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Utilization of Augmented Reality as a Solution for Vernacular Language Approaches to Recognize an Object Through Speech Recognition

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Abstract. With the rise of western culture entering Indonesia, vernacular languages seem no longer essential to learn. People are more concerned with learning foreign languages and cultures so that they are relevant to the times and make it easier to adapt the professions needed, whereas preserving culture is no less important to protect the beloved country of Indonesia. Therefore, a solution relevant to the times is required to solve problems related to this vernacular language. This research aims to create a technology that will provide answers to the community to recognize the vernacular language of a particular object using Augmented Reality and Speech Recognition technology. In supporting the research, we use a qualitative descriptive method and the SDLC waterfall concept in its design. The results obtained indicate that this technology has succeeded in helping to make it easier to find out the vernacular language of an object. Augmented Reality technology gives an exciting impression when using this application. In contrast, Speech Recognition technology makes it easier for users to use this application because they can access it through speech only. With this application, people realize that preserving the vernacular language can be done using today's technology

Keywords: Augmented Reality, Vernacular Language, Speech Recognition

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1. Introduction

Vernacular languages are an essential part of national identity, a legacy of cultural diversity that becomes a mother for their speakers because they are based on various ideas and behaviours that can protect future generations [1]. However, its existence in this digitalization era deserves attention due to the significant impact of changes caused by the times. One of the changes related to language today is that more and more global languages are used to be able to interact, so the use of vernacular languages is starting to erode. Augmented Reality (AR) is an interactive technology that we can use as a medium for approaching vernacular languages. This technology can even be developed by integrating its capabilities through Speech Recognition (SR) as a medium for connecting human interaction with the system.

The importance of the vernacular language approach in this digitalization era is supported by the idea that studying vernacular languages is not only to complete knowledge but also to build character oriented to cultural values [2]. Then, according to the review put forward [3], using technology to support language learning is considered adequate for students to accept and use it. Furthermore, a study revealed that the main advantage of using augmented reality technology for learning is the high rate of learning achievement followed by a high rate of motivation [4]. Specifically, referring to research related to the use of augmented reality technology as an educational medium for language learning, it is known that this technology has the potential to increase motivation, satisfaction, attention, engagement, and enjoyment in learning activities to enable students to practice language realistically so that they can become a promotional medium through genuine communication [5]. Moreover, using speech recognition in learning vocabulary can increase user interest and satisfaction with the system [6]. Based on these studies, it is evident that the use of technology to get to know local languages has an important role. However, there is little literature regarding its application as a solution to the vernacular language approach through fundamental learning such as object recognition.

This research aims to create a technology that will provide solutions to the community to recognize the vernacular language of a particular object using Augmented Reality and Speech Recognition technology. In supporting the research, we use a qualitative descriptive method and the SDLC waterfall concept in its design.

2. Method

To assist the research, the method used in this research is descriptive qualitative. In designing this system, we used Figma software with a prototyping system development approach using the waterfall SDLC. Prototyping is one way to reduce failure factors and errors at the beginning of the design phase [7]. Making this prototype will be the first step in developing the latest technology that plays an essential role in the community regarding the development and preservation of vernacular languages. Based on the SDLC waterfall, which will make the process simpler by following the steps that must be completed [8]. The system development process with a prototyping system approach based on the waterfall SDLC can be (see Figure 1).

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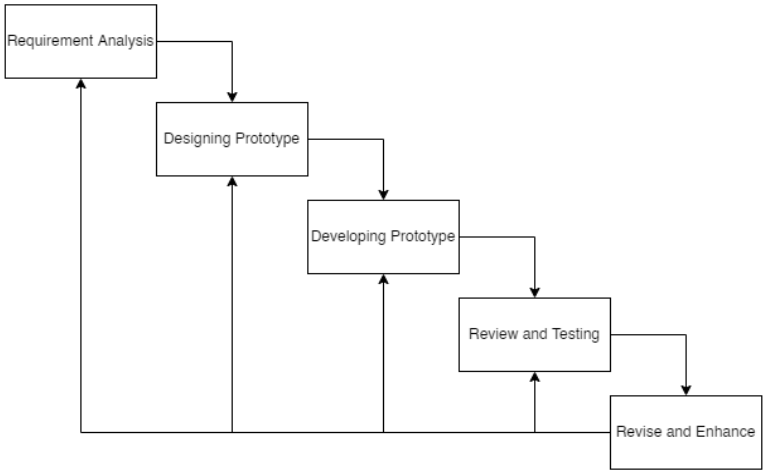

Figure 1. System Development Life Cycle Prototype Waterfall

3. Results and Discussion

3.1. Requirement Analysis

This prototype is designed to make it easier for people to recognize the vernacular language of an object using Augmented Reality and Speech Recognition technology. To determine what features are needed in this prototype, brief research has been conducted to analyze the requirements. The central part of this prototype is to provide information on the specific vernacular languages of an object to the user. Users can use voice input to do a language search for an object. By using Speech Recognition, finding object names will be easier to find. Meanwhile, Augmented Reality will provide an exciting experience to the user by providing an overview of the object being sought.

In analysing the functional requirements that will be applied to this prototype, a context diagram has been designed to provide an overview of the processes in this prototype. A context diagram is a method used to represent all relationships of the leading entities involved in the system [9]. The context diagram of this prototype (see Figure 2).

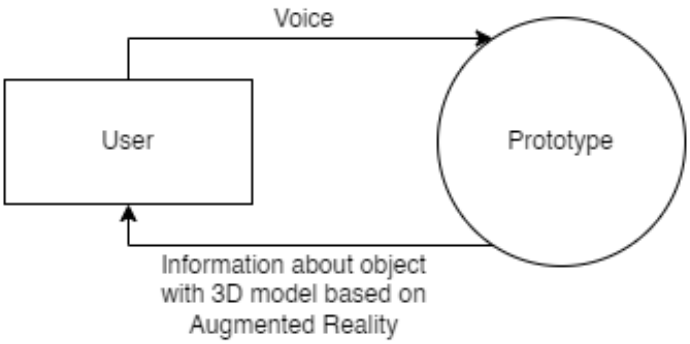

Figure 2. Context Diagram

Based on Figure 2, the prototype designed has 1 type of user. In this prototype, the user provides input to the system through a voice. The sound received by the system is then

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processed and output as information about three-dimensional objects based on Augmented Reality technology.

3.2. Designing Prototype

Based on the analysis that has been done, the next step is to design the prototype to be made. In an application system, an interface is needed based on the menu structure that has been developed. The design of the menu structure can represent the flow of the menu that is run on a system [10]. The method of this menu structure is needed to facilitate developers in the next stage, namely the prototype development process. The menu structure of this prototype (see Figure 3).

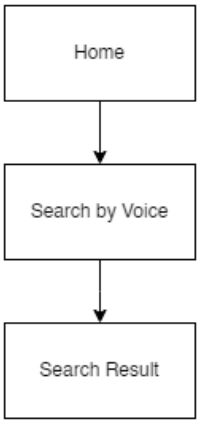

Figure 3. Menu Structure

Figure 3 shows the menu structure of the prototype to be built. The home menu is the initial menu displayed when the user opens the application. The Search by Voice menu is a menu to search for the name of the desired object and its vernacular language by inputting the voice based on the speech from the user's mouth. The search result menu is a menu to showing the results based on the words made in the previous process. In the search results menu, the search results are in the form of three-dimensional objects based on Augmented Reality technology that can be seen through the user's smartphone camera, complete with the vernacular language information of the object.

3.3. Developing Prototype

After completion of the design stage, the next step is to enter the prototype development stage. Based on the previously created menu structure (see Figure 3), an interface menu is made based on the menu structure. The first interface menu created is the main page menu, in this menu, the user will be presented with an initial display of this prototype. The main page menu display of this prototype (see Figure 4).

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Figure 4. Home Menu

Based on Figure 4, the main page menu interface looks attractive and simply to give the user a comfortable impression. The words "Tekan Tombol Start untuk Memulai Aplikasinya" provide direction to users so as not to get confused when using this prototype. By creating a simple and attractive menu display and giving a comfortable impression, it is hoped that users will feel comfortable and have a good experience using this prototype. Next is an interface menu to search for objects in specific vernacular languages using voice input which can be (see Figure 5).

In this menu, the camera will be active, which aims to display Augmented Reality objects at the next stage. Figure 5 shows that when a new user opens this menu for the first time, a message will appear as assistance on how to use this prototype. This interface menu contains a dropdown list and a microphone button that will be used to receive voice input. The dropdown list at the top is an element used to select the desired vernacular language. When the microphone button is pressed, users can say what they want to find in the pre-selected vernacular language. The user speaks the name of the object searched use Indonesian, after that the system will process it and the results will appear in the search results menu, which can be seen in Figure 6.

The search results on the previous menu will appear in this menu. In this interface, the search results and a three-dimensional object model are displayed using Augmented Reality technology. The object name in the selected vernacular language will appear at the top of the

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display. Using Augmented Reality, the three-dimensional object is not static and can adjust the camera's movement. The microphone button can also be reused to search for other object names without pressing the back button.

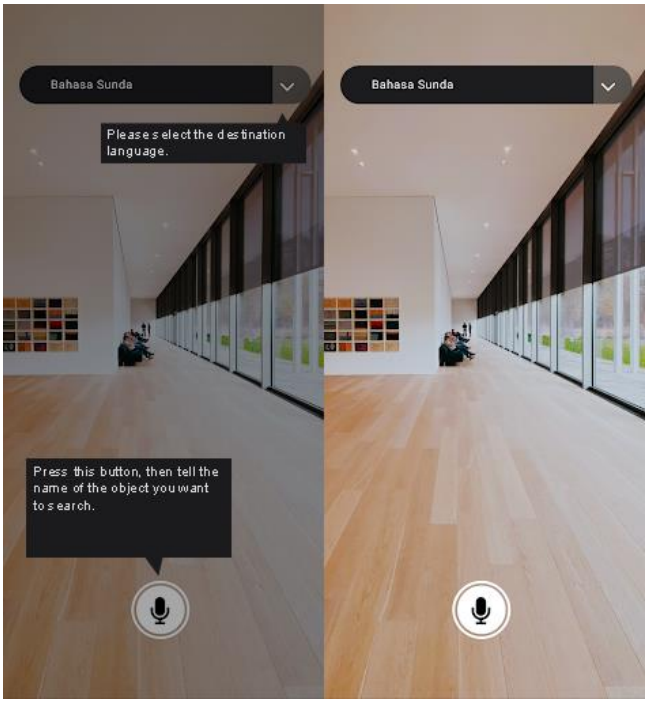

Figure 5. Search by Voice Menu

Figure 6. Search Result Menu

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3.4. Review and Testing the Prototype

After the prototype has been successfully developed, the next step is to review and test the prototype that has been made. The review is carried out to assess and look for deficiencies that can be improved in the future. Testing is carried out to see whether this prototype will run correctly or if there are problems that must be fixed again.

Based on the test results, the prototype interfaces built based on the menu structure runs appropriately. The prototype built has good usability, in other words, this prototype is easy for users to use without having to make more effort in its use. By using a few menus, making the main features of this prototype are well visualized. Switching between uncomplicated and concise menus makes it easy for novice users to use this prototype without difficulties. The review obtained from this test is that this prototype gave the user an excellent impression of the menu's design and the main features provided. The part to search for object names from specific vernacular languages is also easy to use. Just by mentioning the object name, the object name will appear according to the selected vernacular language.

3.5. Revise and Enhancing Prototype

In developing an application or prototype, there must be deficiencies in the results or development. It takes a lot of improvement effort to cover or fix the shortcomings that have been made previously. In this prototype, only a few vernacular languages can be used to search for object names. It is also hoped that in further development, this prototype can be used in general in applications and not in prototype form anymore.

4. Conclusion

The development of this prototype is expected to provide solutions to the community by making it easier to recognize the vernacular language of a particular object or object using Augmented Reality and Speech Recognition technology. The main feature of this prototype is to search for object names based on specific vernacular languages using voice input and search results in the form of three-dimensional objects. Input as a voice in the search for object names is the implementation of Speech Recognition technology. The search results in the form of three-dimensional objects are the implementation of Augmented Reality technology. Using Speech Recognition and Augmented Reality technology provided convenience and an exciting experience when using this prototype.

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