CoreID JOURNAL

Vol. 1 No. 1, March 2023 (1-10)
ISSN: 2987-6990
DOI: https://doi.org/10.60005/coreid.v1i1.5

Virtual Tour Design and Implementation Kiara Artha Park Bandung Tourism Location

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Article Info

Article history:

Received February 01, 2023
Revised February 20, 2023
Accepted March 20, 2023

Keywords:

Kiara Artha Park
Multimedia Development Life Cycle
Virtual Tour

ABSTRACT

Based on the observations made of Kiara Artha Park Bandung, it is known that no interactive media can introduce the description of the situation and environment in Kiara Artha Park to outsiders. When there are restrictions on visit policies due to *lockdown*, tourists or the public cannot directly visit the location. One of the alternative solutions above is to build a Virtual Tour model that can provide an overview of Kiara Artha Park if tourists need help to come directly to the location. The research method used is the MDLC (*Multimedia Development Life Cycle*) method, suitable for designing and developing a multimedia-based application that combines elements such as images, sound, video, animation, and others. Tools used for image media are GoPro Max 360 cameras, and the application used is Quik with photo processing using 3Sixty. The result of the construction of this Virtual Tour is to map and describe the overall condition of Kiara Artha Park with 360-degree image media. The development of the structure of this Virtual Tour is to map and describe the general requirement of Kiara Artha Park with 360-degree image media.

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1. INTRODUCTION

1.1. *Virtual Tour*

A virtual Tour or commonly known as a virtual tour is a series of panoramic images that are combined and arranged in such a way as to create a virtual experience in any location [1], [2]. On this virtual tour, Users can feel how to be in a specific place without having to go to that place directly. This 360 virtual experience can be viewed through a computer or other device such as *a smartphone* [3][4]. For a more immersive and realistic experience, you can use Virtual Reality devices (VR) [5][6]. Some virtual tours may also present sound effects such as narration or music explaining products or points of interest [3].

A virtual tour can be an alternative to tourist activities in this modern era. Virtual tours can be defined as using technology to amplify or create a tourism experience. Thus, one does not have to be physically in a place to travel to the area [1], [7]. Currently, virtual tours have begun to be treated as an industry. They are overgrowing and have become one way or medium for the tourism industry to try to survive during the pandemic[8][9]. Virtual tours also have the potential to open access for the public to objects that have tourism potential.

Like a regular tour, a real *tour guide* or application will take visitors to explore a place and learn the history or information of the area. Because now it is impossible to go or vacation somewhere, this service is being sought after by many people [3]. An example of the appearance of a virtual tour can be seen in Figure 1 below.

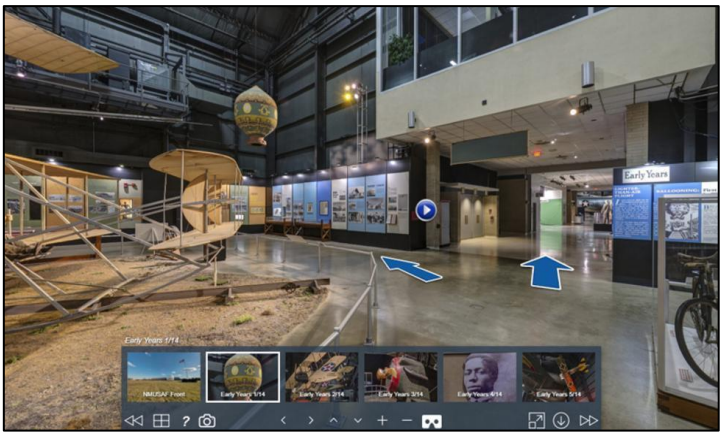


Figure 1. Virtual Tour Example [10]

1.2. Panoramic Photography

Panoramic photography merges several partially overlapping photos to obtain a comprehensive picture that covers a comprehensive view [11], [12]. Panoramic photography is a category of images whose object is the surrounding environment. The object of this panoramic photo is nature instead of man. Even if there are humans, they are not the main object of a panoramic photograph [13]–[16].

Figure 2. Panoramic View of a Rice Field [17]

The main object of panoramic photography is all parts of the photo, although there is still an object that is the center of the beauty of the panoramic photo itself. In general, this panoramic photo is made to show the beauty of the nature around us; even in a destroyed place, we can offer the beauty of that place [13], [14].

1.3. 360 Photography

360-degree photos result from digital photo processing in the form of panoramic images. The panoramic photo is then processed to be used as software that can look up and down, rotate, or zoom in [3], [4], [18]. This photo uses advanced information technology to make users see it as if they are in the place they are looking at.

360-degree photos can be used with interactive CD media or embedded into websites. In addition, this photography technology can also be installed on the viewer in a specific place so that anyone who comes can see it. This photo has good technology to be accessed on Desktop / PC, Tablet, and Smartphone devices.

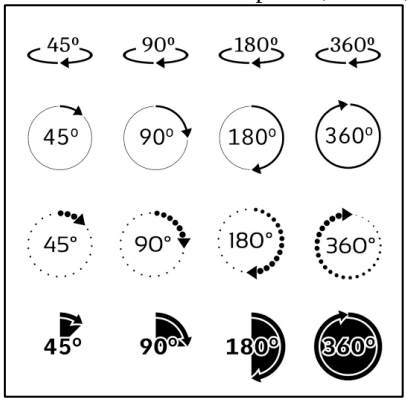


Figure 3. Various Degree Parts in the World of Photography

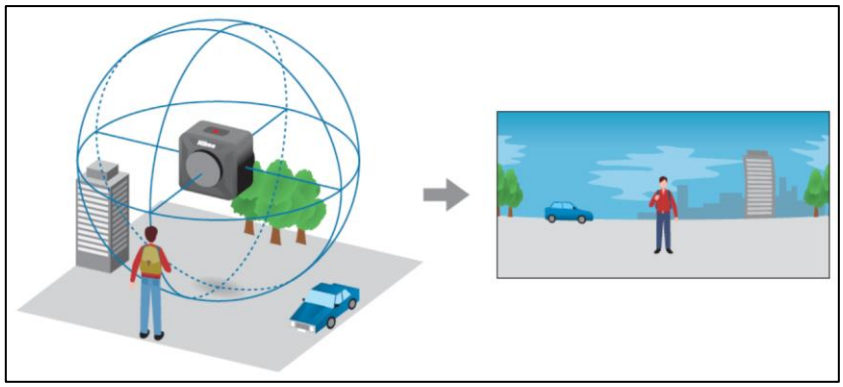


Figure 4. Two Images are Processed in the Camera and Stored as One Image

Figure 5. 360 Photo Examples [19]

1.4. Virtual Reality Photography

VRP is a panoramic photo technique that presents an atmosphere with a panoramic view [5], [6], [18]. Panoramic photos combine several to get pictures with a wide angle of view and cover a wide stance. Panoramic images can even present objects up to 360°[7].

Based on this view, the author sees an opportunity to use Virtual Tour to make it easier for tourists to still access tourist sites without having to come directly to the intended tourist attractions but still be able to see clearly and accurately the actual situation.

2. METHODOLOGY

2.1. Data Collection Methods

The data collection methods used in this study are a. Literature Study, namely data collection by collecting literature, journals, papers, and readings related to the research title; b. Observation is a data collection technique by conducting research and directly reviewing the problems taken; c. The questionnaire is a data collection technique by completing a questionnaire directly related to the topic taken.

2.2. Metodologi Pengembangan Sistem

The methodology used is MDLC (*Multimedia Development Life Cycle*). According to Luther (1994) and explained by Sutopo in the book Application of Multimedia in Education, it consists of 6 stages. 1) *Concept*. This stage is the purpose of making the application, who is the user of the designed application, and analyzing the system's needs. 2) *Design*. At this stage, storyboards are discussed in the designed application and the appearance and material materials in the program or application. 3) *Material Collecting*. At the scene of collecting materials to be used. 4) *Assembly*. At this stage is carried out the manufacture or combination of materials that have been compiled based on the design prepared at the design stage, as well as *storyboards* and navigation structures for the designed application. 5) *Testing*. At this stage, testing or testing is carried out after all the materials that have been carried out at the *assembly* stage are combined. Testing is carried out to determine whether the designed application works properly (*malfunction*). 6) *Distribution* [7], [20]–[25]. This distribution stage is the stage where the application test results are stored.

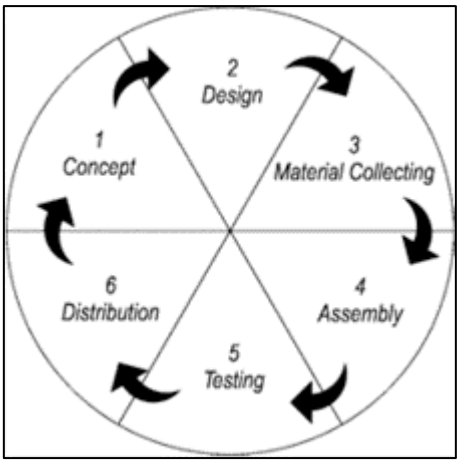


Figure 6. Stages of the Multimedia Development Life Cycle (MDLC) [7]

3. RESULTS AND DISCUSSION

3.1. Analysis of Running Systems

For now, Kiara Artha Park Bandung needs a digital *platform* to introduce its facilities and tourist attractions. Visitors can only visit directly without adequate technology to introduce Kiara Artha Park Bandung to the broader community. Additionally, visitors who come to the park now will need a long time when exploring the park, with an area of approximately 2.5 hectares.

Figure 7. Location of Taman Wisata Kiara Artha Park Bandung.

3.2. System Design

3.2.1. Functional Requirement

This Functional Requirement describes the type of need that contains what processes are carried out by the system. The following author describes the functional conditions contained in the application in Table 1. These Functional Needs represent the types of needs that have what processes are carried out by the system.

Table 1. Functional Requirement

No. KF	User Description
Actor 1	
KF-001	The system displays the start page.
KF-002	The system displays 360 panoramic photos.
KF-003	The system can display images along with captions.
KF-004	The system can display video.
KF-005	The system can play music.
KF-006	The system can access the *URL* that has been provided
KF-007	The system can provide sensor movement option features.

No. KF	User Description
KF-008	The system can provide mouse movement mode option features.
KF-009	The system can provide a normal mode.
KF-010	The system can provide a Cardboard mode.
KF-011	The system can provide a Stereoscopic mode.

3.2.2. Non-Functional Requirement

The following author describes the non-functional needs of the application in Table 2 below:

Table 2. Non-Functional Requirement

No. KNF	Description
KNF-001	The application can be accessed through the latest browser on the PC
KNF-002	The application is *built web-based*
KNF-003	The application is easy to use by users with simple features.
KNF-003	The application must be internet connected in its use.

3.2.3. Use Case Diagram

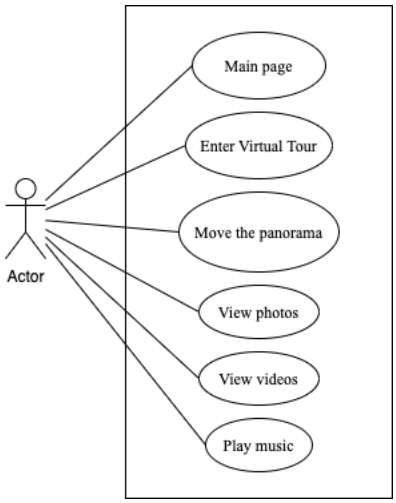


Figure 8. Use Case Diagram

3.2.4. Definition of Actor

The following table of actor definitions can be seen in Table 3 as follows:

Table 3. Definition of actor

No	Actor	Description
1	User	People using the App

3.2.5. Use Case Definition

A table of *Use Case* definitions can be seen in Table 4 as follows.

Table 4. Use Case Definition

No	Use Case	Description
1	Main page	Is the initial view of the application
2	*Enter Virtual Tour*	It is a way to enter panorama applications
3	Move the panorama	Allows users to move pictures in 360 degrees
4	View photos	Display a photo accompanied by a description of the image in question
5	View videos	View videos
6	Play Music	Play Music

3.2.6. Activity Diagram

Activity diagrams illustrate the workflow or activities of a system or business process. The thing to note here is that activity diagrams depict system activities, not what actors do, so actions that the system can perform. Here is the Virtual *Tour* Kiara Artha *Park Activity* Diagram.

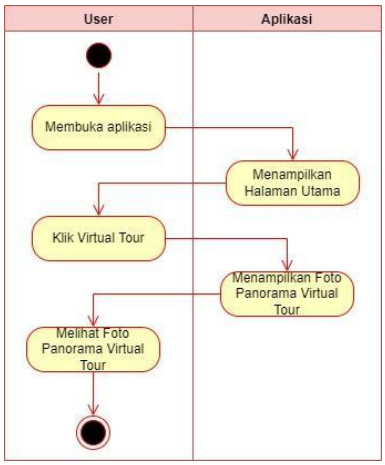
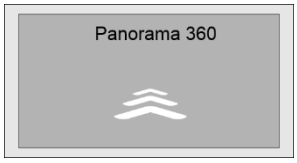
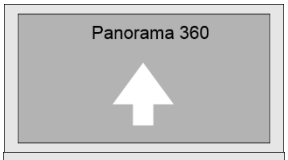
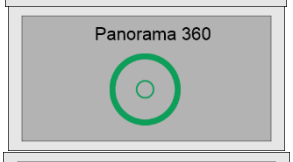
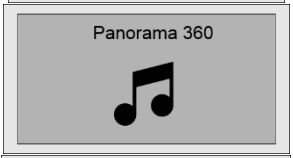


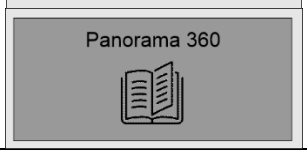
Figure 9. User Activity Diagram

3.2.7. Physical Design of the Application

Here is the physical design of the application, as shown in Table 5. as follows.

Table 5. Physical Design of the Application

No.	Types of Design and their meaning	Picture
1	Start Page. On the home page is a brief description of Kiara Artha *Park*, with extensive writing on it accompanied by a photo of the park with low *opacity* as the background; in the middle, there is *a button* to directly enter the *Virtual Tour* by clicking the button provided.	
2	Virtual Tour page with panoramic displacement hotspots. Panorama movement uses symbols such as three duplicate arrows; if the user clicks on the character, the panorama moves to the designated flow.	
3	Virtual Tour page with hotspots to enter places/rides. The up-arrow symbol becomes a button to enter a different place/vehicle, but for the workflow, it is the same as the transfer of panoramas.	
4	The Virtual Tour page with hotspots displays images. The black camera symbol becomes a button to display the image along with a description of the displayed image.	
5	Virtual Tour page with hotspots moving regions. The green circle symbol is the symbol for region move hotspots, but for the workflow, it's the same as for panorama moves.	
6	A Virtual Tour page with hotspots playing music. The black notation symbol is the symbol for a music-playing hotspot that is already on the system.	
7	A Virtual Tour page with a hotspot plays videos. The black video symbol is the symbol for a video playback hotspot that is already on the system.	

No.	Types of Design and their meaning	Picture
8	Virtual Tour page with hotspot to visit URL. The black WWW (World Wide Web) symbol is for hotspot visiting URLs already existing in the system.	
9	Virtual Tour page with hotspot to display PDF. The black book symbol is the hotspot symbol for viewing PDFs already on the system.	

3.2.8. Program Implementation Results

Implementation is the stage where the system is ready to be used so that it can be known whether the system that has been created can achieve the desired goals. Based on the design that has been made according to the results, development was carried out with steps including taking panoramic photos using the GoPro Max 360 camera and making programs using the *3Sixty* application to build applications that can display panoramic pictures and display information, audio, and video.

Figure 10 Here's what Kiara Artha Park's virtual tour web application looks like :

Main Menu Display

Virtual panoramic view of the tour with three arrows

Virtual tour panoramic view with a green round symbol

Virtual panoramic view of the tour with an up arrow symbol

Virtual panoramic view of the tour with Camera and Book symbols

Virtual panoramic view of the tour with movie symbols

Virtual tour panoramic view with notation symbols

Figure 10. Kiara Artha Park virtual tour web application display

3.2.9. System Testing

After the system coding is complete, the author conducts system testing in the form of software testing. The main goal is to ensure that elements or components of the system have functioned as expected. System testing must be done to find errors or weaknesses that may still occur, so it is necessary to improve the system. In this study, software testing was carried out using the *Black-box Testing* method. *The Black-box Testing* method attempts to find errors such as incorrect or missing functions, interface errors, performance errors, initialization, and termination errors.

Table 6 shows the results of tests conducted using the *Black-box Testing method.*

Table 6. Black Box Testing

Test Code	Description	Test Procedure	Result
KF-001	Enter panorama	Successfully entered the 360 panoramic photo page	Appropriate
KF-002	Panoramic displacement	Successful transfer of panoramic photos	Appropriate
KF-003	View images	Successfully displayed the image	Appropriate
KF-004	View images	Successfully Displayed Video	Appropriate
KF-005	View images	Successfully moved to the URL page	Appropriate
KF-006	Play Music	Successfully turned-on music	Appropriate
KF-007	Move regions	Successfully switch regions	Appropriate
KF-008	View PDF	Successfully displayed PDF	Appropriate

3.2.10. Conclusion of System Test Results

After doing the test above, based on the test results, it can be concluded that the Kiara Artha Park virtual tour application can run well and produce results as expected. This research generally aims to develop a *virtual tour* application Kiara Artha *Park* that is interactive and interesting so that it can be used to help tourists get information about tourist attractions. In addition, the creation of this application also aims to overcome the previous problem, namely the inequality in the number of visitors on each vehicle in the tourist attraction.

3.2.11. Discussion

The result of this research is a product in the form of *a virtual tour* application at the Kiara Artha Park tourist site. The *virtual tour* application at the Kiara Artha Park tourist site was developed using the *3Sixty* application. The material presented in the *virtual tour* application at the Kiara Artha *Park* tourist site includes tourist attraction information, a 360-degree photo gallery, tourist attractions, videos, photos, and audio. In making the application design, the author uses the *visual studio* to create an application appearance design developed and tested to find errors in the program through *black-box* testing (*black-box testing*). The results of *black box testing* show that the performance of the Kiara Artha *Park virtual* tour application that has been developed is good; there are no display errors, *ActionScript* can perform its functions correctly, and navigation on the *virtual tour* nature tour application functions as expected.

Every application that is designed certainly has advantages and disadvantages. The benefits of the program that the author made are as follows: a) This application can be an option for tourists if they want to see Kiara Artha Park accurately without having to come directly to the location; b) This application can be a means of information for tourists who come to Kiara Artha Park because there is information related to objects in Kiara Arha *Park*; c) The application is easy to operate with a simple display and memorable symbols.

In addition to the advantages of the application and with all the limitations of knowledge possessed by the author, the application that the author made has yet to be perfect. However, many things could still be improved in its application. The failures of the program that the author made are as follows. a) The quality of

panoramic photos and videos in this application could be of better quality. b) There is no *background music* when surfing on this application, so when doing a virtual tour, it seems quiet, and there is no sound. c) This application does not yet support VR and can only be run through the website.

4. CONCLUSION

The following conclusions can be drawn based on the results of the analysis and design of the virtual tour application at the Kiara Artha Park tourist site, which has been discussed in the previous chapters. 1) The application is by its expected features and functions so that it can be an alternative to delivering information on Kiara Artha Park attractions that are packaged attractively. 2) This application presents information to the user, who can see the situation accurately, to display interactive visual information. In this application, various kinds of multimedia need to clarify and introduce complete information so that the main objectives and functions of the Virtual Tour are as expected.

ACKNOWLEDGMENTS

The author would like to express his gratitude and highest appreciation to all Dear Staff and Employees at Kiara Artha Park, who have allowed and helped the Author to be used as a case study place. And to fellow STMIK Informatics Engineering study program "AMIKBANDUNG" lecturers who have supported this research.

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