smartphones in visualizing the child reading media can be optimally at a distance of 15 cm retrieval with success percentage of 74.49%, with the angle of the 'medium' in the range of 300-600 with a success percentage of 72.35%, and the lighting conditions using 8 watt fluorescent lamp which is equivalent to 475 lumen with a success percentage of 91.67%.

Keywords: Augmented Reality, Reading Media, Smartphone, Visualization

INTRODUCTION

Augmented Reality prototype smartphone based on the child reading media was developed in order to determine the performance of the prototype of Augmented Reality technology on smartphones in visualizing the reading media in the form of a book for children that have been made into the form of visualization prototype that has been developed. The method used in research and development is an experimental method that is as a scientific research where researchers manipulate and control one or more independent variables and observations of variables bound to find variations that arise in conjunction with the manipulation of independent variables.

The software development model used was a prototype model is an approach to software development model most effective for an application that still has a requirement that can be interpreted broadly or new applications that are
Figure 3. Success Percentage Chart Based on Lighting Conditions

As if it was observed by a sample image marker, an image marker number eighth that displays the objects Jupiter most easily recognizable and displaying 3D objects with a success percentage of 75.00%. Out second most easily recognizable and displays the object is the first image marker that displays object of galaxies have success percentage of 73.61%. For the most difficult to recognize that the fifth image marker that displays the objects moon with the smallest percentage of success among the sample of images marker that is equal to 62.50%. The following figure 4 is a graphic comparison of the percentage of success is based on the type of image marker with maximum control indicator is 100%.

Figure 4. Success Percentage Chart by Type of Marker

If observed by the distance from image marker to camera, at a distance of 15 cm from the image is most easily to recognize and display the 3D objects with a success percentage of 74.49%. As for the distance of 5 cm from the image is the most difficult to recognize and display the 3D objects with a success percentage of 54.04%. At a distance of 10 cm from the marker have success percentage of 71.21%. And for a distance of 20 cm from the marker have success percentage of 68.69%. The following Figure 5 is a graphic comparison of the percentage of success is based on the distance with maximum control indicator is 100%.

Figure 5. Success Percentage Chart Based on Distance

Based on the angle, the angle of the 'medium' with a range of 300 to 600 of the most easily recognized the image marker and display the 3D object with a success percentage of 72.35%. While the angle of the 'high' of the vertical line with the range of 00 to 300 of the most difficult to recognize and display the 3D object with a success percentage of 60.04%. For the angle of the 'low' of the vertical line with a range of 600 to 900 has a success rate of 68.94%. Here figure 6 that is a comparison chart picture percentage of success is based on angle with maximum control indicator is 100%.

Figure 6. Success Percentage Chart Based on Angle

Based on the chart the percentage of each test, the unsuccessful application in displaying 3D objects due to two factors. First, the lack of a functioning facility of auto focus on the smartphone cameras is used especially when shooting with the angle of the 'low' on the vertical line by making a far distance is 20 cm. Second, the cause of the failure of the application reads the image marker is also due to the location of the three-dimensional object is generated by the image marker is in a position above 5 cm perpendicular from the image marker. Except for the objects 'Galaxy', 'Sun', 'Jupiter' and 'Uranus' which has a large size of the object so that the distance of 5 cm is still a fraction of the image of the three-dimensional object. That conditions is described as the following figure 7 and 8.

Figure 7. Graphic Description About The 3D Object Generating Error

Figure 8. Graphic Description About The 3D Object Small Fragment

The factor of cameras resolution and smartphones type is too less visible effect on the performance of the prototype in recognizing the image marker and display three-dimensional object. For lighting, the appearance of a shadow on the image marker may hinder the recognition process by the camera because there are differences in the color contrast between the shaded area and are not shaded.

CONCLUSIONS

Conclusions
The conclusions based on the results of research that has been done as follows: The prototype of Augmented Reality technology as visualization of children reading media on the smartphone device with a camera quality is 5 Mega Pixel are able to display 3D objects with an overall success rate of 62.50%. As for the smartphone device with a
quality of camera is 8 Mega Pixel are able to
display 3D objects with an overall success rate of
68.37%. And on smartphones with 16 Mega Pixel
camera quality are able to display 3D objects with
an overall success rate of 70.45%.

The performance of the prototype Augmented
Reality technology based on smartphones in
visualizing the children reading media can be
optimally at a distance of 15 cm retrieval with
success percentage of 74.49%, with the angle of
the 'medium' in the range of 300-600 with a
success percentage of 72.35% , and lighting
conditions using 8 watt fluorescent lamp which is
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of 91.67%.

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