Interaction Mixed Reality Rare Animal Indonesia with Voice Input Using Microsoft Hololens

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Abstract. Indonesia is one country that is known for its natural wealth. Various types of flora and fauna living in this country. Examples of rich fauna that exist in Indonesia and can still be found at this point that one-horned rhino (Java rhinoceros), Sumatran elephant, Sumatran tiger, deer Bawean even dragons. However, over the times that make more and more people are not responsible for expanding residential land for private purposes and poaching that occurred in Indonesia, the animals are increasingly difficult to find because of habitats and their populations are dwindling. In this research, researchers applied a mixed reality technology with voice input to bring the Indonesian endangered species that has begun difficult to be found with the actual scale without having to disturb the habitat or environment. How it works is a mixed reality which brings together the virtual world with the real world. So that thanks to the development of today's technological world, users can feel the direct presence of these animals without having to hunt or look for them.

1. Introduction

Indonesia's total population of endangered species has been less and less because of the number of poaching going on and narrowing habitats because of the occurrence of forest land in Indonesia (Iqbal, et al 2017). That makes it difficult to deliver directly endangered species to be introduced to the general public, which is where the introduction is intended to make people know the variety of endangered species in Indonesia without having to disturb the population [5].

Currently, with over the times, it appears mixed reality technology (XR) who is able to combine the virtual and the real world is very useful in various aspects of life. Such as health, education, entertainment, travel, and much more. Basically, XR has the advantage that is able to provide experience and a deep understanding of the subject of learning. This does not rule out the possibility that this technology could be presented as a media interaction Indonesian endangered species [1].

Some research to create applications that take advantage of mixed reality technology had been done already, in 2018 Lauren Siff doing research in the medical field by displaying 3D models of organs along with its scenario. Users can learn organs are shown. Research is also conducted by (Iqbal, 2017) that makes realistic shadow augmented reality Indonesian endangered species. In this application is discussed how the lighting on the object in real time by utilizing the Z-GAF algorithm shadow maps. Research is also conducted by (Siti Fatimah, 2017) makes the interaction in augmented reality Indonesian endangered species. In this study, the method used for interaction is to use motion detection utilizing fingers.
Based on the above, the authors propose a study to develop an application that will visualize the interaction of endangered species are more interactive by lifting the title "Mixed Reality Interaction Endangered Animal Indonesia with Voice Input Using Microsoft Hololens".

2. Problem identification
Augmented reality is a technique that can bring Indonesian endangered species into 3D. But less interaction between objects with users make it look stiff and can not come into contact with the user. To bring the virtual object is not rigid and more interactive, other techniques needed to deliver virtual objects that can interact directly with the user as a supporter of the introduction of endangered species in Indonesia.

3. Previous research
In 2017, Siti Fatimah conduct research on augmented reality makes the interaction of Indonesian endangered species. In this study, the method used for interaction is to use motion detection utilizing fingers. In this study, using a camera used to detect fingers and use a marker to show its animals [1].

In the same year, Iqbal doing research create a realistic shadow on augmented reality Indonesian endangered species. In this study, Iqbal using a marker to show its wildlife and create methods that can be mapped shadows adapted to the conditions and the situation on the marker [5].

In 2018, Taka doing research on virtual reality interaction Indonesian endangered species. In this study, Taka creates applications with virtual reality technology where the user can see the kinds of Indonesian rare animals and their information. Taka using the controller for the user to be able to explore the endangered species [6]. In 2018, Christian Oktaviano doing research introduction Indonesian endangered species using augmented reality-based android. In this study, Christian makes Markerless the application method where users have to detect the marker to show their animals.

Research to create applications that take advantage of mixed reality technology had been done already, in 2018 Lauren Siff doing research in the medical field by displaying 3D models of organs along with its scenario. Users can learn organs are shown. Other recent application has been implemented into medical application and animation relating to the Ear, Nose and Throat using mixed reality technology [7].

4. Methodology
The methodology in this study consists of three main stages, namely input, process, and output. For a description of the general architecture of the research, the methodology can be seen in Figure 1.

![Figure 1. General Architecture.](image-url)
4.1. Input
Users will wear microsoft hololens provided, then stand in a certain position. Users will see the object animals and make a voice input or voice commands that will be used for interaction on the Indonesian endangered species.

4.2. Process

4.2.1. Voice input. At this stage of the manufacturing process voice input by inputting a command - the command to serve as an endangered species interactions in Indonesia which will be spoken by the user. By way of adding components to the application Speech Input Source unity.

![Figure 2. The process of inputting a command to all animals.](image)

4.2.2. Defined input. At this stage of defined input, voice commands will be accepted on the hololens sensor and will proceed to the next stage.

4.2.3. Response Handler. At this stage, the command has been set and accepted by the sensor will be responded and accepted hololens object Indonesian endangered species each according to his species. And the process is to add the Speech Input Handler component on each object animals. Then it will be seen orders - orders that have been received in the inspector unity. This image is a process of receiving voice commands elephant animal.

![Figure 3. The admission process orders elephant.](image)
4.2.4. **Matching process.** At this stage, the process of matching between the voice input by the game engine that is where this process will be run in accordance with the voice commands or voice input made by the user.

4.2.5. **3D Animation.** In this process do manufacture animator where animators are animation registration process which will be made in any endangered species, and the animation can be run in accordance with the order made by the user. Animator consists of several animations that can be set how much of the animation you want to use. In the animators, there is a relation - a relation that can be adjusted as needed. Here is a view of one of the animal’s animator:

![Figure 4. Animator on the Sumatran tiger](image)

![Figure 5. Animation rest on the Sumatran tiger.](image)

4.3. **Output.** The output shown is in the form of animation with some movement on any endangered species Indonesia by way of voice commands or voice input by the user. Here is a display output on the Unity3D application.

![Figure 6. Animation is set at rest after the Sumatran tiger.](image)
5. Result and analysis
This section will discuss the results obtained from implementing the use of tools microsoft hololens to display interaction Indonesian endangered species using voice input or voice command from the user-based mixed reality in accordance with the design of the system that has been discussed in the previous chapter, as well as testing on a system that has been built.

5.1. Integration into Hololens
After all the stages are done, the next is to integrate applications that have been built into the hololens device.

![Figure 7. The build process applications.](image)

In Figure 7, an application that has been designed to be built by adding add open scene, then select the target device as hololens.

![Figure 8. Hololens applications on the desktop.](image)

Then connect hololens to pc via wifi and configure it with IP. In figure 8 is a view hololens already connected to the PC.
Next is to open the application that has been in previous builds in visual studio format and enter the IP already on the configuration of the remote column earlier in a machine and run debugging in visual studio. Then the application is ready to run on the hololens device.

Based on the pictures 4:23, 75% of respondents strongly agree that the 3D object in the application is displayed clearly. 25% of respondents said that the 3D object in the application is displayed clearly. Then 90% of the respondents strongly agreed that in accordance with the original 3D. 10% of respondents agreed that 3D in accordance with the original. For the size/posture 3D with the original species, 80% of respondents stated strongly agree. 20% of respondents agreed that the size/3D posture in accordance with the original animal.

Based on the pictures 4:24, 85% of respondents strongly agree that voice input can run well. 15% of respondents agreed that voice input can run well. Then 90% of the respondents strongly agreed that the animation in accordance with the movement of the original animal. 10% of respondents agreed that the animation in accordance with the movement of endangered species originals.
Figure 12. Graph user experience

At 4:25 the picture, 85% of respondents strongly agree that the application is easy to use. 15% of respondents agreed that the application is easy to use. Then 90% of the respondents strongly agreed that blend with the real-world object. 10% of respondents agreed that the object blends with the real world. 100% of the respondents strongly agreed that the application of interactive look.

6. Conclusion
Based on the results of the implementation and testing of the system, then obtained some conclusions in this study, namely:

• The app can provide learning about endangered species Indonesia through mixed reality technology by using voice input or voice commands that give a real impression for users.
• Applications can run well while doing voice input and display of 3D objects. Pelafasan commands on the user should be good enough to avoid errors in the detection of the animation command.
• Animations are displayed in accordance with the animals in the real world.
• The 3D object was seen together with the real world.

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