Implementation of 360° Virtual Reality Using Sky View as Information Media for Infrastructure

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Abstract— The rapid advancement of information technology has had a significant impact on various sectors, including education. One educational institution in Garut, Yayasan Al Musaddadiyah, faces challenges in effectively conveying information to prospective students. Traditional media such as brochures and pamphlets often fail to provide a comprehensive depiction and better visualization of the facilities and educational environment at the institution. As a solution, this research developed a Virtual Reality (VR) 360° media with a Sky View perspective to visualize the existing facilities and infrastructure at Yayasan Al Musaddadiyah. The study utilized the Multimedia Development Life Cycle (MDLC) method in the VR application development process. MDLC was chosen because it provides a systematic approach at each development stage, from concept to implementation and evaluation. In this research, various multimedia elements such as images, videos, and audio were integrated into the VR application to create an immersive and interactive experience for users. By leveraging VR 360° Sky View technology, prospective students and parents can directly view the educational environment and available facilities at the institution without physically visiting the location. Evaluation results showed that the use of VR-based information media successfully increased the interest and understanding of prospective students towards Yayasan Al Musaddadiyah. Additionally, this application proved effective in expanding the reach of information about the institution, particularly in the increasingly connected digital era. Thus, the development of VR-based information media not only provides a practical solution to the institution's communication challenges but also opens up new opportunities as a promotional or marketing strategy for educational institutions in the future.

Keywords—Multimedia Development Life Cycle (MDLC), Virtual Reality 360°, Sky View.

I. INTRODUCTION

In today's world, information technology is advancing rapidly. Technological innovations continue to improve efficiency across various sectors[1]. The development of Information Technology (IT) in the current era is marked by the widespread use of advanced technology devices, which enhances human productivity to be more effective and efficient, leading to better outcomes. IT also serves as a technical tool for disseminating information[2]–[4]. Given that many people who live far from a location are limited by distance, VR technology allows people to view or tour a place remotely without having to visit it in person. Therefore, information media for educational institutions is being developed.

Yayasan Al Musaddadiyah, located in Tarogong Kidul, Garut Regency, is an educational foundation that includes several institutions: PAUD/RA, SMP, MTs, SMA, SMK, MA, ITG (Institut Teknologi Garut), STAI (Sekolah Tinggi Agama Islam), and a Pesantren. The facilities available at Yayasan Al Musaddadiyah include representative dormitory buildings for boys and girls, a large mosque and a smaller mosque, a hall, a health clinic, a canteen, and sports facilities (volleyball court, basketball court, badminton court, futsal court, and table tennis) [5]. Yayasan Al Musaddadiyah currently uses brochures as an information medium, which may not be effective enough in the current era to reach a broader audience. One potential technological advancement for Yayasan Al Musaddadiyah is the use of Virtual Reality (VR) technology [6], which can effectively introduce prospective new students to the institution [7]. Therefore, appropriate

information technology is essential to provide information to prospective students who will be enrolling[8]. VR also allows users or new students to explore the location and become acquainted with the educational institution in a more immersive and realistic manner compared to brochures. Additionally, users can feel as if they are physically present and interact with the surrounding environment [9].

Research on Virtual Reality (VR) [10] [11] [12] [13] [14] has shown that various methods have been used in previous studies, including the Multimedia Development Life Cycle (MDLC) [10] [11] [12] [14], while other studies employed the Waterfall method [13]. The results of previous research include [10], which developed a website-based VR campus introduction application; [11], which created a 360° video virtual tour for uploading to YouTube to assist museum visitors in learning and sightseeing; [12], which produced an Android-based VR application for introducing Institut Teknologi Telkom Purwokerto (ITTP) with 360° video implementation; [13], which developed a website application for campus introduction at Ahmad Dahlan University as an information medium for new students and the public; and [14], which created an Android-based virtual reality tourism catalog application for promoting tourist destinations in Garut. Among these studies [10] [11] [12] [13] [14], none have utilized Virtual Reality Sky View.

The goal of this application is to develop an informational media application for introducing Yayasan Al Musaddadiyah using 360° Virtual Reality technology with the Multimedia Development Life Cycle (MDLC) method [15]. This media will feature a Sky View to offer a different perspective of the educational facilities [16]. The MDLC method used in this research consists of six stages: concept, design, material collecting, assembly, testing, and distribution [17].

II. RESEARCH METHODS

A. Research Framework

The system design and development process involves several stages of activities. The research framework presented is based on a diagram that outlines the general logical flow of conducting a research study. The stages involved are shown in Figure 1.

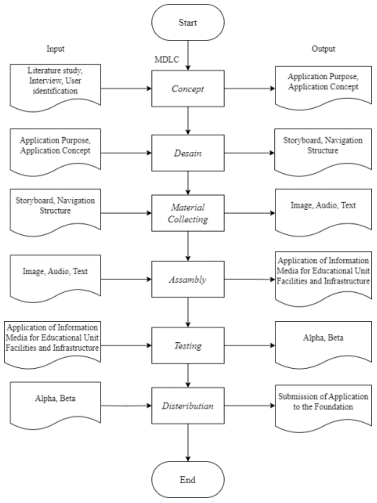

Figure 1. Reserch Framework

B. Multimedia Development Life Cycle

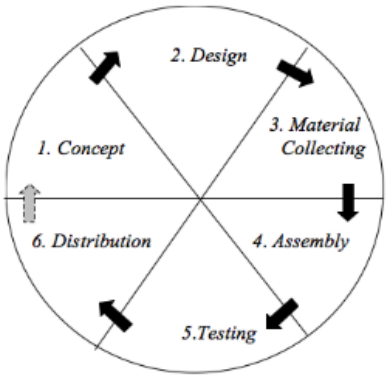

Figure 2. Work Breadown Structure This Research

Multimedia Development Life Cycle (MDLC) approach will be used in application development. This method has 6 phases, including Concept (idea), Design (design), material collecting (collection of materials), assembly (making), testing (testing) and distribution (distribution) [18]–[20]. These stages are carried out sequentially, the following is the MDLC method flow used in the development of Virtual Reality 360° introduction of facilities and infrastructure in educational units

1) Concept
   Concept is the first stage carried out to determine the purpose of the program, who the users are, and the type of application. To determine the purpose of the application.
2) Desain
   At this stage, the design of multimedia elements is made. This includes sketching, storyboarding, interface design, and navigation. This stage ensures that all visual and interactive elements are in accordance with the established concept.
3) Material collecting
   At this stage all the necessary materials including text, images, audio, video and other multimedia elements must be collected. These materials are collected using the design that has been created.
4) Assembly
   Assembly is a stage to combine all materials or assets. The application will be made according to the design stage, where the creation of an application will be made according to the storyboard created in the previous stage, namely design.
5) Testing
   To ensure the results of making multimedia applications are in accordance with the plan, testing is carried out. There are two types of testing used, namely alpha testing and beta testing. The following is an implementation of beta and alpha testing.
   a) Alpha Testing
      Alpha testing is a type of testing conducted by application developers. The quality and stability of the application tested by the developer can be evaluated using this test;
   b) Beta Testing
      Beta testing is a test conducted after alpha testing is completed. Beta testing will be tried by the client, this test is conducted because it is necessary to know how much client recognition there is before the application is actually distributed.
6) Distribution

The final stage is to distribute the multimedia product to the end user. Distribution can be done through various methods such as uploading to online platforms, physical distribution in the form of CD/DVD, or other methods that suit the target audience.

III. RESULTS AND DISCUSSION

A. Research Findings

Based on the background of the research, the identified problems, and the research gaps that have been discussed, this study designs and develops an application by implementing 360° Virtual Reality technology with Sky View using the Multimedia Development Life Cycle (MDLC) method. Below is an explanation of the MDLC method:

1) Project Concept

In this stage, the project concept, project goals, user identification, and the analysis of requirements for project development are determined. The devices to be used in the development of the application for introducing the educational facilities using Virtual Reality (VR) with Sky View at Yayasan Al Musaddadiyah Garut are also specified.

Table 1. Project Concept

No	Descriptions	Details
1	Title	Implementation of 360° Virtual Reality Technology with Sky View as an Information Media for Facilities at Educational Units of Yayasan Al Musaddadiyah Garut
2	Users	Students, university students, prospective new students
3	Features	isplaying 360° object images, Sky View feature (aerial view), hotspots feature, and a map of Yayasan Al Musaddadiyah
4	Images	360° images, classroom images, canteen images, mosque images, and pesantren (Islamic boarding school) images
5	Videos	Video of activities during a break in the canteen
6	Audio	Background sound in the application

2) Application Objective

The purpose of this application is to serve as an information medium for new students, allowing them to familiarize themselves with the various locations within Yayasan Al Musaddadiyah Garut.

3) User Identification

Based on interviews and literature studies from the previous stages, the identified users of this application are prospective new students, as well as current students at Yayasan Al Musaddadiyah Garut.

B. Design

In the design phase, the storyboard and menu structure of the system are created according to the activities outlined in the WBS, as a continuation of the previous stage.

1) Storyboard Design

Table 2. Storyboard Design

No	Scene	Content	Description
1	Scene 1	Menu Page	The menu includes a 360° image along with features like auto-rotation, VR mode, and music options.
2	Scene 2	Location Information Page	This page provides information about the location to be visited.
3	Scene 3	Developer Information	This section presents information about the VR

			application developer.
4	Scene 4	Educational Units	This section provides information about the educational units available at Yayasan Al Musaddadiyah.

2) Designing the Menu Structure

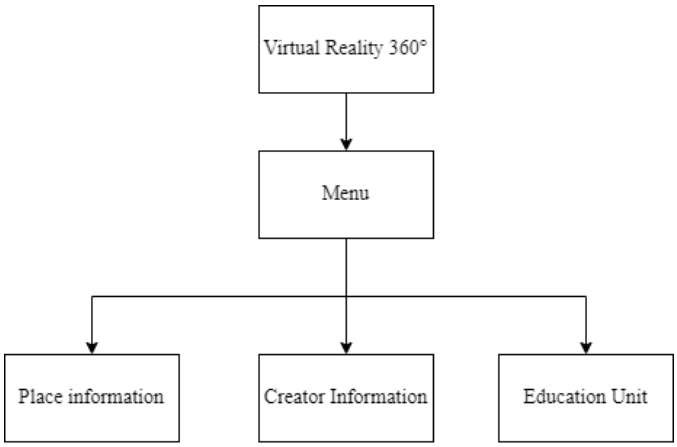

Figure 3. Menu Structure

3) Material Collecting

In designing the VR Sky View for Yayasan Al Musaddadiyah, supporting materials such as static images, 360° images, videos, and audio are required. These materials need to be gathered during this stage.

a) Static Images
This involves collecting images in .png and .jpg formats needed for the VR Sky View of Yayasan Al Musaddadiyah.

b) 360° Images
These are 360° images taken from the Yayasan Al Musaddadiyah Garut.

c) Video
This includes video data captured directly in 360° format with .mp4 file extension.

d) Audio
Audio files in .mp3 format were also prepared, sourced from the internet (Source: https://url1.io/hsYLK), with a file size of 3.3 MB.

4) Assembly

The Assembly stage involves creating all the content based on the design phase, including the storyboard and navigation structure that has been established.

a) Crafting the 360° Virtual Reality in 3D Vista
In this process, we will create the virtual reality sky view using the 3D Vista software.

Figure 4. Virtual Tour Yayasan Al Musaddadiyah

The picture is the initial appearance of the Al Musaddadiyah Foundation Virtual Tour. On that page contains information menu, panorama list, location, maker profile, VR box, and other menus.

5) Testing
   Beta testing was conducted by selecting respondents in advance, using the User Acceptance Test (UAT) with 20 participants. Seven questions were asked using a Likert Scale ranging from Strongly Agree (SA), Agree (A), Neutral (N), Slightly Agree (SA), to Disagree (D). The overall percentage results from the UAT method showed a highly satisfactory criterion with an average of 86.43%. This result indicates that users are very satisfied with the VR information media application using Sky View as a facility for educational purposes at Yayasan Al Musaddadiyah Garut.
6) Distribution
   At this stage, the Virtual Reality Tour website for the Wildlife Park is ready for use and distribution after testing has been completed. The website was handed over to the Cikembulan Wildlife Park's Virtual Reality Tour, hosted and ready for use.

C. Discussion

Information media for infrastructure facilities of the Al Musaddadiyah Foundation using virtual reality technology with sky view using the Multimedia Development Life Cycle (MDLC) method which has six stages, namely the first is concept, at this stage what is done is to make the concept of Virtual Reality that we will make, the next is the design stage, namely doing storyboard design and creating a menu structure according to what has been conceptualized from the previous process, The third stage is material collecting, namely the collection of materials that will be used to create VR such as 360 ° images, audio, and video, the next stage is assembly at this stage we make our VR using the 3D Vista application to combine the materials we have collected in the previous stage, the fifth stage is testing, namely the stage of testing VR applications that we have made as expected, the last stage is distribution, namely the VR application that we have made is distributed or used by end users. Information media applications for infrastructure facilities using Virtual Reality technology with sky view at the Al Musaddadiyah Foundation displaying 360 panoramic images. please summarize

Based on the background of this research it is important to do because the Al Musaddadiyah Foundation Garut hasn't adopted a media application for the introduction of infrastructure facilities with Virtual Tour Sky View technology. By making this application, it is expected to provide information about the Foundation well and can provide information about facilities and infrastructure to prospective new students who

will continue their education at Al Musaddadiyah Foundation. This virtual reality sky view technology can provide a view from above this provides a new experience for users who use virtual reality sky view.

IV. CONCLUSION

The research has resulted in an application that helps Yayasan Al Musaddadiyah provide better information about its facilities through Virtual Reality (VR) technology with a sky view. This application allows prospective new students or users to see a top-down view (sky view), offering a new experience for those unfamiliar with VR technology. It also enables users to clearly understand the layout of the foundation's facilities. The method used was the Multimedia Development Life Cycle (MDLC), which includes concept, design, material collecting, assembly, testing, and distribution.

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