

Augmented Reality Application for Metamorphosis Recognition in Animals: An Android-based Approach

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ABSTRACT

Augmented reality technology can really help learning, especially in the world of education for now. In the world of education, the use of augmented reality technology as a learning medium can now be said to have used a lot of technological developments. AR technology makes it easier for users to understand because 3D objects are displayed more attractively. In the application of the introduction of animal metamorphosis, a direct description is needed to easily understand a lesson. So the beginning of these problems is one of the reasons I decided to take the title. By providing the application development that I made, it is hoped that students can understand more in the learning process. The conclusion found is that making this augmented reality application can help teachers and students regarding learning about metamorphosis in animals.

Keywords

Augmented Reality, Learning media, Biological Education, Metamorphosis Recognition.

1. INTRODUCTION

The life cycle process in animals starts from the egg to the adult stage, each animal has a different life cycle [1]. For example, the life cycle of frogs is different from the life cycle of butterflies, flies and mosquitoes. These animals experience changes in body shape as they grow [2]. The process of changing an animal's form is called metamorphosis. Metamorphosis itself is divided into two types, namely perfect metamorphosis and imperfect metamorphosis. Metamorphosis usually takes a long time according to the days of development of the life cycle [3]. Therefore, to shorten the process, an augmented reality application is needed, which is used to support real-time visibility of the surrounding environment [4]. This augmented reality technology can help information obtained in the real world become more interesting and easier to develop digitally using markerless methods. There has been quite a lot of research on augmented reality metamorphosis in animals [5]. However, this time the metamorphosis process in animals is a little different due to the addition of several additions to the display of objects using markerless and additional features such as sound. In this augmented reality research, the focus is on explaining the metamorphosis of imperfect animals such as cockroaches and grasshoppers [6]. We can find this through literature studies or through field observations (observations, surveys, etc.).

A research problem can also be defined as a statement that questions a variable or the relationship between variables in a phenomenon. Meanwhile, the variable itself can be defined as a differentiator between something and another [7].

This research aims to produce a learning application regarding how metamorphosis occurs in animals which is created using 3D augmented reality objects as a learning implementation.

2. METHODS

This research uses literature study data. This research uses secondary data sources in the form of events, figures who spread Islam, the beginning of the development of Islam and the process of Islamic development in Indonesia [8].

In this research, there are several system rules in the application that will be built, including admin accounts, managing data, taking quizzes, scan maker.

3. RESULT AND DISCUSSION

3.1 Result

With Augmented Reality (AR) technology, Android-based applications can be developed in C#. Based on these results and identification, try to create an Android-based Augmented Reality learning application for Introduction to Metamorphosis in Animals using the C# language. In the process of making this application, researchers used marker-based Augmented Reality (AR) technology [8].

The results obtained in this research include the following:

1. Koneksi.php

```
<?php
$host="localhost";
$user="root";
$password="";
$db="metamorfosis";

$kon = mysqli connect($host,$user,$password,$db);
if (!$kon){
    die("Koneksi Gagal:" .mysqli connect error());
}
?>
```

Fig 1. Koneksi.php

2. Database web

The database that manages admin contains 2 data, namely admin data and description data. The following is the picture:

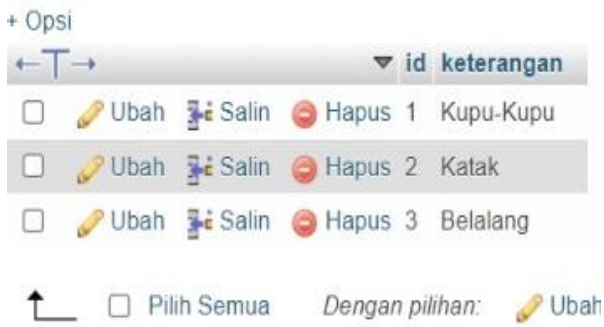


Fig 2. Information database

3. Admin Page

This page is the first page when a user uses the application. The main menu page contains a scan AR button, quiz button, button, about, exit button, sound button, and download marker button. The main menu page display can be seen as follows:

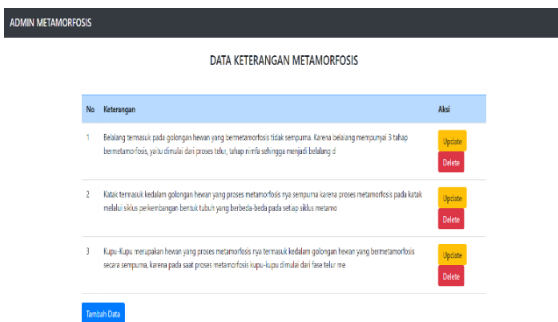


Fig 3. Admin Page

4. Home User Page

This page is the first page when a user uses the application. The main menu page contains a scan AR button, quiz button, button, about, exit button, sound button, and download marker button. The main menu page display can be seen as follows:

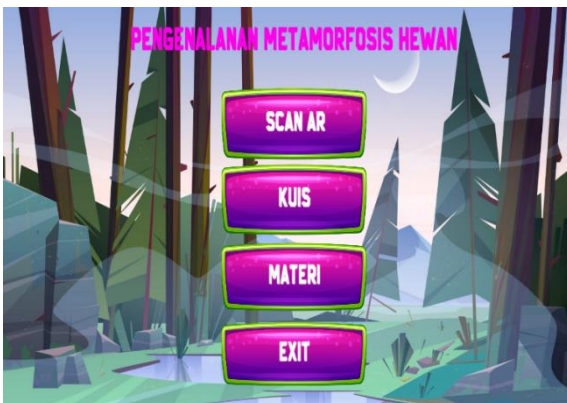


Fig 4. Home User Page

5. Metamorfosis Page

This page contains the process of metamorphosis in animals from egg to adult. In this menu, an explanation of the metamorphosis of animals such as butterflies, frogs and grasshoppers will appear.

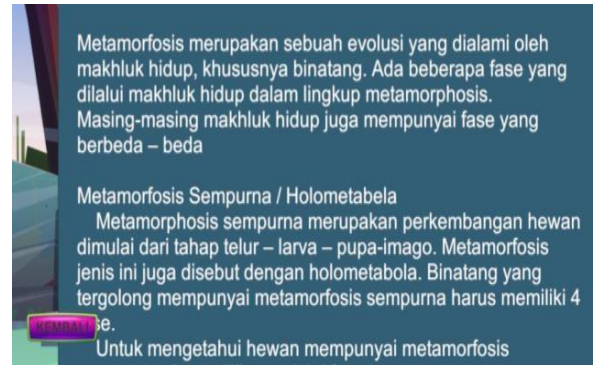


Fig 5. About Metamorphosis

6. Quiz Page

This page is a page that contains quiz questions that users must complete after reading the introduction to the application. Apart from that, on this page there is a next button to go to the next question. The quiz page can be seen in the following image:

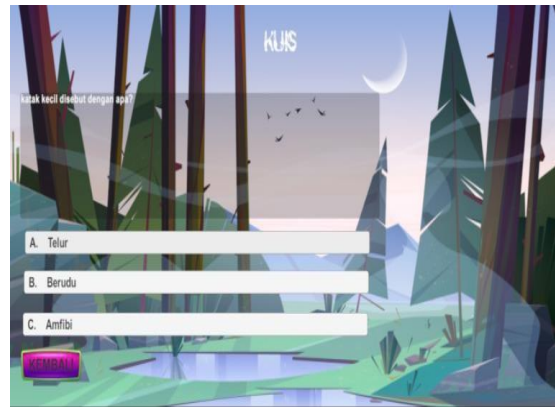


Fig 6. Quiz Page

7. Scan AR Page

This page will display 3D objects, as well as information about how animals metamorphose. The AR Scan display can be seen in the following image:



Fig 7. Scan AR Page

3.2 Discussion

In this research, the testing carried out on the SAI AR application was functional testing (black box). The method used in this testing is black box testing which focuses on the functional requirements of the application being built.

Testing on this AR application is carried out to test each button or button function in the application, so that it is known whether the buttons are appropriate or not with the expected output results. Application testing results can be seen in the following table:

Tabel 1. Testing Blackbox

No	Testing Scenarios	Test Case	Expected results	Test result	Conclusion
1.	Enter the ScanAR page	ScanAR button	Displays the ScanAR page	Opens the ScanAR page	succeed
2.	Go to the quiz page	Quiz button	Displays the quiz page	Opens the quiz page	succeed
3.	Go to the about page	About button	Displays the about page	Open the about page	succeed
4.	Go to the marker's main page	Download marker button	Displays the marker download page	Opens the marker download page	succeed
5.	Exit the application	Exit button	Exit the application	Exit the application	succeed
6.	scanAR testing	Navigate	Displaying	Displaying	succeed
7.	Displays description	Description button	Displays description	Displays description	succeed

4. CONCLUSION

Based on the results and discussion regarding creating an Android-based Augmented Reality Application for Introduction to Metamorphosis in Animals and completing the process of creating this application, we can draw a conclusion, namely the Augmented Reality Application for Introduction to Metamorphosis in Animals.

Based on Android, it was created using C# language. In making this application, it uses marker based Augmented Reality (AR) technology.

Black box testing has been carried out on all application pages. This shows that the feature menu and AR camera are working well

5. SUGGESTION

Based on the results obtained, conduct a user study or user satisfaction survey for this AR application, in order to get direct input from users regarding features, user interface and user experience that can be improved or improved as well as adding more interesting 3D objects.

6. REFERENCES

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