Android-based 3D Digital Story Telling development for learning batik

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Abstract. This study aims to design an android-based 3D Digital Story Telling application that is used to introduce the philosophical value of batik motifs. This application development integrates 3D technology with marker-based Augmented Reality (AR). This marker will later act as a detection tool to display visual objects in 3D or video. The design of the 3D Digital Story Telling application can provide more real and more complete information about the philosophical value of batik which is depicted in the batik motif which is the object of visualization. This application can provide a more complete picture of the various local wisdom values of Indonesian Batik.

1. Introduction
Digital Storytelling is one of the famous approaches in learning for giving information on historical aspects or revealing meaning behind a certain image or symbol in digital form. Digital story telling is a form of media that combines the art of telling stories with digital multimedia such as images, audio, and video [1]. One of the discussions on new media that explores the aspects of computing, science, and visual art is on the field of digital storytelling [2]. Important components that media digital storytelling offer is point of view, dramatic question, emotional content, author voice, music, length, and rhythm [3]. There are two main theories that influenced the concept of digital storytelling, technology in pedagogy and social behavior modification [4]. The effect of digital storytelling use in form of 3D will make learning more fruitful compares to the use of static 2D media [5,6].

3D media is a form of media that could be seen within the perspective of length, wide, and tall. There are 3 types of 3D media that could be use in learning such as 3D visualization, 3D animation, and 3D animation interactive [7]. 3D virtual environment is one example of 3D technology that is used in learning platforms. This 3D media gives students to understand an object more thoroughly [8]. The students experience in operating 3D media in virtual setting make learning more interactive by operating independent navigation [9]. Transformation from 2D to 3D digital platform making learning materials more interesting and students could understand more about the topic since the visual interface is more dynamic and closer to real life [10,11]. Specifically, the 3D model that is used for cultural heritage exploration in web platform will have a larger storage as valuable archive [12].

Batik learning is one of the learning that could use the 3D technology. As popularly known, Batik is one of Indonesian cultural heritage in form of various patterns that symbolizes the nation heritage values. One of the inspirations of creating a batik pattern is from the nature and geographical conditions on each territory. Each batik pattern that is made symbolizes certain philosophical value that becomes part of the nation character learning to values the local cultural heritage values.
The main purpose of this research ignites by the desire to expose batik pattern philosophical values as part of batik learning. As designing an android application that visualizes the philosophical values of batik pattern in the form of 3D and video is the main objective.

2. Methods
Designing a 3D Digital Storytelling application is integrated with Augmented Reality (AR) application. In general, this application will show a three-dimensional virtual object or in other forms such as video, text, and audio. Interaction with the AR system will be divided into two parts, touching the screen and touching on physical media in controlling the 3D object information. This information later presented as an augmented scene that could be seen from the monitor screen as described in figure 1.

![Figure 1. Overview of the 3D digital storytelling application.](image)

Figure 1 shows that the application developed in AR for Android contain physical and digital form. The implementation will use the webcam or camera on user’s gadget to capture the real-world images and transmit it to process marker detection on AR software. 3D object later will appear after the ID from marker is processed by content management system. Later, the real-world images will be captured and combined with digital content and immediately sent to the user through their gadgets.

3. Results and discussion
The development of 3D Digital Storytelling application is taking learning contents on one of the flowers in West Java, Indonesia, that is the lotus flower. The lotus flower is widely used as an inspiration for batik patterns because it is found in many regions in West Java. However, more importantly this lotus flower has a sublime philosophical meaning that can be used as a guide in everyday life.

The lotus flower lives in three realms, namely above the water surface, on the water surface, and below the water surface. This statement means that in everyday life a human being must be honest and sincere to help older people or superiors, to others must respect and respect each other, and younger people must be role models [13].

Figures 2a and 2b visualize the 3D aspects of the Lotus Flower batik pattern by the students directing the android to the marker (Figure 2a) so that later on the android will appear the shape of a lotus flower in 3D (Figure 2b) which looks more attractive. This process will provide direct experience to students to better understand these objects in a more real and dynamic manner [11]. The visual appearance of the 3D Lotus Flower batik pattern will be seen in the visualization in three parts, namely the Lotus Flower above the water surface, on the water surface, and below the water surface. This condition will make students understand the philosophical meaning of the three positions, so that students get Experiential
Learning Space [9] and also improve spatial abilities which are very important to be able to understand certain visuals [14].

Figure 2. (a) Lotus flower 3D marker pattern (b) Lotus flower 3D pattern.

To provide more in-depth information about the philosophical meaning of the Lotus Flower batik pattern the application designed is also equipped with a video display. To operate the video, students work in the same way, namely directing an android that has previously installed the AR application to the Lotus Flower motif video marker (Figure 3a). Furthermore, on the android layer a video will appear about the philosophical meaning of the Lotus Flower pattern presented in the form of a video equipped with text, photos, animation, and audio (Figure 3b). This video provides more detailed information about the Lotus Flower batik motif from Sumedang City, West Java. The combination of 3D and video with more complete information makes an application that has been designed to provide broad insight to students and is expected to foster a love for the natural wealth of the region. Through this application, there is a transformation of the value of local wisdom to students in a more contemporary context [15].

Figure 3. (a) Lotus flower batik pattern video marker (b) Information video of the philosophical value of the lotus flower batik pattern.

Various weaknesses, of course, occurred when designing and testing this 3D Digital Story Telling application. The weakness that is most felt is during the 3D creation process where the visualization is closer to the actual object. Another obstacle is that when the test shows 3D by highlighting the marker, it is often still slow to respond.

4. Conclusions
The design of the Android-based 3D Digital Story Telling application is combining 3D technology with AR with the main platform for using marker. Applications that are designed can visualize a 2D object into 3D in accordance with the actual real object. This application is made in batik learning to teach the
philosophical values contained in batik patterns as part of local wisdom-based learning. This application can be run by installing it on Android and must be equipped with a batik pattern marker which is used as an object of visualization. This application can provide a more real picture (real life) of an object that was only a 2D object.

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