

Smart Book With Augmented Reality Technology As A Medium For Children's English Learning About Animals

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ABSTRACT : English language learning in Indonesia is one of the subjects that has a strong role. English lessons in the world of education in Indonesia need to exist in schools. This research aims to develop a Smart-Book application as an Augmented Reality (AR) based English learning media in order to help the teaching process and facilitate children in speaking English with a learning method that is not boring. Smart-Book application as an Augmented Reality (AR) based children's English learning media is made using the C# programming language and the tools used are Unity Engine and Vuforia as an Augmented Reality SDK, while the testing method used is by means of black box testing and beta testing. This application has specifications for Home Screen features, scanning Target Image, viewing Target Image scan results, Screenshot Share, exercises, and selecting animations. The test results show that the Smart-Book application can be used for children's English learning media where out of 100 respondents who took part in filling out the questionnaire, 35% of respondents strongly agreed and 61% of respondents agreed if the Smart-Book application features were suitable for children's English learning media.

KEYWORDS : Smart Book Applications, English Learning, Children, Animals, Augmented Reality

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I. INTRODUCTION

The current reality of language learning increasingly involves autonomous and creative uses of digital media and technology in informal contexts [1]. English is an official language spoken by more than 1.5 billion people as a first or second language and is widely used in many fields, including business, science, technology, education and entertainment. With the rapid development of educational technology and the increasing need for English learning skills, it is necessary to know students' attitudes toward mobile apps for English learning [2]. Thus, what motivates students to use various technological resources to maximize their language learning potentials is an important question for educators and researchers [3].

While learning English as a foreign language, learners could repeatedly encounter different learning challenges, including being unable to pronounce words correctly, making use of wrong spellings in writing vocabulary, speaking or writing grammatically incorrect sentences, and composing paragraphs with silly punctuation problems and bad feedback [4]. Therefore, this research aims to design a smart book application using augmented reality (AR) technology. This application can help users understand the material read better so that children become more interested in reading. AR-based smart book technology is relatively new but has great potential to change the way we read and learn.

Augmented reality (AR) is a technology that has gathered much attention recently due to its wide use [5]. AR-based technology has been recommended for use in education due to its excellent potential in helping to improve the understanding of the concept of a material to be better [6]. AR books, resembling printed books except that computer-generated graphics or information are superimposed on the pages, thus create an opportunity to enrich users' learning experiences beyond electronic book reading [7]. This system was created using Unity3d and Vuforia SDK, then for the development of this application researchers used the C# programming language. Vuforia is a free software development kit for implementing mobile augmented reality [8]. Vuforia AR Software Development kit utilizes technology to recognize and analyze camera input from the real world developed by Qualcomm and fully supported by the Unity game engine [9]. The C# language is expressive in implementing all the features of a modern object-oriented programming language [10]. This

programming language is relatively easy to learn, even for those who are new to programming as it is well supported by Microsoft and a large developer community.

II. RESEARCH METHOD

The current English learning media system in elementary schools still uses printed media in the form of books. This certainly makes students less interested in learning. This research aims to innovate the existing system. The system that will be created is an android application that is used as an English learning media using augmented reality technology. This research was made using augmented reality technology which is visualized in Fig. 1 below.

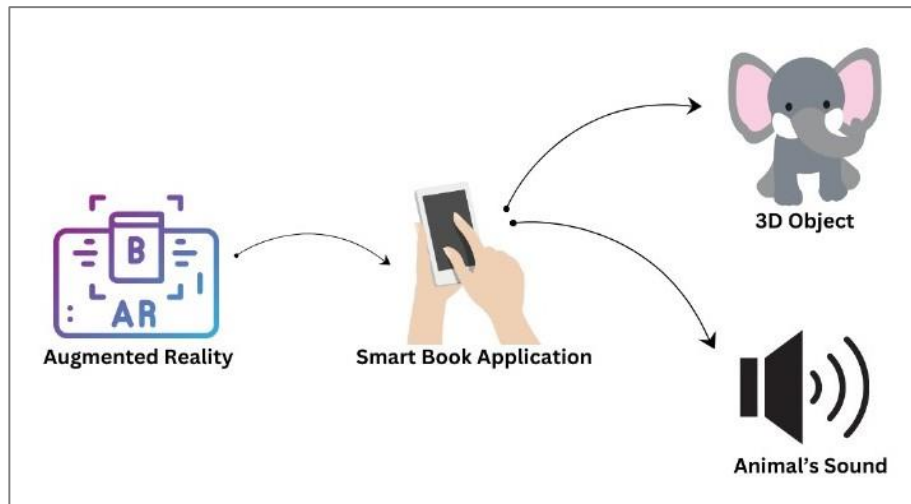


Fig.1. Architecture Diagram

Applications made using augmented reality can display 3d objects when doing quizzes. Then if the user can answer correctly, the sound of the animal in question will appear.

A. Data Collection Procedure

1) Interview

Interviews are question and answer activities between researchers and sources related to the research being conducted. The results of the interview with Mrs. Rahmawati, S.Pd.SD as the principal of the elementary school that the learning methods commonly used in learning are lecture and listening methods. There are several obstacles, namely children who are easily bored, textbooks that only contain text and few pictures make children's focus easily distracted, children prefer fun things like playing.

2) Literature Study

Collecting data in this study, the authors used literature studies as a reference to support the research conducted which was sourced from sinta accredited online journals through the search engine <https://scholar.google.com>. The use of English-Indonesian dictionaries to make sentences in the application.

3) Questionnaire

The questionnaire was used to find out whether this application is feasible to use as a learning media for children by distributing it to the relevant parts. The respondents were SD Sering teachers, SD Sering students, parents, and experts in the field of informatics, namely Sumbawa University of Technology lecturers. The total number of respondents was 100 people.

B. System Design Logic

The system design in this application uses the Unified Modeling Language (UML) model which is used to visualize, specify, build, and document software systems. The Unified Modelling Language (UML) has, after ten years, become established as the de facto standard for the modelling of object-oriented software systems [11]. The use of UML iteratively in analysis and design allows the fulfillment of the system requirements with object-oriented design and relational databases model [12]. It can describe the specific system through a series

of graphical symbols, such as class diagram, use case diagram, state diagram, etc [13]. Therefore, the use of UML modeling can help improve software quality by providing a structured way of designing.

1) Flowchart System

The system design uses a flowchart that explains the performance of the system from start to finish. First, the user must use a smartphone and then use the camera to detect the marker. After the marker is successfully detected, the application will display the 3d object along with other features.

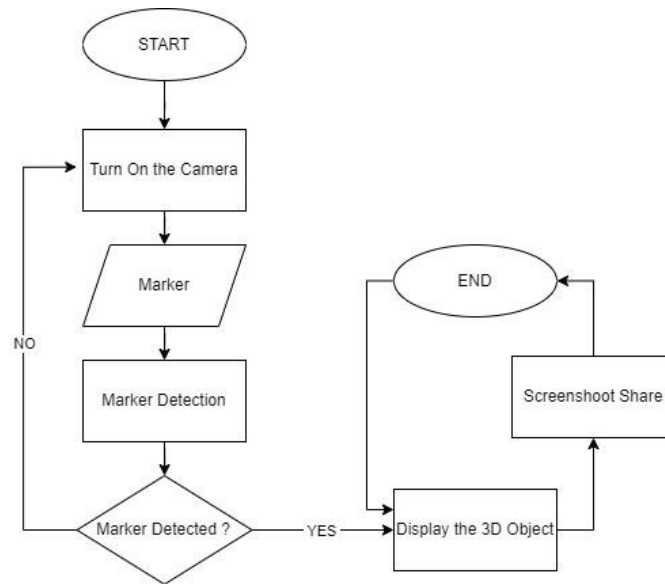


Fig. 2. Flowchart System

2) Use Case Diagram

The use case diagram describes the features in the application. In the diagram, it can be explained that the user has a role to carry out activities on the features that have been provided.

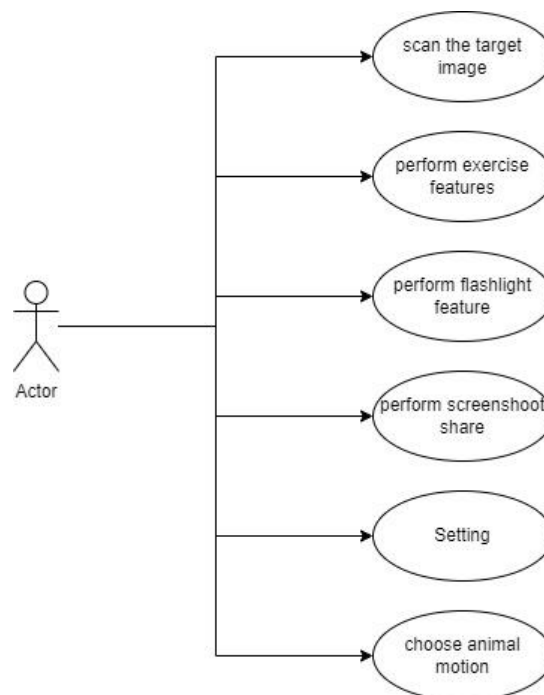


Fig. 3. Use Case Diagram

3) Class Diagram

The class diagram describes the AR products applied to the application, namely the camera, 3D object, Render, and camera activation.

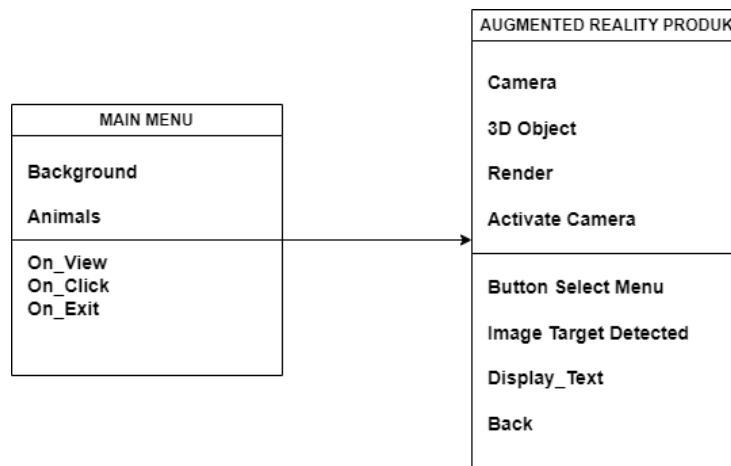


Fig. 4. Class Diagram

III. RESULT AND DISCUSSION

A. Implementations

This implementation stage aims to realize an AR-based smart book application system that can run as expected. Then the final result at this stage is an AR-based smart book application that can display 3D objects and run all features as learning media for children.

1) Main Menu

In the picture above, there are two main menus, the first menu is a menu that will directly direct to the AR camera and the second menu will direct to the quiz menu.



Fig. 5. Main Menu

2) 3D Object

In the picture above the AR camera will display 3D objects by pointing the camera to the target marker that we have created and in the AR camera menu section there is a back button.



Fig. 6. 3D Object

3) Quiz

If you successfully complete the quiz, it will make a sound indicating that your answer is correct and if you incorrectly complete the quiz, it will make a sound indicating that your answer is incorrect. In addition, animals can make sounds if we press the sound button on the animal.

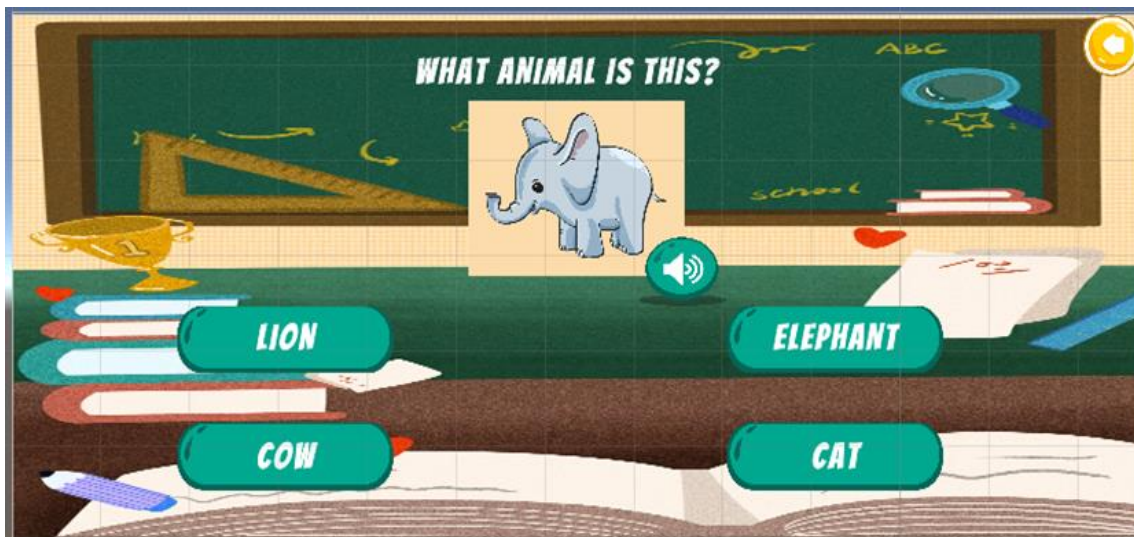


Fig. 7. Quiz

4) Questions

Each question can be accessed via the quiz button.

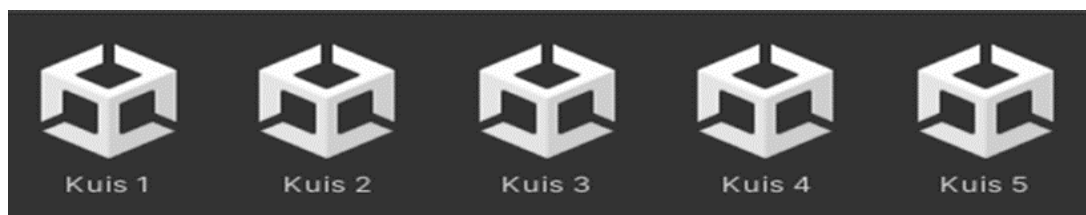


Fig. 8. Questions

B. Discussion of Result

Testing is the process of implementing a program with the aim of finding errors. With a rapid increase in size and complexity of software today, the scope of software testing is also expanding [14]. A good test case is if the test has the possibility of finding uncovered errors. A successful test is when the test finds errors that were not initially found. One type of testing that exists is Black Box Testing. Black box testing assesses a system solely from the outside, without the operator or tester knowing what is happening within the system to generate responses to test actions [15].

Table 1. Black Box Testing

Action	Expected Result	Result
When the user presses the exit button or the user presses the play button as an AR camera or Quiz button.	If the user presses the exit button, the application will exit, and if the user presses the play or quiz button, it will move the menu to the AR camera or to the Quiz menu.	Successfull
When the user points the camera at the provided target marker	Display 3D objects that have been provided as well.	Successfull
When the user enters the quiz menu section and presses the back or play button	When the user presses the play button it will move to the quiz menu and if you press the back button it will return to the main menu of the application.	Successfull
When the user answers correctly or incorrectly	If the user answers correctly, the score will increase by 20 and if incorrect, the score will not increase or decrease.	Successfull

IV. CONCLUSION

From the results of the discussion in the previous chapters, it can be concluded that the Smart-Book application as a medium for children's English learning about Augmented Reality-based animals has gone through testing so that the application is in accordance with the objectives with the Main Menu specifications, scanning target images or AR cameras, and quizzes. For the target marker scanning distance so influential for a distance of 5 - 10 cm then the object will appear when the camera points to the target marker, but if it is at a distance of 50 cm the object will be somewhat more difficult to bring up 3D objects. Then the light intensity also affects the image scanning so that a place or room with sufficient light is needed.

This application can only be run using Android at least Android 8.0 'Oreo' (API level 26). With the Smart-Book application as an English learning media about Augmented Reality-based animals can facilitate children in learning and recognizing various kinds of English-based animals.

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