

Implementation of the Fisher Yates Shuffle Algorithm in Medical Equipment Learning Applications with Augmented Reality Technology


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ABSTRACT

At this time there are more and more types of medical devices which include goods, instruments or other tools including each component, part or equipment produced. Basically, many people have not been able or are still minimal in knowing medical equipment. One way to provide knowledge to the community is through socialization. Socialization equipped with media that is in accordance with technological developments will facilitate and greatly help the community, namely smartphone media using Augmented Reality technology using the Marker Based Tracking method. This research will build an application for the introduction of medical devices that will combine Augmented Reality technology and the Marker Based Tracking method with the Fisher Yates Shuffle algorithm. The purpose of this research is to produce an application for the introduction of medical devices based on Android and apply the Marker Based Tracking method in Augmented Reality technology with the Fisher Yates Shuffle algorithm in making random questions. The results of this study are in the form of applications that apply augmented reality technology and the Fisher Yates Suffle algorithm in introducing medical devices.

Keywords: augmented reality, medical device, fisher yates shuffle

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1. INTRODUCTION

The development of technology is getting faster and faster, especially information and communication technology. This makes a lot of software creation that can be used by humans. One of them is learning in the medical world on medical devices (Pasaribu & Usman, 2021);(Nugroho & Hutagalung, 2020). Basically, many people have not been able or are still minimal in recognizing medical devices (Lubis et al., 2022). These factors include the condition of education and lack of knowledge. One way to provide knowledge to the community is through socialization. Socialization that is equipped with media that is in accordance with technological developments will facilitate and greatly help the community, namely Smartphone media using Augmented Reality technology utilizing the Marker Based Tracking method (Nugroho, 2020);(Al-Khowarizmi et al., 2020). In this study, the algorithm used is the Fisher Yates Shuffle which will be implemented in the questions of medical devices contained in the application of the introduction of medical devices. This application uses a method for randomizing questions using the Fisher Yates Shuffle algorithm. Fisher Yates Shuffle algorithm is an algorithm to generate a random permutation of a finite set. The results of randomization using the Fisher Yates Shuffle algorithm will not be one-sided, so that each permutation has the same probability (Rapi et al., 2019);(Nidhom et al., 2019). A good randomization method is very important in the development of an application. Many randomization methods can be used, including the Fisher Yates Shuffle method or commonly known as the Fisher Yates Algorithm. The advantages of the Fisher Yates Algorithm are the effectiveness of the randomization method and the optimal complexity of the algorithm.

This study will build an application for the introduction of medical devices that will combine Augmented Reality technology and the Marker Based Tracking method with the Fisher Yates Shuffle algorithm. Previous researchers have never applied anything like this, in many cases applying only Marker Based Tracking. Fisher Yates Shuffle is an algorithm to generate a random permutation of a finite

set, the results of this randomization algorithm have the same probability level. Previous research conducted by (Destiningrum & Adrian, 2017);(Eddy et al., 2021) entitled Implementation of Image Tracking Method in Medical Device Catalog (Laboratory) Using Android-Based Augmented Reality concluded that this application can display medical device objects (laboratory) in 3D form for Augmented-based sales catalog The reality of the target images and summary descriptions are arranged in the form of a catalog book and each 3D object is stored in the form of a virtual object

2. Algoritma Fisher Yates

Simulation Question shuffling is a process of randomizing questions to form question packages. The questions were randomized using the Fisher-Yates algorithm. Fisher-Yates algorithm is an algorithm that generates random permutations of a finite set, in other words to randomize a set. If implemented correctly, the results of this algorithm will not be biased so that each permutation has the same probability.

The steps used to generate a random permutation for questions 1 to N are as follows

1. Write down the questions from question no 1 to question no N
2. Choose a random question K between 1 and the number questions that have not been crossed out.
3. Counting from the bottom, cross out the questions K that have not been crossed out, and write it down somewhere else.
4. Repeat step 2 and step 3 until all questions have been answered crossed out.
5. The order of the questions written in step 3 is a permutation random from the beginning.

From the sample data collection above, there are 3 attributes taken, namely the question number symbolized by q1 for question number 1 and so on until it reaches q15 for question number 15, the order of questions, the order of answer choices. The next stage after determining the attributes of the 15 (fifteen) questions that will be used as examples, the first process is to enter the attribute questions into scratch (a list of questions that have not been selected), then make a range (the number of questions that have not been selected) then the randomization process is carried out. Next, show the roll (for a question that is selected from all the number of questions) then the results of the questions that have been selected are entered into the result (the results of all the questions that have been randomized) The process of the Fisher-Yates algorithm in randomization is 15 (fifteen) pieces the exemplified questions can be described in table 1 as follows:

<i>Range</i>	<i>Roll</i>	<i>Scratch</i>	<i>Result</i>
		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	
1 – 15	6	1,2,3,4,5,7,8,9,10,11,12,13,14,15	6
1 – 14	10	1,2,3,4,5,7,8,9,10,12,13,14,15	11,6
1 – 13	3	1,2,4,5,7,8,9,10,12,13,14,15	3,11,6
1 – 12	1	2,4,5,7,8,9,10,12,13,14,15	1,3,11,6

3. RESULTS AND DISCUSSION

Implementation is carried out after the design is completed and will then be implemented in the programming language that will be used. The purpose of implementation is to implement the program module from the design on the system users so that the user can provide input to the system builder. In the Augmented Reality system, the tools are built using Unity 3D software which is a cross-platform based game engine software. Unity can be used to create a game that can be used on computer devices, android smart phones. In this study, the tools were designed using Blender software.

A. Main Menu Display

On the main menu display there are four buttons, namely the information button which functions to display two choices of buttons, namely the developer information button and the medical device information button, the AR camera button which functions to open the AR camera, the question button which functions to display several questions that have been randomly generated. random by using the fisher yates shuffle algorithm, the exit button which functions to close the application which can be seen in Figure 1 as follows.



Figure 1 Main Menu Display

B. Information Menu Display

The information menu display will appear when the user presses the medical device information button on the main menu display. In the medical device information there are eight names of medical devices that will use Augmented Reality technology in accordance with the system requirements on android-based learning media. The display of the medical device information menu can be seen in Figure 2 as follows:.



Figure 2 Information Menu Display

C. AR Camera View

The AR camera display will appear when the user presses the Augmented Reality or AR camera button on the main menu display. On the AR camera there is a back button that functions to the main menu page. When the AR camera page opens and when directed to an object or marker, the application will immediately read and detect it, and when the marker is successfully detected, a 3D object with

Augmented Reality technology will appear followed by an explanation of the medical device. An example of an AR camera display can be seen in Figure 3 as follows.

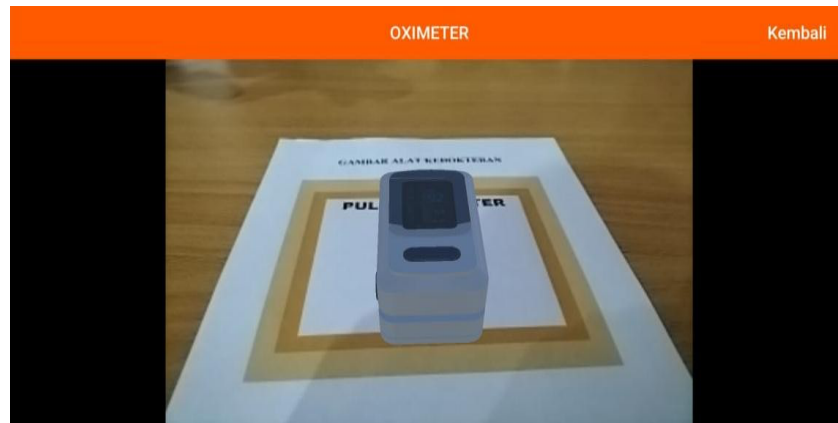


Figure 3 AR Camera View

C. Display Question Menu

The question menu display will display several questions about medical devices that will train the memory of users of the Augmented Reality application. An example of the question menu display can be seen in Figure 4 as follows..

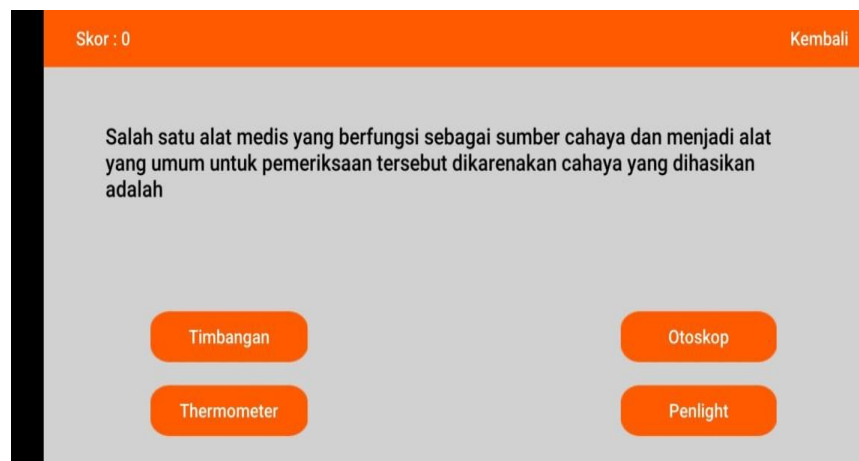


Figure 4 Display Question Menu

4. CONCLUSION

In planning software development in building an application using Augmented Reality technology that the author designed, it can be concluded that the implementation of medical devices using Augmented Reality technology is very useful for students who want to know about medical devices. In this study, samples were taken of several medical devices that will be made using Augmented Reality technology. The medical devices were redrawn using the blender software and then inserted into the Unity 3D software so that Augmented Reality technology could be run. The results of this research are in the form of an application for the introduction of medical devices using Unity 3D which can be used as a learning medium. The fisher yates shuffle algorithm is implemented to randomize the array that is used to create questions in the application of medical device recognition, to get the position of the sequence of questions that are not repeated according to the number of question arrays.

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