



Introduction of Cut Nyak Dien's Figure in 2D Animation- Based Mobile Applications

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ABSTRACT

The introduction of National Indonesian heroes at this time is still a little using existing technology, where technology is currently developing rapidly. Making prototypes about Indonesian heroes is a form of appreciating, remembering and remembering the existing heroes. Thus, the design of the "Leafatory" Cut Nyak Dien application is expected to make target users with the target of elementary school children ages 7-12 years able to know and remember Indonesian heroes by utilizing online mobile-based technology. The design of this application also pays attention to UI/UX by presenting an attractive appearance in the form of text, graphics and 2D animation to positively impact users. Developers also make trials to target users so that there is feedback from developers to users and vice versa.

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1. INTRODUCTION

National Heroes are honorifics bestowed upon Indonesian citizens or individuals who fought against colonialism. National Heroes are a form of recognition, remembrance, and commemoration for Indonesian citizens who have died while defending the nation and country, or who have demonstrated heroism and extraordinary achievements in the development and progress of the Republic of Indonesia (Brata *et al.*, 2021; Pramono *et al.*, 2021).

As a result of the development of information technology, numerous devices have been developed to facilitate access to information (Chege *et al.*, 2020; Hamidi and Chavoshi, 2018). There are currently few application-based information systems about the annals of Indonesian heroes. Utilizing the rapid development of Android-based mobile technology is a suitable strategy for developing a highly useful learning application. This application covers the biodata, biographies, histories, exemplary characteristics, and quizzes of Indonesian national icons. This is due to the fact that many elementary school students lack historical knowledge of these heroic figures who fought for the nation and country. In addition, it capitalizes on the current digital era, in which children are already using smartphones for a variety of purposes. Thus, it is anticipated that users will be able to comprehend the application's content.

This application is designed as a learning resource for Cut Nyak Dien, the Indonesian national icon (Rahayu, 2020). It includes materials about her biodata, biography, history, exemplary characteristics, and assessments presented in an attractive interface, ensuring that users remain engaged and interested in the content through text, images, and animations. This application's intended consumers are elementary school students aged 7 to 12 years old.

2. LITERATURE REVIEW

User Experience (UX) refers to how a user perceives the responses generated by an application (Gonzales *et al.*, 2021; Hussain *et al.*, 2018; Richardson *et al.*, 2021; Ejaz *et al.*, 2019). Before constructing a tangible visualization, it is necessary to comprehend the user's perspective or the imagined form of a user in an application, if UI is the tangible visualization. The user has the ability to determine his or her own level of contentment (customer rule) is one of the fundamental principles of UX design.

User Interface (UI) is a physical representation intended to facilitate user interaction with a system and add ornamental elements to make it more aesthetically pleasing and user-friendly. The user interface (UI) plays a vital role in system design because a good and appealing UI makes users feel at ease and reduces tedium (Alomari *et al.*, 2020).

Consistency, Hierarchy, Personality, Layout, Type, Color, Imagery, Control, and Affordances, according to (Alam and Saputro, 2022; Lima and Gresse von Wangenheim, 2022), are the design elements that must be considered to ensure a positive and useful outcome when designing or creating a visual for an application.

According to (Yanuarti, 2017; Ulumik and Purnamasari, 2023; Sudrajat and Rofifah, 2023), "Prototype is a software engineering technique that demonstrates how software or software components will function in their environment prior to the actual construction phase. The prototype model serves as an indicator of the future representation and identifies two distinct functions: exploration and demonstration."

3. METHODS

In the design of the "Leafactory" application, the developer employs the Prototype design method (Cagnoli *et al.*, 2020). The prototype method is a software development method with a new paradigm in software development that represents an evolution in the development world by revolutionizing the creation of old software or famous sequential systems such as the Waterfall sequence (Heriyanti and Ishak, 2020; Supandi and Sudir, 2019). In the prototype/prototyping process, the software produced is presented to prospective users, who are given the opportunity to provide feedback and critique on the application design (Cico *et al.*, 2021). The developer will then proceed with the production process according to the requests, criticisms, and suggestions from users.

3.1. Collection of Needs

To build the "Leafactory" prototype, the developers collaboratively identified the system requirements, starting from the target users, functions, and content within the prototype to be created, the software to be used, the analysis of the flow process within the prototype, and other requirements related to the utilization of the prototype.

1) User Analysis and Functionality

In this prototype, there will be one user scope in practice with two age ranges, namely students in grades 1-3 of Elementary School and students in grades 4-6 of Elementary School. With the difference in target users, there will also be several differences in user experience and functionality within the prototype.

2) Required Software

a. Figma

In creating the prototype, the main application needed is Figma. Figma is used as the primary tool for creating, designing, and running the prototype. After the animated assets are created and designed using Adobe Illustrator and animated in Adobe Animate, the animated assets will be integrated with the application prototype in the Figma application (Azizah *et al.*, 2022; Kurniawan and Romzi, 2022; Ibrahim and Nada, 2022).

b. Adobe Illustrator 2021

Adobe Illustrator is used as a tool for creating animated assets. Before animating them in Adobe Animate, we need to create the necessary assets in Adobe Illustrator.

c. Adobe Animate 2021

Adobe Animate is used to animate assets that have been created in Adobe Illustrator.

3.2. Building Prototype/Prototyping

During the prototype design process, we concentrate on determining the input and output values that will be utilized in the user-facing prototype.

3.3. Evaluation of Prototypes and Prototyping

Users conduct the evaluation of the prototype we designed. In this quantitative research method, we will conduct user testing by incorporating an evaluation column into the supplied form, thereby enabling users to provide feedback and suggestions for the prototype we have designed.

3.4. System Codification

Our prototype has not yet reached the stage of system coding or the creation of a sequence of systematic code. Nevertheless, the prototype operates by generating a prototype flow within the Figma application.

3.5. System Testing

After designing the prototype and announcing that it is available for user testing, we test the system through user testing or questionnaires filled out by elementary school students of varying ages. This is done in order to evaluate the user experience from multiple angles.

3.6. System Assessment

The users then assess whether the application is user-friendly and whether additional changes are necessary.

3.7. System Deployment

The application is available for use after passing the testing phase and receiving positive user feedback (see **Figure 1**).

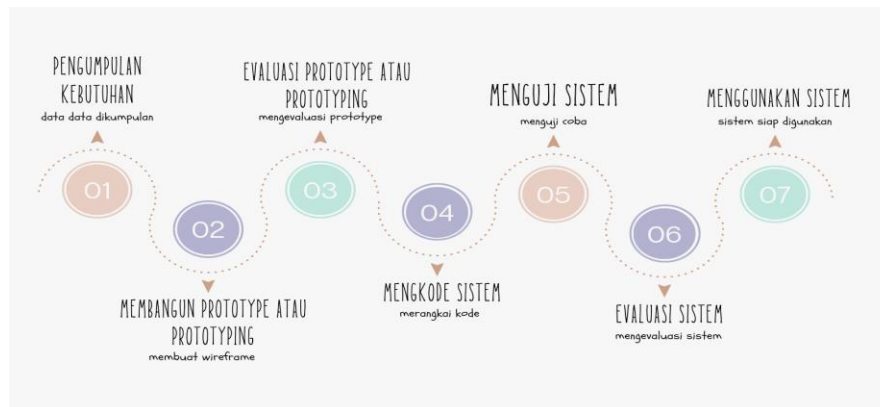


Figure 1. System Development

4. RESULTS AND DISCUSSION

4.1. Idea Stages

To create an application themed "Introduction to Legendary Figures/Historical Figures/National Heroes in Indonesia," the designer has conceptualized the creation of an application that introduces Indonesian National Heroes to its users, specifically elementary school children. The prototype application aims to introduce the national hero, Cut Nyak Dien. The application includes various information such as personal details, a brief biography, the history of her struggle, exemplary traits, and a short quiz about Cut Nyak Dien. Utilizing smartphones as the medium, the prototype is designed to fit the screen resolution of a smartphone.

4.2. Design Concept

The concept we have incorporated in the prototype is Flat Design, combining 2D character assets with coloring techniques that have minimal shading, making it suitable for the flat design concept of the prototype. The color tone used consists of warm colors such as red and light brown. The color palette (see **Figure 2**) we have used includes 4 colors, which are:

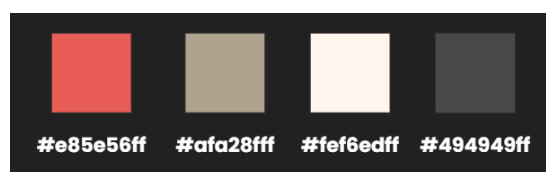


Figure 2. The color palette.

By using the Flat Design concept itself, we are looking for UI design references to be used in the prototype. The reference can be seen in Figure 3.

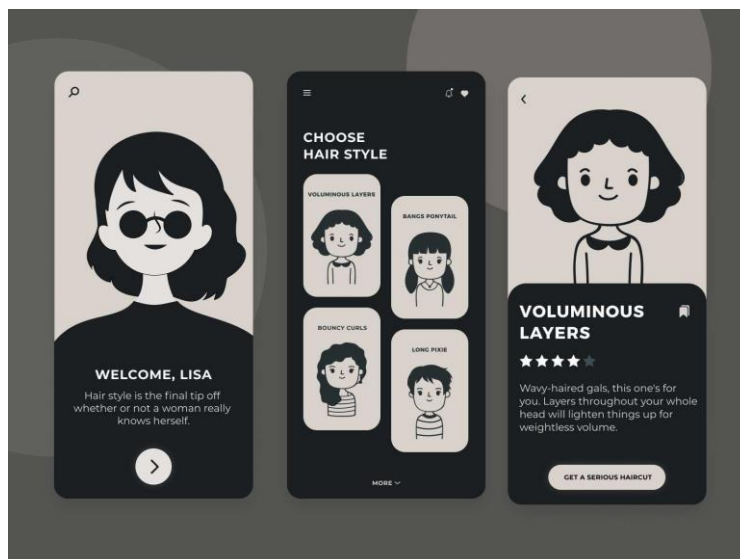


Figure 3. Flat Design Concept

Furthermore, in selecting the font, we chose the Poppins font family as shown in Figure 4 to adapt the Flat Design concept to the application because the Poppins font is considered simple but attractive and easy to read.



Figure 4. Poppins family font.

In the selection of character proportions, the developer chose to create character assets that have semi-chibi style proportions as shown in Figure 5. Where the proportion of the character's body is not too small compared to the size of his head.



Figure 5. Semi-chibi style

Next, the character concept is continued by making digital black and white character sketches as shown in **Figure 6**.

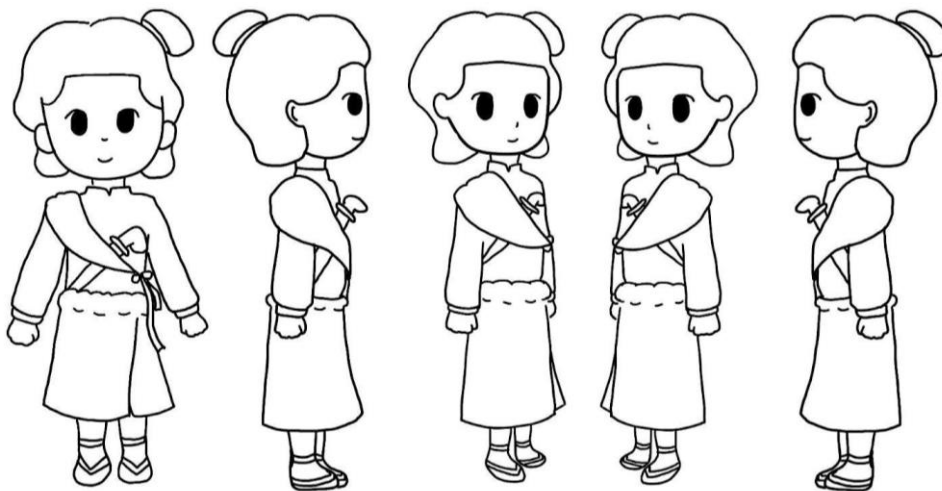


Figure 6. digital black and white character sketches.

4.3. Prototype Production

1. Before designing a prototype, the developer first creates a wireframe as a reference for the process flow of the application. The following **Figure 7** is a wireframe of the application flow that has been mentioned in the design method section:

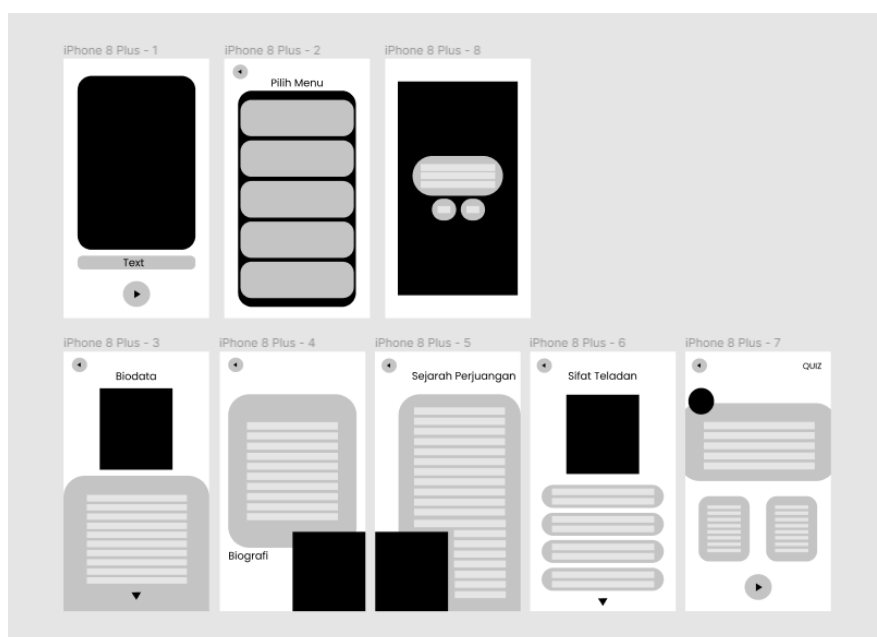


Figure 7. Wireframe.

2. As one of the main components, character assets (see **Figure 8**) need to be created before building the prototype. After sketching the characters, the sketches are further executed into digital character designs, which will later become assets to be animated in Adobe Animate. The developers design character assets using Adobe Illustrator, starting from outlining to filling the characters. In addition to the character rotation sheet, other assets such as weapons, various eye movements, and mouths are also needed. Once the assets are created, the animation process is carried out using Adobe Animate.

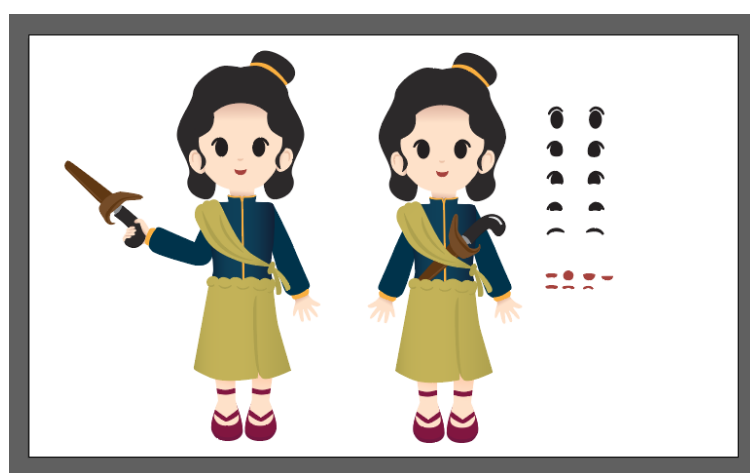


Figure 8. Character assets.

3. After determining the flow of the application process, creating assets in Adobe Illustrator, and animating the assets, the developer proceeds to execute them in the Figma application to design the prototype as shown in **Figure 9**.

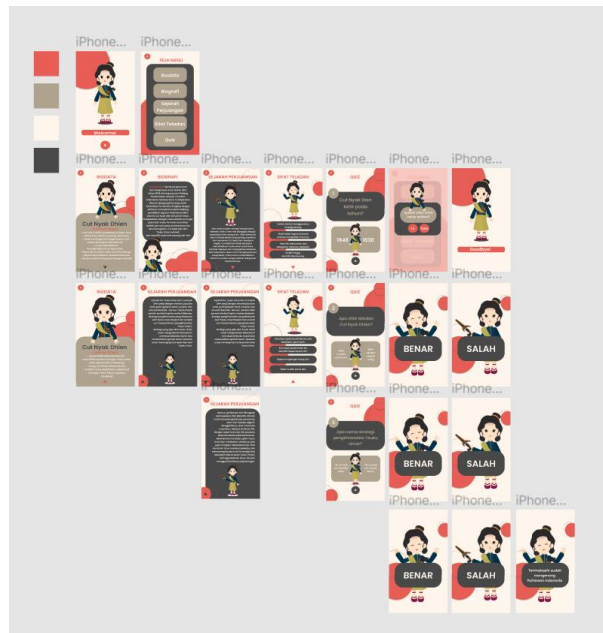


Figure 9. The process of creating the prototype design in Figma.

After analyzing the prototype's requirements, the following process flow was utilized to create the prototype:

- 1) When the user accesses the prototype, a welcome page is displayed. To move to the next menu, the user presses the play button.
- 2) The user is presented with a page that contains five menus: biodata, biography, historical conflict, exemplary characteristics, and an exam. The user chooses the biodata menu option.
- 3) The user is redirected to Cut Nyak Dien's biodata page, which contains information about his personal information. The user can scroll down the page to observe the content.
- 4) The user selects the back button located in the screen's upper-left corner. The user is returned to the primary menu with options for biodata, biography, historical conflict, exemplary characteristics, and quiz. The user chooses the biography menu option.
- 5) The user is redirected to the Cut Nyak Dien biography page, which contains a condensed biography of the national hero.
- 6) The user selects the back button located in the screen's upper-left corner. The user returns to the primary navigation page. The user chooses the historical conflict menu option.
- 7) The user is redirected to the historical struggle page, which contains information about the national hero Cut Nyak Dien's historical struggles. The user can scroll down the page to observe the content.
- 8) The user selects the back button located in the screen's upper-left corner. The user returns to the primary navigation page. The user chooses exemplary characteristics from the menu.
- 9) The user is redirected to the exemplary traits page, which contains information about the exemplary characteristics that can be learned from national hero Cut Nyak Dien. The user can scroll down the page to observe the content.
- 10) The user selects the back button located in the screen's upper-left corner. The user returns to the primary navigation page. The user chooses the exam menu option.
- 11) It redirects the user to the exam page. On this page, the user can perform a game by responding to presented questions. The user must merely tap the correct response on the

screen. If the response is incorrect, the user will be redirected to the same query. Nevertheless, if the response is correct, the query will change.

- 12) After answering three questions accurately, the user will be redirected back to the homepage. To exit the prototype, the user can select the back button in the upper-left corner of the screen.
- 13) The user presses "yes" and departs the prototype upon pressing the button. The user is provided with a farewell page.

4.4. Video Test

During the video testing using the Quantitative Research Method with the data collection technique of a questionnaire, the developer utilized Google Forms that included analysis, design, implementation, and testing sections. There were 22 respondents who filled out the questionnaire after watching the video or testing the prototype. The questionnaire also included sections for suggestions and feedback. The following are the questions and results from the questionnaire:

- a) The first question (system analysis). This prototype is a design created to introduce and commemorate the Indonesian hero, Cut Nyak Dien. It includes biodata, biography, historical struggle, exemplary traits, and a quiz. The target users for this prototype are specifically elementary school children. Among the rating scale of 1-5 (not interesting-very interesting), 3 individuals chose number 3, 14 individuals chose number 4, and 4 individuals chose number 5.
- b) The second question (design). How appropriate are the fonts and hues utilized in this prototype? On a continuum from 1 to 5 (not appealing to very appealing), 6 individuals selected 3, 12 individuals selected 4, and 4 individuals selected 5.
- c) The third inquiry (design). Is this prototype's layout or arrangement of elements orderly and aesthetically pleasing? On a continuum from 1 to 5 (not appealing to very appealing), 5 individuals selected 3, 13 individuals selected 4, and 4 individuals selected 5.
- d) The fourth inquiry (test). Are the prototype's menus simple to access? On a continuum from 1 to 5 (not appealing to very appealing), one individual selected number 3, eleven individuals selected number 4, and ten individuals selected number 5.
- e) Design is the fifth topic. Are the employed animations appealing and appropriate? On a continuum from 1 to 5 (not appealing to very appealing), 3 individuals selected 3, 11 individuals selected 4, and 8 individuals selected 5.
- f) Question number six (implementation). Can the information be comprehended? 8 individuals selected number 4 on the rating scale from 1 to 5 (not enticing to very appealing), while 14 individuals selected number 5.
- g) Question number seven (implementation). Is this prototype enticing in general? On a continuum from 1 to 5 (not appealing to very appealing), 2 individuals selected 3, 17 individuals selected 4, and 3 individuals selected 5.
- h) The eighth inquiry (testing). User suggestions and responses. The variety of animations could be expanded. According to consumers, it is already satisfactory, but there are a few factors to consider. For instance, the application's buttons appear excessively enormous. Layout consistency should be emphasized. Additionally, it would be advantageous to include a scroll-down option. The colors are appropriate, and the characters are similarly colored and designed. The animated GIFs are amusing and adorable. The content is informative and of high quality.

5. CONCLUSION

Respondents concur, based on an analysis of the "Leaftory" application, that this application prototype is suitable for elementary school students. The application prototype's fonts and colors are also appealing to fifty percent of respondents. According to the majority of respondents, the design is neat and aesthetically appealing. Regarding the accessibility of the application prototype, there is a minor distinction between "appealing" and "very appealing," but the majority of respondents selected "appealing," indicating that the application prototype is accessible. In addition, fifty percent of respondents find the animations used to support the UI in the application prototype to be appropriate and enticing. As for the presented information, respondents find it to be extremely appealing. In conclusion, respondents concur that the "Leaftory" application prototype is generally enticing to the general public.

Based on our quantitative research, the prototype we developed is informative and engaging for children in grades 1-3 and 4-6 of elementary school. The evaluation based on the feedback and suggestions received indicates, however, that there is too much text on one page of the prototype, making it somewhat difficult for elementary school students who generally favor concise and straightforward information. Future modifications to the prototype could make it easier to comprehend for elementary school students and increase its visual allure.

In conclusion, based on the survey responses of 22 participants, the "Leaftory" application prototype is deemed suitable for distribution to the actual target audience, minors aged 7 to 12 years old. Respondents rated all elements of the application prototype with an average score of 4 out of 5.

AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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