Interactive Virtual Museum for Malaysian Traditional Games

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ABSTRACT

Virtual Reality Malaysia Traditional Games Museum (VRMTG) has been developed to produce a virtual museum about Malaysian traditional game objects through Virtual Reality technology. Most traditional games museum is not available globally through the Internet, and quite rare for stand-alone museums. Only a few websites describe about historical traditional games but in still image and 2-Dimensional presentation. Historical artifacts can only be display as the way the artifacts are placed. Visitors cannot explore and view closely these artifacts from different sides and angles. VRMTG comes with the objectives to use virtual reality technology as a new method of delivering information about traditional games, to allow users to see multi sides of the equipment needed in the traditional games and users can manipulate any 3D objects which might be too fragile to be touched in the real world. VRMTG allow its users to explore the new ways of historical information to the public. VRMTG consists of 3D artificial Malaysian games artifacts, interaction, manipulation capabilities, walkthrough and valuable information. It provides knowledge about traditional games equipment in three different categories based on ethnics such as Malays, Chinese and Indian. VRMTG is hoped to achieve the objective of being successful system in promoting virtual heritage, interactive education and information delivery through the virtual reality technology.

Keywords: *virtual reality, museum, Malaysian traditional games.*

I. INTRODUCTION

Virtual Reality technology is used as a new way of delivering information about musical artifacts through the concept of virtual museum. It is believed that virtual museums provide new architectural space for museology because "virtual reality" can enhance the "conventional museum space" with numerous innovative aspects. Virtual reality museum for Malaysian Traditional Games (VRMTG) has been developed to produce virtual museum about Malaysian traditional games through Virtual reality technology. It delivers presentation that makes users feels being presence in the virtual environment as if the users in the real-life museum. It provides knowledge about traditional games equipment in three different categories based on ethnics such as Malays, Chinese and Indian. VRMTG allow its users to explore the new ways of historical information to the public.

The existences of historical traditional games museums are quite rare around the world. But, if a traditional games museum is built, the museum can only be visited by community around the area. There are three problems statements which leads to the idea of developing these traditional games museum. Most traditional games museum is not available globally through the Internet, and quite rare for stand-alone museums. Therefore, historical artifacts can only be display as the way the artifacts are placed without allowing its visitors to explore and view closely these artifacts from different sides and angles. There are several websites about historical traditional games but only in pictorial representation and 2-Dimensional for users to gain information.

VRMTMG comes with the objectives to use virtual reality technology as a new method of delivering information about traditional games, to allow users to see multi sides of the equipment needed in the traditional games and users can manipulate any 3D objects which might be too fragile to be touched in the real world. This Internet based VR system allows users can walk through the museums and gaining information about traditional games historical values from their homes. It also provides people with the educational knowledge to preserve the values of these traditional games based on their own uniqueness in terms of their history and their characteristics from being forgotten in the coming future.

The scope is divided into five sub-sections. First, information such as the description of traditional games artifacts and the navigation instruction. Second, multimedia elements such as still text, dynamic text, graphics and animation to give some attraction to the system. Third, Virtual environment and 3-Dimensional (3D) objects, in order to increase the reality values of each historical objects modelled. Forth, Interaction

Capabilities such as the user's camera movement and menus that consist an interactive button. Lastly, traditional games equipment in three different categories based on ethnics such as Malays, Chinese and Indian.

II. RELATED WORKS

According to [1], "Museums have a substantial role in the growth possibilities of cultural travel. They are important destinations for many travelers and create possibilities for the growth of the tourist industry itself". A virtual museum is a collection of digitally recorded images, sound files, text documents, and other data of historical, scientific, or cultural interest that are accessed through electronic media [2]. The ideas to these virtual reality museums are to allow users to explore and virtually walkthrough museums and exhibition centers virtually with computational devices. For example, VR Headset, without physically being present on the real museums ground. Users can make choices during their virtual travel enabling them to feel a sense of exploration, triggering curiosity and the desire to learn about historical information without needing users to go all the way to a specific museum. At the same time, users can interact with the Virtual reality museums user interfaces to control their movements in the virtual world and manipulate with virtual objects exist in the virtual world.

According to the survey carried out by Axiell in 2016 for the Museums and the Web's Conference, the use of integrated ICT applications had a significant impact on the public which is 48% of the museums has had an increase in physical visits, 50% saw an increase in the number of visits to their website and 82.3% of the museums has recorded an increase of social media sites visitor.[3]

Museum exhibits using virtual reality method has been researched and done by some museums to allow its users to explore the new ways of historical information to the public. For example, The Louvre Museum, Okyeonjungsa VR Museum, The British Museum. The British Museum became one of the first museums in the world to incorporate VR technology into a learning programme. All these existing systems exist with 3D objects, user interaction capabilities and educational exploration 3D application. Only a few virtual museums show traditional games such as Chinese Historical and Cultural Project (CHCP) and Malaysian National Department for culture and arts website. CHCP virtual museum consists of music, traditional Chinese games, Chinese custom, festival and celebrations and decorative arts.[4]

Malaysian National Department for culture and arts website [5] explains the Malaysian traditional games such as 'Tossing the stones' (Batu Seremban),'Galah Panjang', 'Marbles' (Guli),'Kicking the feathers ' (Sepak Bulu Ayam), 'Kicking the rattan ball' (Sepak Raga Bulatan), 'Kite Flying' (Wau), 'Filling the wooden board' (Congkak) and 'Top Spinning' (Gasing). There are video and still images in the website.

Most of the virtual museums use web and incorporate VR to present the artifacts. Virtual reality museum for Malaysian Traditional Games (VRMTG) presents the combination of web, VR and Virtual gallery using "Artsteps" application

III. ELEMENTS IN VR MUSEUM

Virtual reality museum focuses on traditional games equipment in delivering the application. Virtual reality museum 3D objects are modeled according to Malaysian Traditional Games Equipment in three different categories based on ethnics, which are:

a) Malay (3 types): Top spinning, Congkak and Batu Seremban
b) Chinese (3 types): Mahjong, Go and Yoyo
c) Indian (2 types): Pallanguli and Gilli Danda

The design framework is based on Warneka museum template [6] and web presentation. Blender is used as the development tool.

A. Warneka design

There are three types of framework such as Warneka design, blue-yellow design and grand entry design. Warneka design will be used in this project as a design framework. Warneka is a template that can be used as an alternative method for creating virtual museum interior such as exhibit rooms, museum halls and any other museum elements.

There are few advantages by using Warneka template as a framework for the system. Firstly, the process in developing the system will be smooth as the picture of the future system has been shown. Secondly, the Warneka template is simple and easy to be understand. Thirdly, the design of the museum is simple as the elements on the template does not overflow the screen.

The template has different kind of shapes and colours. Warneka template easy to navigate. Visiting another rooms or part of the museum also will be easy as the template has arranged it with different page. The elements have been arranged with plenty spaces in between other elements. Even though the design of the template is simple, but the elements are complete. Labels for each room, artifacts and any other elements has been stated. The separation of rooms has been created in order to arrange the traditional games in their own category.

B. Web navigation and presentation

There are three main categories of navigation which are Structural navigation, Associative navigation and Utility navigation. This VR museum is based on utility navigation which accesses information about the site itself or site functions and may include global utility options, such as "help" and "search," as well as extra-site navigation and tools. [7]

The way the different types of navigation are arranged on the page plays a large role in how visitors will perceive and use them. The purpose of a navigation type should be clear and obvious for a more efficient interaction. Fig. 1 belows shows the web navigation structure.

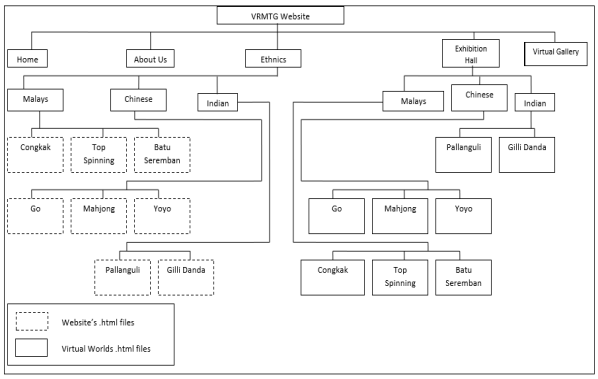

Fig.1. Web navigation structure

C. Tool and technologies

The 3-Dimensional (3D) objects which are the focus for this project, are designed, created and built first according to the multiple images of real traditional game objects in Blender version 2.79 software. All the 3D artificial games objects' structure is developed using this software. This 3D modeling approach is used in order to give more flexibility for object manipulation in the virtual world on the user-end. All the exhibition rooms used the same modeling approach. All the pivot points, rotation points, coordinate position and object sizes are being set here before being exported for integration. Next, images, information, 3D objects' textures and graphics that will be included in the system's website pages using wix.com, Blend4web, Artsteps and 000webhost. Other needs and requirements for implementation are Web server (FileZilla Server) and Internet connection.

IV. IMPLEMENTATION

There are three basic components in a virtual reality museum which are: 3-Dimensional application, 3-Dimensional objects and User Interaction. These three components also will be constructed according to the architecture of a system and then presented in graphical user interfaces (GUI) for functionalities and interaction.

3-Dimensional applications work closely with presence and immersion. Most presentation on a virtual reality museum system used 3-Dimensional objects. There are several characteristics in 3D objects which differentiate 3D representation with 2D objects. There are three characteristics in 3D models [8] which are: 3-Dimensional object can interact with other objects along any of the three rotational axes which is x (pitch), y (yaw), z (roll). 3-Dimensional objects have depth, height and width which is represented by three axes coordinates called x, y, and z.

3-Dimensional objects models can be resized, moved and viewed all around to view parts of the object that are hidden from view from other angles. Besides, 3-Dimensional object can be viewed from different angles when the properties of the object are changed according to three aspects which is scalling, translation and rotation. (Fig.2)

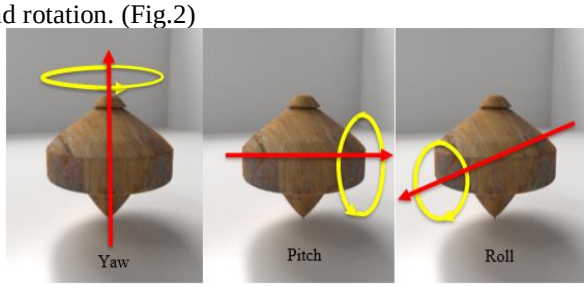

Fig 2. Rotation of 3D Object

Basically, there are three phases in modelling creating 3D objects.[9,10]. The three phases are: Modeling Phase, Scene Layout Setup Phase and Rendering Phase. Each 3D objects' textures and colors are based on the nearest proximity with real world objects. Every exhibition room designed the colors and lighting that friendly to human eyesight. All the rooms used the same color to maintain interface's consistency. In order to allow clear views on any angle in the exhibition hall, appropriate lighting is selected.

Fig.3 shows the main entrance of the museum. Users can choose which room to go.

Fig 3: Main entrance

Fig.4 is the room for Malays traditional game. Users can select any of the games. For example, user select the top spinning. The object can be manipulated, resized, moved and viewed all around to view parts from different angles. Fig.5 shows the explanation of top spinning.

Fig.4. Malays room

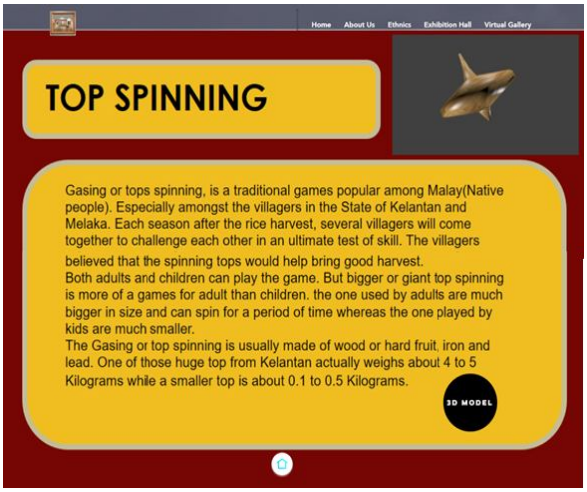

Fig.5: Explanation

Fig.6 shows the 3D Model (Button). The page will appear when the "3D Model" button is clicked. When users click the button, it will be redirect to Blend4web Player. Users can experience the virtual reality technology and can manipulate the 3D object such as rotate and zoom. Users also can look on the small guideline when users manipulate the 3D object on the below right corner. The same function and experience are used for other 3D objects.

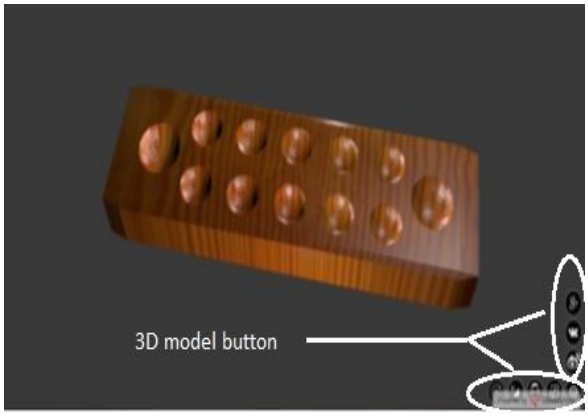

Fig.6. 3D model button

Virtual gallery using "Artsteps" application allow users to go to respective websites and walk through the VRMTG to experience the virtual gallery, which have similar information on original webpage. Users can walk through the virtual gallery by following instruction keys displayed vertically on the upper right corner. Users also can look on the small guideline when users walk through the virtual gallery on the below left corner. Fig.7 and Fig.8 show the virtual gallery.

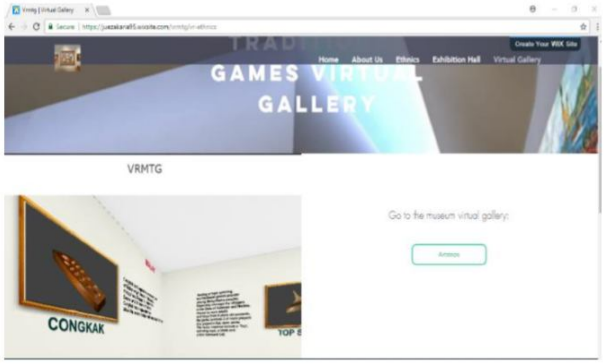

Fig.7: Virtual gallery

Fig.8. Virtual gallery navigation

V. CONCLUSION

Virtual museums have the potential to preserve and disseminate their cultural information with such innovative tools, by engaging the visitors and making their experience more interactive and immersive.

VRMTG provide information, customize the visitor experience through the possibilities which the user selects among the information content of its interests, access to the collections at any time. VRTMG has been developed with the hope to promote active learning and encourages the young generation to appreciate their cultural heritage.

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