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360° Virtual Tour of the Traditional Malay House as an Effort for Cultural Heritage Preservation

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Abstract. The rapid growth in technology has created new innovation in the field of information technology. One of the innovations created from technological advancement is virtual reality that can be extended through virtual tour that provides real-time experience in exploring a space or an area. Nevertheless, preliminary research on the development of digital sector in heritage architecture only focused on historical site instead of building. Although there is an exploration paid to the heritage building, the effort is limited to colonial buildings and little attention has been given to the local heritage architecture. Hence, this paper aims to explore the development of 360 ° virtual tour of the traditional Malay house that is over 100 years old as one of an important measure to preserve, protect and interpret the built heritage and cultural history. The primary data was analysed from the building inventory through high-resolution photography using a fisheye lens digital camera. Photos collected were combined to create panoramic effect using a stitching technique. The 360 ° virtual tour application was developed based on the Multimedia Development Life Cycle theory. The findings show the application is produced as a digital database consisting of physical qualitative attributes data for university's management and recording for posterity. The outcome from this study has proved how technology converts the traditional learning and museum visit can become an enjoyable platform of learning, motivating and understanding of building structures and unique architectural details.

Keywords: Malay architecture, 360 virtual tour, panorama, building preservation

1. Introduction

Heritage building falls under tangible cultural heritage and can be defined as a building or groups of separate or connected buildings aged more than 100 year with a unique value of an architecture, homogeneity or their place in the landscape and have outstanding universal value from the point of view of history, art or science (Heritage Act, 2005). Besides historic building preservation project, the government of has been promoting the uniqueness and importance of built heritage since the enactment of Antiquity Act way back in 1976. However, preliminary studies on the development of digital sector in architecture focused more on the documentation of heritage buildings with colonial architecture and little attention has been given to the Malay architectural heritage. Hence, this study aims to explore the development of 360 ° virtual tour of the traditional Malay house that is over 100 years old as one of an important measure to preserve, protect and interpret the built heritage and cultural history. This is in line with the development of information technology in data capture and the management of collections and



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historical sites as numerous cultural institutions like museum and galleries are also experimenting with digital media to communicate in new ways and attract new audiences (Economou, 2016). The study therefore assumes that 360 virtual tour is potential to become one of the evolving technologies to demonstrate and present the historical and architectural significance of an old building or monument, enabling the user experiences the real environment through virtual scene.

2. Literature review

Virtual reality (VR) photography is an interactive visual media creation, especially in the form of panoramas and object movies. VR can be interpreted in three dimensions including multisensory, immersive, and interactive digital environment that has sparked a broad imagination of future technologies that will dominate work, education, and leisure (Roussou 2004; See and Cheok, 2015). The photography technique for VR application is called "immersive imaging" as visitors can effectively enter the environment of the application as if it is real. Rather than the method of viewing an object through a brochure, visitors can actually see the object more closely through various angles and look at the interior from a virtual perspective. Panoramas are images that allow visitors to view the entire scene surrounding the camera through a 360° view. VR panoramas basically allow visitors to become immersed within the image or locations captured by photographers (Highton, 2010; Economou, 2015).

The development of 360° virtual tour is one of the ways that can promote the uniqueness and richness of local heritage of a country through digital technology. Various countries have been working hard to highlight and promote the diversity and uniqueness of their own heritage. For example, in neighboring countries, the 360° virtual tour of Chinatown Heritage Centre, Singapore appears comparable to the purposes of this study. Through the virtual tour, several media elements can be used to make the information interesting and effective. For example, the function of an in-app image button helps the visitors to view the image more closely and clearly. The background sound element in some spaces in the house can also add value to this virtual tour. This is supported by (Putra et al., 2018; Talip et al, 2014) who stated that a person's memory of a given content of an app can be enhanced through a combination of media and senses in presenting the information. On the other hand, in other cities, Said and Hasibuan (2012) have developed a 360° application to introduce cultural heritage tourism sites in Medan City, Indonesia through visual and interactive information.

3. Methodology

This study adapted the development stages in the Multimedia Development Life Cycle (MDLC) employed by Said and Hasibuan (2012). Practically, the MDLC development process does not have to be sequential, the positions and development stages are changeable. However, the planning stage or concept must be carried out as the first step in development (Luther, 1994; Osman et al, 2009; Said and Hasibuan, 2012; Eiris et al, 2017). The application of 360° virtual tour was developed through six stages as described in Figure 1 below. Through the employment of aforementioned stages, an old Malay palace located inside the university ground was selected as a site study to disclose the uniqueness of the architectural heritage. Rumah Puteri Bongsu or also known as IstanaTengku Fatimah Zaharah, was bought by the National Museum of Malaysia before it was handed over to Universiti Kebangsaan Malaysia, was originally a legacy of the Royal Family of Kelantan, built in 1886.

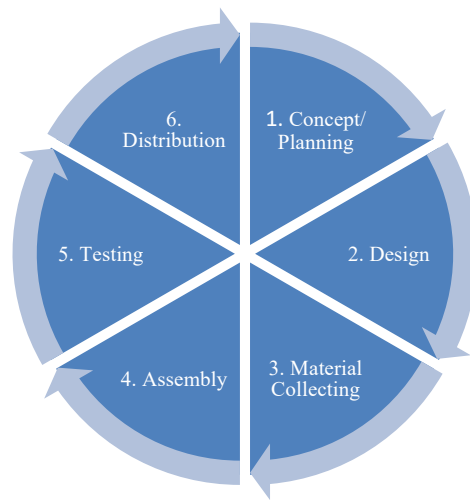


Figure 1. Multimedia Development Life Cycle Methodology

4. Findings

4.1. 360 ° Virtual Tour Main Interface

Interface is an important view that builds the interaction between the users and the application being developed. The main interface of 360 ° virtual tour of the traditional Malay house is shown in Figure 2. Some elements like symbols, icons, and navigation are included to help the users navigate the building easily. The little arrow icons are among other functions of navigation that allow the users to explore the place, whether to move left, right, front and back. Apart from these functions, the users can also move and explore the place by pressing the mouse button and turning it to the left and right according to the preferred direction.

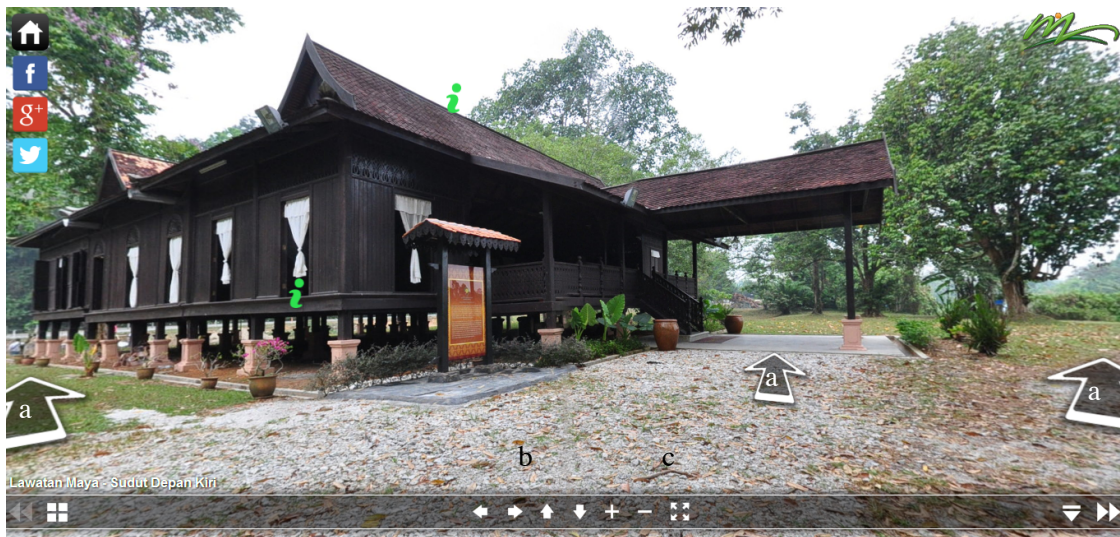


Figure 2. 360° Virtual Tour Main Interface

4.2. Detailed information on the structure of the building.

Detailed information on the structure of the building is included to provide additional information on the motive, philosophy and structure of the building to the users. This information can be accessed through links on the information and figure icons in each space involved. The information provided in

each of the building space explains the uniqueness and skills of earlier Malay community. Each structure has its own philosophy and meaning that is unique and relevant to its position and use. Figure 3 shows the information icon with detailed information through texts that appear when the icon is clicked.









Figure 3. Information detailed through icon

4.3. Close-up figure.

Close-up figures can be found in the spaces provided. These figures highlight the uniqueness and art wisdom of earlier Malay community in producing decorative arts in the house structure. Table 1 shows figure icons that are placed on each wall through the Cooking House (Rumah Masak). A close-up figure will appear when the users click on the figure icon.

Table 1. Interior design of the traditional Malay house

1. Elephant Door (Pintu Gajah)	2. Perabung	3. Tebar Layar
		
4. Sesiku Keluang	5. Carving Door	6. Corner space combination design
		

7. *Kekisi*

8. Carving motifs above the door



9. Carving motifs on the door



10. Five calligraphy carvings on Grooved-Frame Wall (Dinding Janda Berhias)



In line with the current technological advancement, the development of 360 ° virtual tour in this study is seen as a great potential in providing information on the heritage architectural space for in-depth understanding. Virtual tour can be interpreted as simulation to existing locations which includes video image sequences in which they can be generated from media either in the form of photography or panoramas that have a combined and endless view. In addition, the creation of this 360 ° virtual tour is hoped to highlight the advantages, uniqueness and local wisdom of the early Malay community. At the same time, it is hoped to increase the knowledge and appreciation among the new generation towards traditional Malay architecture hence craft and transform their experience. The creation of non-linear journeys is also hoped can attract 21st century audiences as the application allow visitors to explore a site at their own speed and direction through a more flexible and fluid exhibits.

5. Conclusion

The development of 360° virtual tour of the traditional Malay house is one of the efforts to preserve Malay architectural heritage for future generation. This application also shows that 360 ° virtual tour can provide a real-life experience of visiting the place. The effectiveness of virtual tour is unquestionable due to its simplicity, low-cost, and effectiveness in providing information to the digital visitors in spite of the difference in location. Consequently, this virtual tour has successfully integrated the Malay architectural heritage information to the digital visitors through digital technology. In addition, virtual tour can also be used as a medium to promote and preserve the local architectural heritage as it offers fascinating panoramic images compared to the static images in brochures and books. Hence, the development of the virtual tour can indirectly attract the people's interest to recognise and have in depth understanding on the uniqueness of traditional Malay houses so that the architectural heritage of traditional Malay houses will be appreciated and preserved.

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