

Virtual Tour Website 360° Design Of Cultural Medan Heritage

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Abstract

The development of technology is growing rapidly days by days, rising to new innovations in technology. One of innovation in technology is that the development of virtual reality technology can be developed as a virtual tour that is widely used, for example, on several web applications to introduce a location. But the use of virtual tour application as media promotion of tourism in Indonesia itself is still very less, because of photo taking and the concept capturing are quite complicated. The 360° panoramic photo is a set of images - photos those are combined into a single unit that produces images that can be seen from all directions, called panorama stitching process. This website is designed to develop an interactive application that can display information visually on a cultural heritage tourist spot in the city of Medan. Developed methodology used in this study is the Multimedia Development Life Cycle (MDLC) methodology which is a method of design that emphasizes multimedia software on the 6th stage of the development of multimedia. The usable Tools in this application is PTGui. Overall, this website can display photos 360°, this web application will be provided 8 existing historical tourist spots in the city field that will be created with the technique of immersive photography.

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Key-word: - Panorama 360°, virtual tour, mdlc, immersive photography

1. Introduction

Early virtual reality technology is Map Theatres Aspen, created by MIT in 1977. Virtual Reality (VR) is a technology made to enable the user interact with an environment simulated by computer (computer-simulated environment), both a conventional environment and a pure environment that exists only in the imagination. The development of VR concept in the field of photography, 360° panoramic (Equirectangular) or virtual reality photography (VRP) is a technique for displaying photos without borders (borderless) or photos that can be seen from all directions properly, as can be seen from a photographer (Azuma 1997; Colasante 2011).

Virtual Reality is defined as a three-dimensional digital media such as multi-sensory, immersive and interactive environment that has sparked public imagination as future technologies which will dominate employment, education and recreation (Osman et al, 2009). The 360 photos designed are used for the manufacture of a virtual tour or to see details of the buildings and environmental surroundings. The development of virtual tour with 360 degree panoramic technique (VRP) is extremely low, due to the need for special tricks to make the image pure. Indonesia itself has quite a lot of websites that provide a virtual tour to introduce a location. However, in Medan itself, it is found that the applying of (VRP) photography technique within a website is quite less, so the innovation to create a website travel with the concept of the virtual tour is necessary in order to give the development in the field of tourism promotion of natural and historical attractions in North Sumatra province, especially in Medan. Web media is the easiest media to introduce a travel destination, by utilizing (VRP) photography technique, it is expected to deliver travel information in Medan where web media can inform travelling destination in attractive way due to this virtual media tour. The users who access this website, will feel as if they were in real location, what had been seen by the photographer when shooting the 360° panoramic photos will be shared to the user. It is unique and will be a new experience for Internet users in Indonesia.

The virtual tour is a technology that convey user the pictures and allows the user to improve awareness situational and enhance the view, capture and analyze virtual data significantly. The virtual tour is a simulation of a location consists of a series. The series of images are aggregated (stich) to produce a 360 degree panorama. Virtual tour itself is usually used to provide such experiences somewhere just by looking at the screen. Presentation virtual tour can be done by using pictures or video, but it can use the model of three-dimensional (3D). For pictures presentation, it can use a panoramic photo. Panoramic photos also affect the results generated virtual tour. For the type of cylindrical panorama, vertical section can only be captured from less than 180 ° distance while the spherical type, it is possible to look up and down (Jan et al, 2009).

According to Highton (2010), virtual reality photography is a visual interactive creation, especially in the form of a panorama and video objects. Panorama is an image featuring a wide viewing angle. Visual reality photography basically gives a view as if the user was inside of a picture or location immortalized by photographers. The resulting image can be given modification by using computer, the last result can be referred to the Virtual Reality Panorama. Immersive panoramic photo is a photo displayed to allow users to interact with the surroundings look and also see it in a different direction. The image must change the user's perspective to feel a sense of ambient conditions. In the virtual tour can also use some other multimedia elements such as sound effects, music, narration and text are also often used to simulate the variety of media video and photography based (Jan, 2009). Panoramic tour and virtual tour are often considered to have the same meaning, namely a virtual tour created with the help of a camera, comprising a number of photographs taken of the strategic position by means of a camera and lens is rotated around the one location that is often referred to as no- parallax point (just behind the lens where the light meets). Virtual tour overall application can display interactive visual information from anyplace (Wulur, 2015). The website is also called as web, site, web sites, or portals. Literally, a website is a collection of information pages provided via the Internet that can be accessed around the world over the network connected to the Internet without limited space and time. Website is a component that consists of text, images, sound animation thus becoming interesting media information visited by others. Virtual tour website is a website featuring information about various buildings using text, photos and video (Mohler, 2000). Web design is the art and process of creating a single web page or in whole, and can involve the aesthetics as well as the ins and outs of the mechanical operation of a web site, though the main thing is to focus what is seen and felt from the site.

Most aspects are covered in web design, among others:

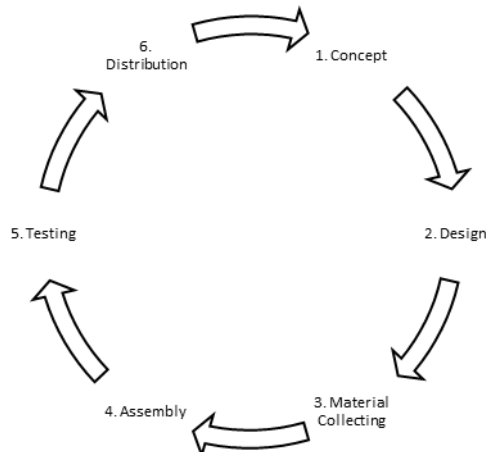
- Creating animation and graphics
- Color selection
- Font selection
- Navigation design
- Creating animated html or xml, java script, programming, and development of e-commerce.
- Creating web content (content)

Panoramic photos are merging multiple photos overlap partly with the aim of getting the photo wider and cover a broad view. Manually, this panorama technique can be done by any camera, including DSLR cameras. The trick is to make a few photos to capture the part - part of a wide landscape. When taking photographs to be combined, the most important thing is to use the exposure settings and the same camera. The most ideal is a manual mode, where we can set the shutter speed and ISO value is fixed. It is recommended to use the manual setting that the resulting image is much better. Yet, it uses the room spacious sharp f / 11 and f / 12. White Balance (WB) should also be established in accordance color of the light source (not AWB). Active D-Lighting function, Auto Lighting Optimizer / Dynamic Range Optimizer should be turned off (OFF) so that between the light and dark photos with one another does not change. Photo panorama should be photographed using the vertical camera orientation.

This is because the center of the photograph is usually less distortion (deformation convex / concave) than the edge. The use of tripod is good to get sharp and accurate images, but also grasp the camera with both hands, the origin of the light is bright enough so that the shutter speed can be fast. Good lens focal distance is 50 mm or more in length, with a focal distance of 50 mm, a panoramic photo will look natural. But if you want to make dimensional effects and dramatic, focal distance as wide as 24 and 35 mm can be used. PTGui is software that works to combine multiple images into a single unit commonly referred panoramic images, PTGui is the development of Panorama Tools Graphical User Interface which has now been turned into a software with all kinds of features merging photos. In view panoramic photos 360°. The process originally started from merging photos with engineering flat, cylindrical, spherical (Equirectangular), cube faces, cross, T and strip.

2. Methodology

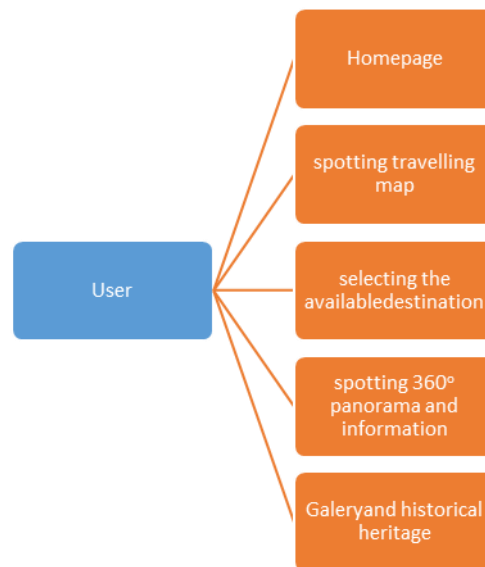
The methodology conducted in this media web is that MDLC (Multimedia Development Life Cycle) conducted by Luther (1994) and explained by Sutopo within the education application, consist of 6 stages as follow:



Picture 1. Developmental stages methodology MDLC
Source: Sutopo (2003)

1. Concept
The concept is the stage for determining purposes and who will use the program (audience identification).
2. Design
Design is specification made stage which is performed in program architecture, style, display, and material needs for the program.
3. Material collecting
Material collecting the stage for collecting material based on the valuable needs.
4. Assembly
Assembly is the stage for creating an object or multimedia terms. The application made is based on several stages, such as storyboard, flowchart and navigation structure.
5. Testing
Testing is done after finishing assembly stage by running the program and see whether there is failure or not.
6. Distribution
In this stage, the application will be saved in a storing media. If the storing media is not enough to store in the application, compression on the application will be conducted.
Based on the picture 1, the methodology conducted in this research is Multimedia Development Life Cycle approach so that the research phase is as follow;
 - a. Concept
The title of the research is “Rancang Bangun Website Virtual Tour 360 Cagar Budaya Kota Medan”. The objective of the research is developing an interactive website application which can performed information visually from one cultural heritage in Medan. The last user is the whole society with virtual object that can be resulted in 360° panorama. The input of the system are photos and text, while the output is the website with Input dari sistem berupa Foto dan Teks serta output yang dihasilkan berupa Website dengan foto panorama 360°

b. Design



Picture 2. Research Metodology

From the diagram above, the user can do 5 activities. The first activity, the user will be welcomed to the homepage consist of the spot line information of the website. The second user will display travelling map, where the map shows some spots of travelling destination. The third user should select one of travelling destination to see 360° panorama. The fourth user will display some information about the tourist attraction during the user carried on to virtual tour. The fifth after going out from virtual tour, the user can see gallery and information about the history of tourist attraction.

c. Material collecting

The researcher collected the data from several historical tourist attractions in Medan in the forms of photos and information about the tourist attraction. The researcher also analyzed capturing location. This is necessary to be conducted to make the quality of the photos maximal. The researcher collected 8 photos 360° panorama in historical places in Medan. The taking picture session is done by selecting the spot in the middle of 360° photo. Furthermore, tripod is put on the spot determined. Then, the used camera is equipped with lens (focal length) 18-55 mm which is placed on the top of tripod. The position of the camera is vertical. Then, the photos were taken by turning from the right to the early position, then after coming back to the early spot of capturing the photo, the lens camera is directed vertically zenith and perpendicularly down (nadir). The researcher needed at least 8 photos in every spots of travelling to produce 1 360° photo panorama. If the action used great lens cam (focal length) 2,75mm photo takes much less is enough 4 horizontal photograph with a division of the 4 corners berberda photo and one photograph facing upwards (zenith) and one photo face down (Koyuncu & Pinar, 2007). Determination of a hotspot in the creation of virtual touring is also required. It is used to connect the mutually continuous panoramic image. Determination hotspot is done by looking at the site plan panoramic imagery. Arrow symbol is used as an indicator for the hotspot. By pressing the arrow symbol located on the panoramic image of the virtual touring users can switch to the panoramic image associated with the image of the previous panorama (Aznoora, 2009).

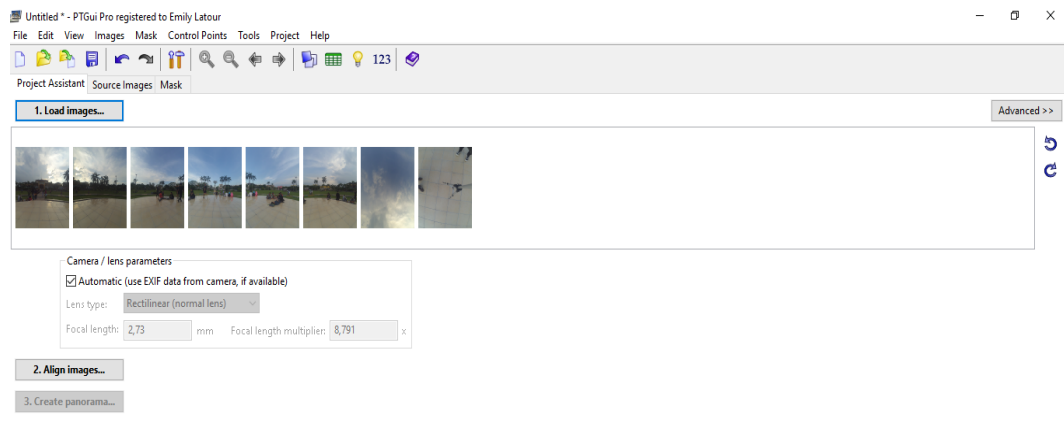
3. Finding and Discussion

Based on the research, it was found several benefits of using 360 website virtual tour system, such:

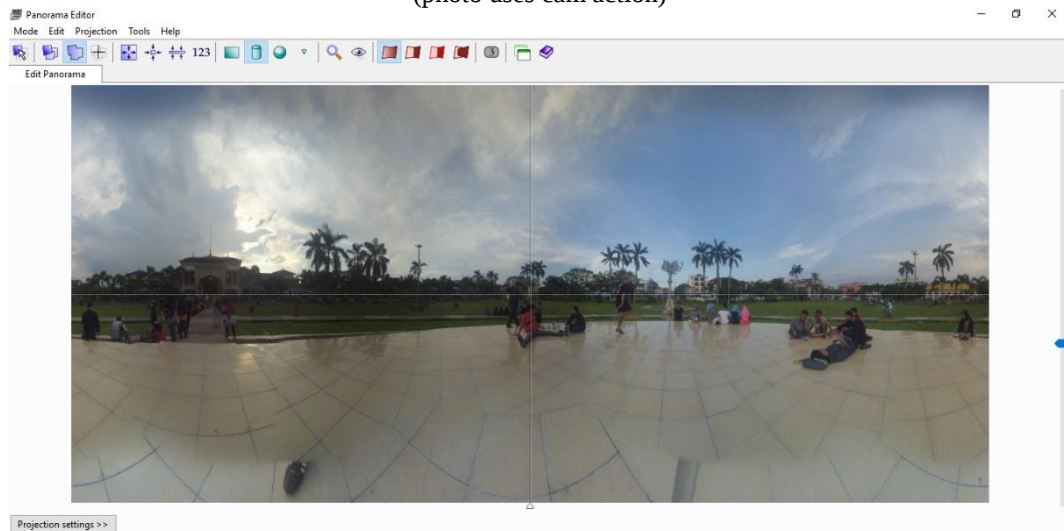
a. Assembly

Assembly stage is the stage of making all objects or multimedia materials. Making the applications based on the design stage, such as storyboards, flow charts and navigational structure. Based on the results of the photographs that have been made, it will be done development stage, namely:

1. Making a 360 panoramic images using software PTGui.
 2. Making Mini map using Corel Draw software to guide google maps to see the location suit to the original.
 3. Creation of website using adobe software Dreamweaver with HTML programming language to build applications that can display panoramic images and displaying information and maps.
- The result of making a virtual tour process of the website in accordance with the results of the analysis carried out. In the web application user can see the cultural heritage of the state outside of the building and inside. Eight places are displayed using the techniques of immersive photography, so it can display interactive visual information. Photos are displayed can be rotated in all directions as desired user and also a city map terrain as a guide to see the tourist sites. Here are the stages of the Merger process photo images (stitching) to be uploaded to the website. As shown in Figure 3. All of the captured image will be imported into the software PTGui. To pursue photo merging (stitching). Then the "Align Images" will process all available photos and incorporate them automatically. In Figure 4. is the result of merging photos automatically. Those have already been in combination (stitching) can still be edited as necessary to get the perfect result.



Picture 3. The process of making 360 picture with PTGui software (photo uses cam action)

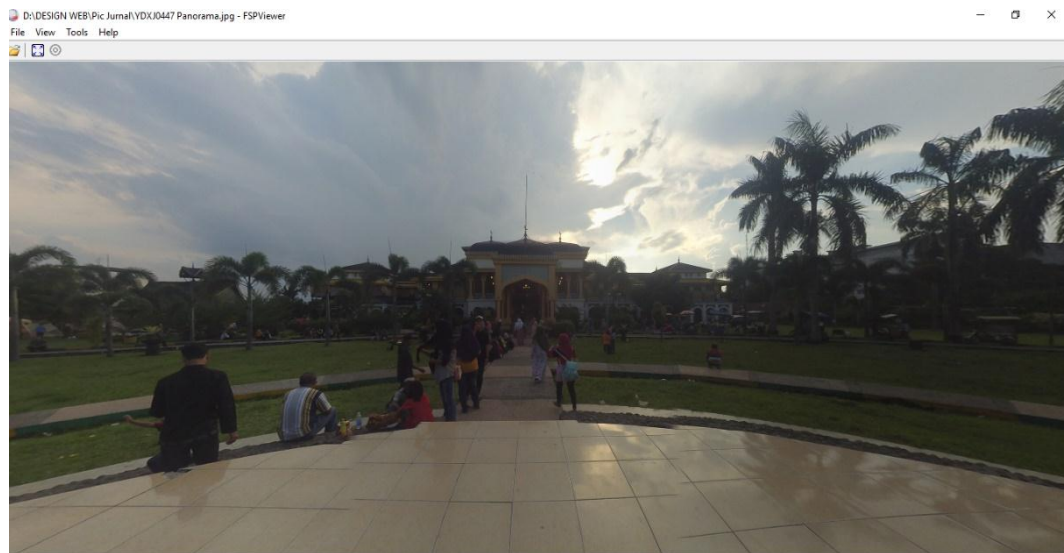


Picture 4. Sticking Editor Panorama

To see real panoramic photos of 360° need special software called FSPViewer. This Disoftware, panoramic images in Figure 5, it would look was rounded like the place. Figure 6 is the result after the image opened in software FSP Viewer.



Picture 5. photo 360° panorama in .jpg or .tif format

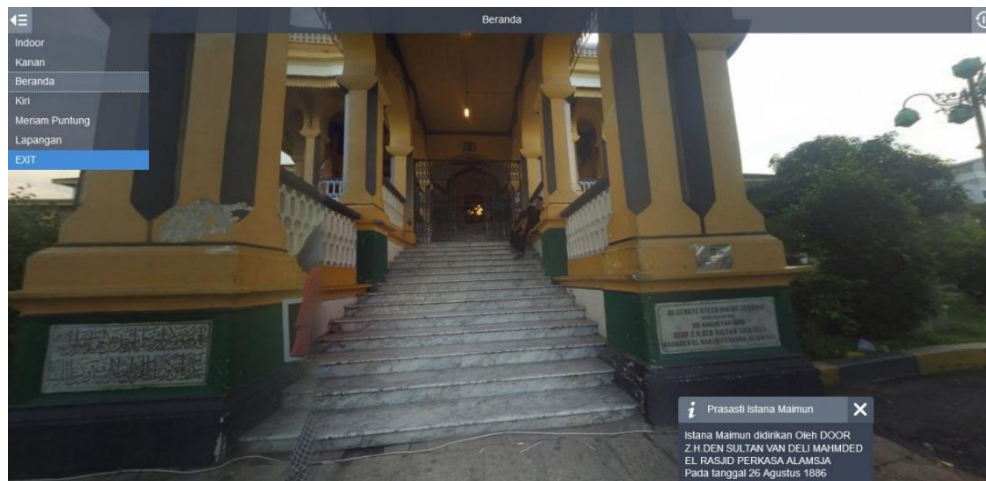


Picture 6. The display panorama after being viewed through software FSPViewer

After all process of photos stitching have been completed, directly the photos uploaded to web marzipano.net which is a medium that provides html plugin to view panoramic photos in 3D. At this stage, the authors create a website that provides panoramic photographs of a variety of natural attractions in the city of Medan. Figure 7 is a mini map that displays the location of the existing historical sights in the city field in format 3D panoramic images. Figure 8 is a plugin media 360° panoramic photos that are uploaded from marzipano.net and is aligned with HTML program that the author made. Figure 9 is a historical information about the travelling location.



Picture 7. The location of 360° panorama



Picture 8. Panoramic photo after uploaded to Website



Picture 9. Display information about the history of travelling destination

b. Testing

Testing is done by locally access the website before hosting and see if there is a mistake or not, the results of these tests can be concluded as the program run smoothly and the content and the navigation buttons work well.

But researchers found several external issues, namely:

1. Type of device

The device for accessing this website up to a panoramic image 360⁰ can run stable minimum screen resolution of 1366 x 768 pixels. Due to the resulting picture size is wide enough.

2. Internet connection

Due to the use of the concept of Virtual Reality Photo so many photos to be processed, it is necessary a good and stable connection before the content goes well

c. Distribution

This Project website Virtual Reality Photo has been uploaded and can be accessed by the whole society with the domain address www.hertagemedan360.plm.ac.id

Conclusion

By presenting the information in the form of 360⁰ panorama, it is expected to enlarge user's insight about photography technique recently and also easier user to achieve and understand what is going to be conveyed. This Reality Virtual Photography technology will be easier society to see environmental surrounding in detail and also improve readers' interest.

References

- Azuma, Ronald T., (1997), "A Survey of Augmented Reality", In Presence: Teleoperators and Virtual Environments 6, 4, 355-385.
- Colasante, Meg. (2011), Nicola Building Virtual Tour; Considering simulation in the equity of experience concept.
- Highon, Scott, 2010. Paper of Virtual Reality Photography – Creating Panoramic and Object Images. China: Library of Congress.
- Jan, Dusan; Rogue, Antonio; Leuski, Anton; Morie, Jacki; Traum, David. (2009), A Virtual Tour Guide for Virtual Worlds, Proceeding of the 9th International Conference on Intelligent Virtual Agent.
- Koyuncu, B., Pinar, Kocabaşoğlu., (2007), "Virtual Campus", International Journal of Computers, Issue 4, Vol.1,2007. Issue 4, Volume 1.
- Luther, Arc C. 1994. Authoring Interactive Multimedia. Boston: AP Profesional
- Mohler, J.L. (2000). Creating a Web-based Virtual Tour at Purdue University. *Journal of Computing in Higher Education*, 11(2), 50-62.
- Osman, Aznoora,; Wahab, Abdul Nadia; Ismail, Mohammad Hafiz. (2009), "Development and Evaluation of an Interactive 360⁰ Virtual tour for Tourist Destinantions", Journal of Information Technology Impact, Vol. 9, No. 3,pp. 173-182.
- Sutopo, Ariesto Hadi, 2013, multimedia Interaktif dan flash, PT Graha Ilmu, Yogyakarta
- Wulur, Hera Wulanratu. (2015). Aplikasi virtual tour tempat wisata alam di Sulawesi Utara, E-Journal Teknik Informatika, Volume 6, No. 1 (2015), ISSN : 2301-8364
- Zulkarnaen, Rizky. (2010), Perancangan Aplikasi Viewer Model 3D Interaktif Berbasis Web dengan Teknologi Augmented Reality, Universitas Sumatera Utara, Medan, Indonesia.
1. <http://artikelkondang.blogspot.co.id/2012/11/panduan-bikin-foto-panorama-360-derajat.html> (di akses tanggal 19 September 2016)
 2. <http://www.baliwebs.com/id/artikel-berita/85-apakah-itu-website-manfaatnya.html> (di akses tanggal 23 September 2016)
 3. <http://www.infofotografi.com/blog/2013/07/memotret-foto-panorama-dengan-kamera-dslr/> (di akses tanggal 23 September 2016)
 4. <http://yadicucuklauk.blogspot.co.id/2011/12/apa-itu-web-design.html> (di akses tanggal 23 September 2016)
 5. www.ptgui.com (di akses tanggal 23 September 2016)