

Applications Introduction to Angklung Padaeng Interactive Based Augmented Reality

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Abstract Angklung is a traditional musical instrument typical of West Java that must always be preserved. Currently, public awareness of the angklung musical instrument is very minimal, this is due to the lack of media introduction to the angklung musical instrument. This study aims to build angklung recognition application that uses Augmented Reality (AR) technology. The musical instrument that is the focus of this research is the Padaeng Angklung or modern angklung with a melody type made for the Android platform. To test the level of acceptance of the application that has been built, testing is carried out using the System Usability Scale (SUS) method. From the answers of 45 respondents, an average score of 78 was obtained, where in terms of the Acceptability Range of the Padaeng Angklung application it was included in the Acceptable category, in terms of the Grade Scale it was included in the Grade C position, the Adjective Rating included in the Good position and the assessment with Percentile Rank on the results. the average score of 78 lies in Grade B.

Index Terms— Angklung Padaeng, Augmented Reality, Android, System Usability Scale

I. INTRODUCTION

Angklung Padaeng is a type of angklung introduced by Daeng Soetigna in 1938. This type of angklung is a breakthrough angklung with the application of diatonic tones derived from western music, therefore this type of angklung can play western songs.

The development of angklung musical instruments in Indonesia was initially in great demand by the public, especially on the island of Java, as evidenced by the proliferation of angklung artists in Yogyakarta. This proves that the angklung musical instrument needs to be maintained because it functions as a means of entertainment which is a characteristic of an area and has many positive sides that affect the growth and development of one's character [1].

Factors that can cause a lack of public awareness of traditional angklung musical instruments are the lack of media regarding the introduction of traditional angklung musical instruments from an early age and the number of people who think that traditional musical instruments do not keep up with the times and are still very ancient [2], [3].

Research conducted by [2], [4] resulted in a more interesting digital transition of learning the angklung musical

instrument, but this research has limitations, including media introduction and simulation of the angklung musical instrument. can only be run through a computer only also looks still in the form of 2 dimensions. [5]–[7] also conducted a similar study The research resulted in an angklung application but only a prototype, but did not contain interactive features for its technological functions.

Based on the problems found and seen from previous studies, it is necessary to have a media that can be used to recognize the traditional musical instrument angklung. The solution that will be done to overcome the problems in this research is to create a media introduction of the angklung musical instrument into a digital context without eliminating the characteristics of the musical instrument so that it is easier and more interesting to be introduced to the public, especially children, especially during the current pandemic which forces students to study at home online and with the introduction of this angklung musical instrument, they can maintain the traditional musical art culture that is owned by Indonesia.

This Padaeng Angklung Introduction application was built with software engineering stages using Augmented Reality (AR) technology [8]–[10]. Augmented Reality (AR) is an interaction between humans and computers, which adds

virtual objects to the real senses provided by a camera [11]. This application uses Augmented Reality (AR) because it fits the need where 3D displays can improve the image (representation) and perception, create an interactive and more fun atmosphere in building a virtual world to be more real on a computer, and this media is created based on Android Mobile.

II. RESEARCH METHODS

The development method used is the Multimedia Development Life Cycle (MDLC) method [12], [13]. The method used in this research consists of problem formulation, problem analysis, analysis of system and data requirements, engineering of multimedia products with MDLC, evaluation and drawing conclusions [14], [15]. Each methodology in this study was carried out in a coherent manner. The stages of the research can be seen in Figure 1

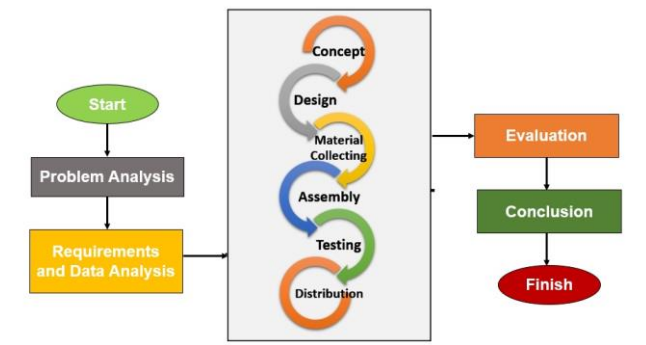


Figure. 1 Research Methods

A. Problem Analysis

At this stage of problem analysis, problem identification is carried out by describing the problem in detail using specific data/information. Develop possible causes of the problem by using experience and logic from the description of the problem and find the real cause by critically testing to prove the existing data/information.

B. Requirements and Data Analysis

Needs analysis in this study includes data analysis, input requirements analysis, output requirements analysis and system requirements analysis [16], [17].

C. Multimedial Product Engineering with MDLC

At this stage the aim is to make multimedia products with the method that has been chosen and in accordance with this research, namely the Multimedia Development Life Cycle (MDLC).

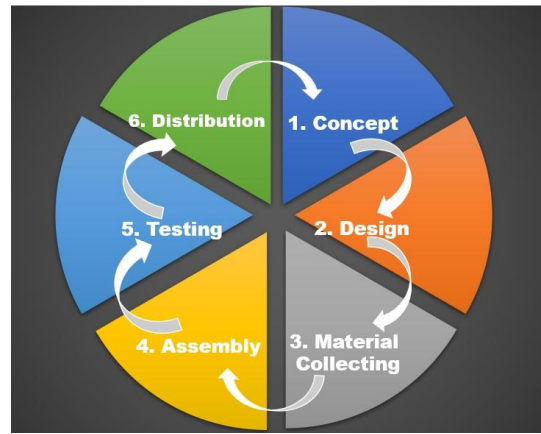


Figure. 2 MDLC Development Method

Figure 2 is the MDLC method that will be applied to the development of multimedia products that will be made. MDLC has 6 stages, namely Concept, Design, Material Collecting, Assembly, Testing, Distribution [14], [18].

D. Test Plan

The plan for testing this research will use Alpha Testing and Beta Testing, where Alpha Testing will use the Black Box method and for Beta Testing using the System Usability Scale (SUS) method. SUS is one of the most popular Usability testing tools. SUS was developed by John Brooke in 1986. This SUS is a reliable, popular, effective and inexpensive usability scale [19], [20].

In this test, respondents are given a choice of a scale of 1 – 5 to be answered based on how much the respondents agree with each statement on the application or feature being tested. A value of 1 means strongly disagree and a value of 5 means strongly agree with the statement. the following is a way to convert respondents' responses :

- 1) Odd statements, namely 1, 3, 5, 7 and 9 the score given by the respondent is reduced by 1.

$$\text{SUS score odd} = \sum P_x - 1$$

Where P_x is the score given by the respondent.

- 2) Even statements, namely 2, 4, 6, 8 and 10, the score given by the respondent is used to subtract 5.

$$\text{SUS even score} = \sum 5 - P_n$$

Where P_n is the score given by the respondent.

- 3) The results of the conversion are then added up for each respondent and then multiplied by 2.5 to get a range of values between 0 – 100.

$$(\sum \text{odd score} - \sum \text{even score}) \times 2,5$$

- 4) After the score of each respondent has been known, the next step is to find the average score by adding up all the scores and dividing by the number of respondents. This calculation can be seen with the following formula.

$$x = ((\sum x))/n$$

Where x is the average score, $\sum x$ is the total score of the System usability scale and n is the number of respondents. From these results, one average value will be obtained from all respondents' score assessments.

E. Population and Sample

The population taken was 60 children who took music lessons at Sanggar Mang Atus in the Kawali area. In this

study, a sample of 45 children was taken as respondents, before filling out the questionnaire that had been provided, the respondent had to try using the Angklung Padaeng application, to get the application the respondent could download it from the link that had been shared. In practice, the respondents will be assisted by teachers to understand and obtain data about this research.

F. Evaluation

At this stage, an evaluation of the application that has been made is carried out, whether the application is in accordance with the formulation of the problem and the objectives of this research or not [21].

G. Conclusion

The existence of the results of this study, it is necessary to draw conclusions from the results of research that has been done. The conclusions drawn include the stages that have been carried out, apart from that the results of the application also need to be concluded about how the application works, the accuracy of the user as well as various other shortcomings that must be corrected from the research.e.

III. RESULT AND DISCUSSION

A. Application Implementation

The following is the result of the implementation of the Assembly stage of making applications regarding Angklung Padaeng with game and AR media.



Figure. 3 Main Menu



Figure. 4 Transisi Display

Figure 3 is the main menu display which is the center of page switching in the application. The buttons on the main menu each have the following functions :

- 1) AR scan, takes players to the AR detection display where players can detect a predetermined marker to display the angklung model.
- 2) Download AR Marker, will open a link to download the image that becomes the marker.
- 3) Materials, will open the material collection panel.

- 4) Test, will open the test collection panel (quiz and free music playing).
- 5) Info, will open the general information panel about the application.
- 6) Exit, will take the player out of the application.
- 7) Music Toggle, positioned in the upper right corner of the screen which serves to turn on or turn off the background sound of the application.

While figure 4 is a display that appears every time a player exits or enters a display such as the main menu, AR detection display, quiz display, and song notation display.



Figure. 5 . Display when the Marker has not been Detected

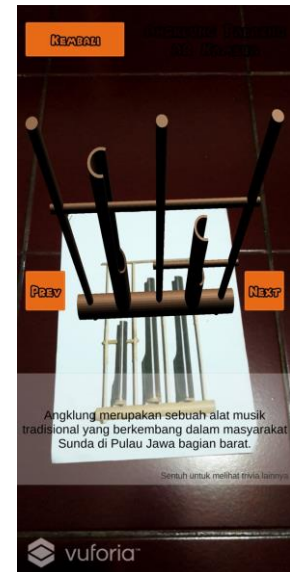


Figure. 6 Display when Marker is Detected

The figure above is an AR detection display where figure 5 is the display when the marker has not been detected. Figure 6 is the display when the marker is detected. Players can press a sentence on the screen to see other brief information about angklung padaeng. Players can also press the next and prev buttons to choose the sound that will be issued by the angklung model. Angklung can sound when the player touches the angklung model. The back button serves to return the player to the main menu.



Figure 7 Material Collecting Panel Display

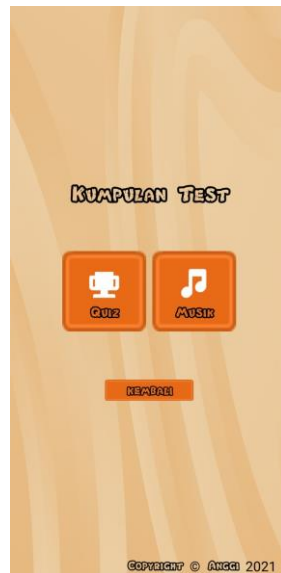


Figure 8 Test Panel Display



Figure 11 Angklung Padaeng Material Panel Display



Figure 12 Play Music Panel

Figure 7 is a panel containing buttons that will take players to material about angklung, starting from the history of angklung, who is Daeng Soetigna, and what is angklung padaeng. In addition to the material in the form of text, there is also a button that takes players to try playing music with the sound of angklung. While Figure 8 is a test panel that contains buttons for the quiz display and a view of playing music freely.

Figure 11 is a panel that contains material about angklung Padaeng. The source button will take the player to a link that is a reference to the material contained in the application. While Figure 12 is a panel that contains a selection of music that players can choose to play. When the player presses one of several music options on the screen, the player will be taken to the music playing screen.



Figure 9 Angklung Material Panel Display

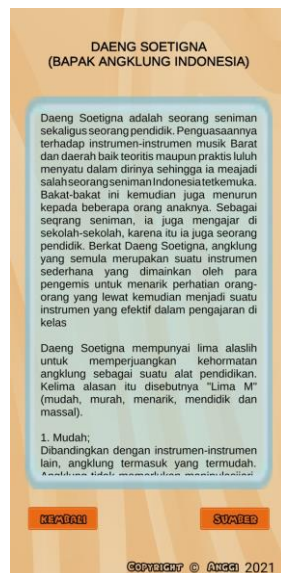


Figure 10 Daeng Soetigna's Biographical Panel Display



Figure 13 Quiz Display



Figure 14 Quiz Display is Complete

Figure 9 is a panel that contains material about the history of angklung. The source button will take the player to a link that is a reference to the material contained in the application. While picture 10 is a panel containing a biography of Daeng Soetigna as the father of Indonesian Angklung. The source button will take the player to a link that is a reference to the material contained in the application.

Figure 13 is a quiz display where players are given questions and choose the correct answer from one of the three available answers. The questions that appear every time the player enters the quiz display will always be different. When the player answers correctly, the player's score will increase and the questions will change. Conversely, if the player is wrong then the player will not get a score. The quiz is completed when the player successfully answers (either

true or false) 10 questions. Figure 14 appears when the player finishes answering the 10 quiz questions given. The score obtained by the player will be shown. If the player wants to try again to answer the questions on the quiz, the player can press the 'repeat quiz' button. If the player has had enough, the player can press the 'back to main menu' button to return to the main menu.

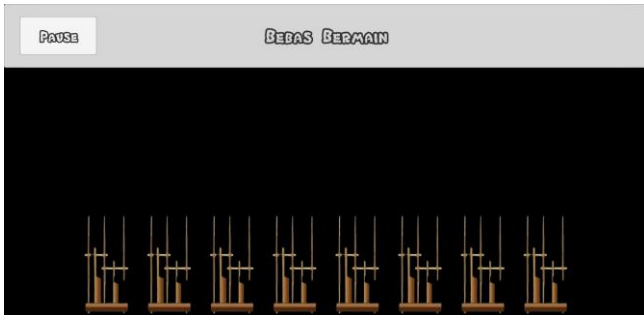


Figure. 15 Free Play

Figure 15 is a display of playing music, in this view the player can freely play the notation as he wishes. Players can press the pause button to return to the main menu.



Figure. 16 Info Panel Display

Figure 16 is an information panel that contains brief information about the angklung padaeng application.

B. Test Results with System Usability Scale (SUS)

To find out user responses and assessments of the Angklung Padaeng application, questionnaires were distributed to respondents based on the target user, after which calculations were carried out using the usability scale system method.

Table. 1 SUS Calculation Results

Calculated Score											Sum	Score
Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10			
2	2	4	3	3	4	4	3	4	4	33	83	
3	2	4	3	3	3	4	3	4	4	33	83	
1	3	4	4	3	4	4	4	4	2	33	83	
3	3	4	3	2	4	4	3	4	2	32	80	
3	2	4	2	2	3	3	1	4	2	26	65	
3	2	3	2	3	3	4	2	4	2	28	70	
3	3	4	2	2	3	3	1	3	2	26	65	
2	2	3	2	2	3	3	3	3	2	25	63	
3	3	3	2	3	3	4	3	3	2	29	73	
4	3	4	1	4	3	4	4	4	3	34	85	
4	4	4	4	4	4	4	4	4	2	38	95	
3	2	4	2	3	3	4	3	4	1	29	73	
3	3	4	2	3	3	4	3	4	1	30	75	
4	3	4	3	3	4	4	4	4	3	36	90	
4	3	4	3	2	4	4	4	4	2	34	85	
3	3	3	2	2	3	3	2	3	1	25	63	
4	2	4	2	3	3	4	2	3	1	28	70	
3	2	4	3	2	3	4	2	3	2	28	70	
2	2	3	2	2	2	3	2	4	2	24	60	
3	2	4	2	2	3	4	3	4	2	29	73	
4	4	4	4	3	4	4	4	4	4	39	98	
3	3	3	2	2	3	3	3	3	2	27	68	
3	3	4	2	3	3	4	3	4	3	32	80	
2	2	4	3	2	3	4	3	4	2	29	73	
4	3	4	2	4	3	4	3	4	3	34	85	
4	3	4	3	4	3	4	3	4	3	35	88	
4	3	4	3	4	3	4	3	4	3	35	88	
4	3	4	3	1	3	4	3	4	3	32	80	
4	3	4	2	4	1	4	0	4	3	29	73	
4	4	3	3	4	3	4	3	4	3	35	88	
4	3	4	0	4	2	4	3	4	3	31	78	
4	3	4	2	4	2	4	0	4	3	30	75	
4	4	4	3	4	3	4	0	4	4	34	85	
4	3	4	0	4	4	4	0	4	0	27	68	
2	3	4	3	4	2	4	0	4	3	29	73	
4	3	4	3	4	3	4	0	4	4	33	83	
4	2	4	0	4	2	4	2	4	3	29	73	
2	3	3	3	2	3	3	3	3	2	27	68	
3	3	4	3	3	3	4	3	4	3	33	83	
3	3	3	3	3	3	4	2	4	3	31	78	
2	2	2	2	2	2	2	2	2	2	20	50	
4	4	4	4	3	4	4	4	4	4	39	98	
4	4	4	4	4	4	4	4	4	2	38	95	
4	3	4	1	4	3	4	4	4	3	34	85	
4	3	4	3	4	3	4	3	4	3	35	88	
Average Score (Final Result)											78	

Table 1 is the response from the respondents who have been calculated using the system usability scale method.

Table. 2 SUS Rating Scale

Scale	Score
Score	78
Acceptability Range	Acceptable
Grade Scale	Grade C
Adjective Rating	Good
Percentile Rank	Grade B

Table 2 is the result of beta testing with the System Usability Scale (SUS) questionnaire conducted on 45 respondents, an average score of 78 can be obtained. In terms of Acceptability Range, this Angklung Padaeng application belongs to the Acceptable category, in terms of Grade Scale, it is in the Grade C position, in terms of the Adjective Rating it is in the Good position and the assessment with Percentile Rank is in grade B. So it can be concluded that the Padaeng Angklung application is in a good category to use.

IV. CONCLUSION

Based on what has been discussed in this study, it can be concluded that by creating digital-based learning media, it can increase public interest in knowing the angklung musical instrument. When learning is done conventionally, it requires the involvement of students, teachers and angklung tools. While digitally, only the user and the application are needed. Because people are used to smartphones, this application should be able to increase public interest in getting to know the angklung musical instrument, this is also evident from the results of the SUS test.

The right medium for the introduction of angklung Padaeng is a smartphone, this is proven by the successful way of designing and building a digital angklung Padaeng application based on Android Mobile.

By using the MDLC method, a series of stages were successfully arranged to create an Augmented Reality-based interactive Angklung Padaeng application.

Testing the level of acceptance of the application using the System Usability Scale method resulted in a score of 78, from this score it can be concluded that the Angklung Padaeng application can be accepted by users and can also be a learning medium for people who are interested in music.

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