

# Research for building virtual models visit online Hung Vuong Museum

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**Abstract.** Virtual reality technology is increasingly developing and has many benefits in reality in Vietnam as well as in the world. Thanks to 3D graphics applications, people can create virtual models on computers that simulate real models in a realistic and vivid way, where users can interact with the model. . One of the issues of concern today is the implementation of virtual tours on the internet environment. In this article, we have researched and built the process of designing an online tour model; applying the designed process, effectively using graphic design software to successfully build an online virtual tour model of Hung Vuong museum, Hung Temple, Viet Tri, Phu Tho, Vietnam. The model can be used to let visitors visit the museum online, interacting to learn more about each part inside and outside the museum. Tourists have the feeling of "immersing" as if they are visiting on a real model; especially the ability to interact directly with the virtual model will increase the excitement for visitors.

**Keywords:** Virtual model design process, Hung Vuong museum virtual model, online visit Hung Vuong museum.

## 1. Introduction

Hung Vuong Museum, Viet Tri city is likened to a "history in kind" attracting a large number of tourists from all over the world to visit, learn and discover unique and unique values of history and culture. culture of the ancestral land. The museum displays 2,000 beautiful and unique artifacts with high historical, cultural and aesthetic value. On the other hand, with the strong development of information technology globally. In Vietnam, the Internet is increasingly popular with an increasing number of users. Tourism is also not out of the trend of digitization when more and more tourists search for information about destinations, tours, services... on the Internet.

Virtual Reality -Virtual Reality (VR) is a simulation system in which. Computer graphics are used to create a "realistic" world called an "artificial" world. This world is not static, but reacts and changes according to the will (input signal) of the user (through

actions, words, ...). This defines a key feature of VR, which is real-time interactivity. Real time here means that the computer has the ability to recognize the user's input and change the virtual world instantly. The user sees the changing things on the screen as they wish and is attracted by this simulation [1] - [4].

With 3 levels of virtual reality [5]: non-immersive VR, semi-immersive VR and immersive VR, it can be found that non-immersive VR is the easiest to build, which is the virtual environment observed through the screen. , interaction is done by keyboard, mouse, or other equivalent tools such as joystick, pen and touch screen, etc. There have been a number of research works on applying 3D graphics to build virtual reality models at the non-immersive VR level to promote the images of units [7], build and manage urban models. marketing [8], application in teaching [1], [9].

On the other hand, with the strong development of computer graphics, there are many powerful graphic design tools for building virtual models that have been studied and applied, such as: SketchUp [10], [11]: 3D graphics software specialized in application to sketch design, model building in the fields of architecture, interior, landscape, construction; Enscape [12]: virtual 3D simulation engine, featured with fast speed. Adobe Premiere [13]: Professional video editing software provided by Adobe Systems; Cloudpano [14]: An application that allows users to create virtual interactions with 3D models.

This study offers a solution that is to combine 4 software Sketchup, Enscape, Adobe premiere, Cloudpano into the process of designing virtual tour models online on the computer, specifically: Sketchup software to draw models, software Enscape creates 3D perspective simulations, Adobe Premiere software to combine perspectives, cloudpano software to create interactions.

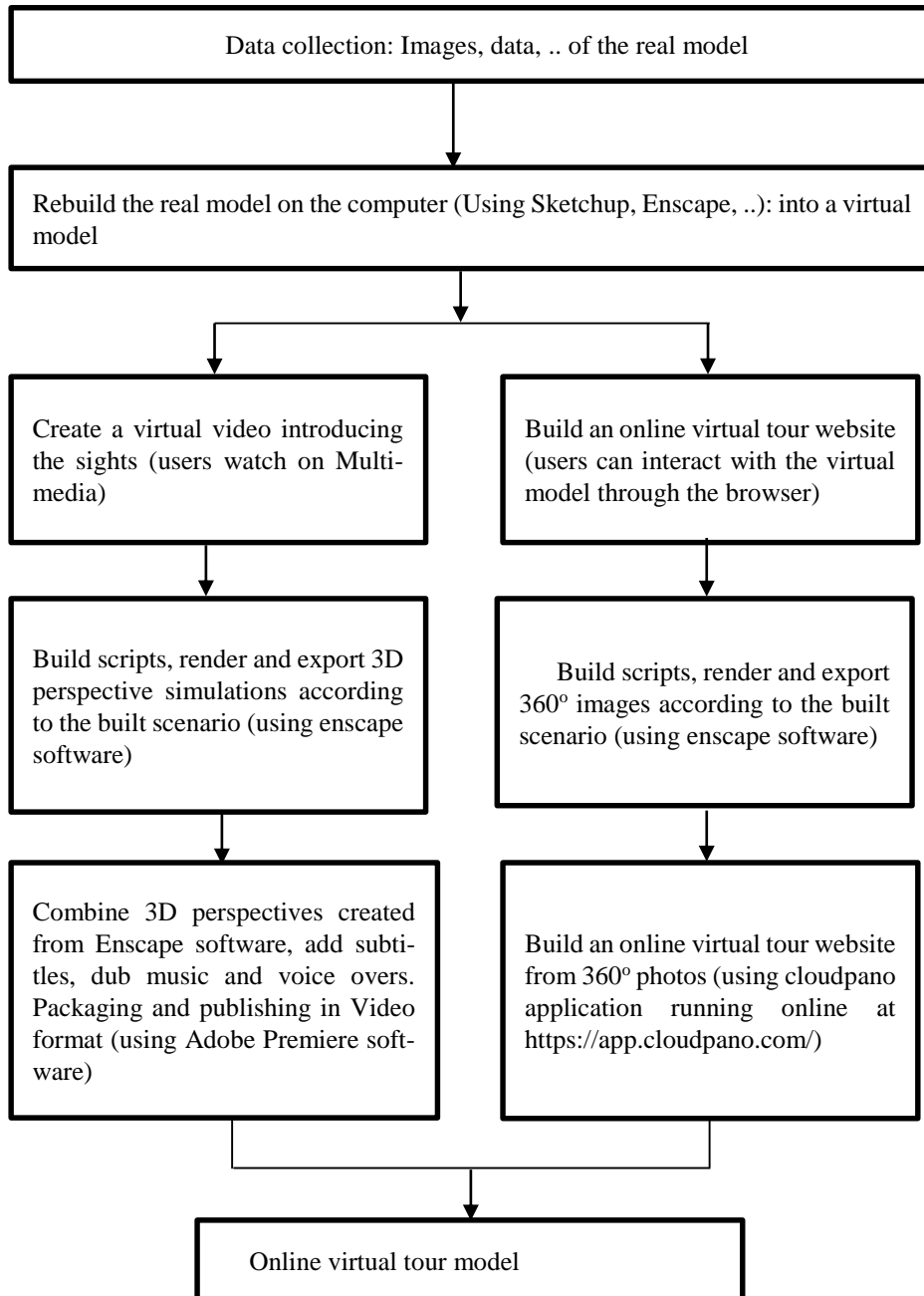
The structure of the article includes: Part one presents an overview of the application of virtual reality in online tourism in Vietnam, the trend of research and application of some 3D graphic design tools. Part two presents the empirical research method to build the design process of an online virtual tour model. Part three presents the product "Virtual model of Hung Vuong museum online". Section 4 presents a review of the research results.

## **2. Research Methods**

Research and apply 4 software: Sketchup [11], Enscape [12], Adobe Premiere [13], Cloudpano [14]; research on virtual reality models at the non-immersive VR level [5]. From there, build a process to design an online virtual tour model, and realize the process with an online virtual tour model of Hung Vuong museum.

### **2.1. Building an online virtual tour model design process**

The process of building an online virtual tour model is proposed as shown in the diagram below



**Fig. 1.** Diagram describing the process of designing an online virtual tour model

Technology used in steps:

Step 1. Data collection: Visit the actual model, use a camera to take detailed photos of the entire real model, measure and get data about the size of the real model.

Step 2. Rebuild the real model on the computer into a virtual model

Use Sketchup software and Enscape software to redraw the entire real model on the computer, based on captured images and measured dimensions.

Step 3. Create a virtual video introducing the sights

Use Enscape software to create 3D perspective simulations according to the developed scenario

Use the recording studio to record a voiceover introducing the model

Choose background music, compose subtitles

Use Adobe Premiere software to combine 3D perspectives created from Enscape software, subtitles, overdubs, and voiceovers. Package and publish in Video format

Step 4. Build an online virtual tour website

Use Enscape software to create 360° images from the model built on the computer according to the built scenario

Use cloudpano app to Build an online virtual travel website from 360° photos

The virtual tour model includes 2 parts: A video section introducing the tourist destination and a website section allowing users to visit online (users can interact with the model).

## 2.2. Building an online virtual tour model of Hung Vuong museum

To evaluate the effectiveness of applying the built-in online virtual tour model design process into practice. We have applied this design process to successfully build an online virtual tour model of Hung Vuong museum.

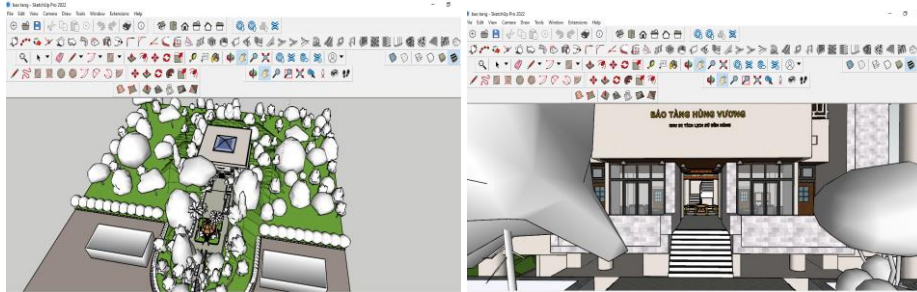
Step 1. Data collection: visit the museum, film and photograph all the details inside and outside the museum, measure the overall size of the museum and details of the antiques inside the museum



Fig. 2. Some pictures taken from the Museum

Step 2. Use Sketchup software and Enscape software to recreate the entire museum on the computer

Redraw the entire room, all the antiques in the museum, the trees, and the scenery around the museum.

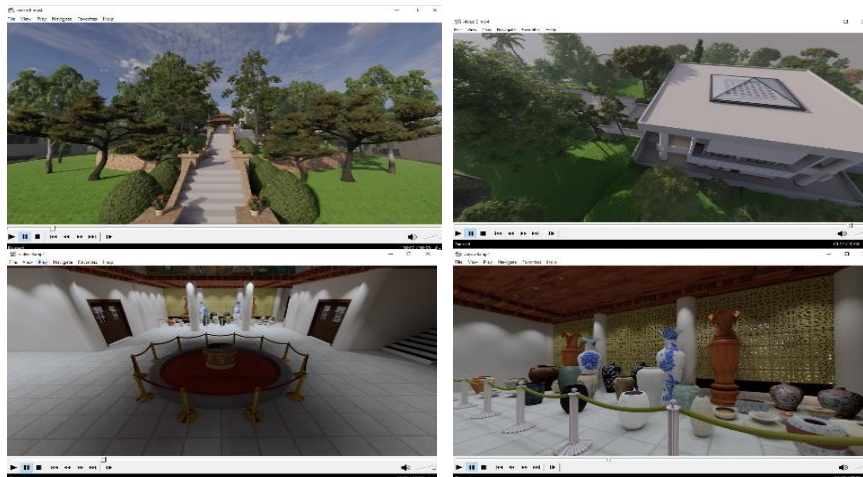


**Fig. 3.** Virtual model of Hung Vuong museum built on computer

Step 3. Create a virtual video to introduce the historical site of Hung Temple

Build script

Render and export 3D perspective simulations according to the built scenario (using Enscape software)



**Fig. 4.** Partial virtual simulations of the Hung Vuong treasure table

Use Adobe Premiere software to combine 3D perspectives created from Enscape software, add subtitles, music dubbing and voiceovers. Package and export products in video format (\*.Mp4).

The result is a virtual model file of Hung Vuong museum BTHV.MP4.



**Fig. 5.** Partial virtual simulations of the Hung Vuong treasure table

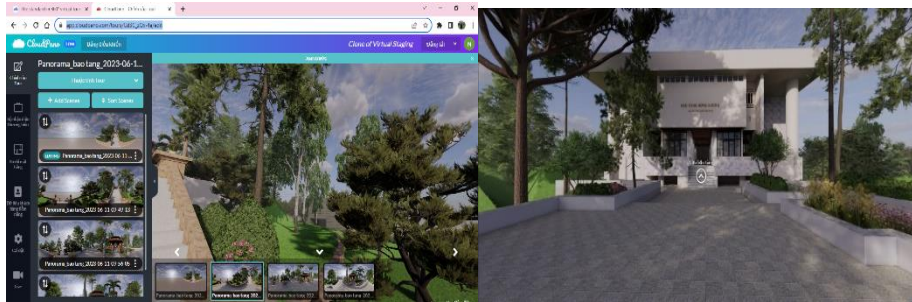
**Step 5. Create website to visit online virtual Hung Vuong museum**

Create 360° photos taking the whole view of the inside and outside of Hung Vuong museum from the virtual model the museum has built on the computer.



**Fig. 6.** 360° images depicting Hung Vuong museum

Use created 360 photos to build a website to visit Hung Vuong museum virtual (using Cloudpano application) at [https://app.cloudpano.com/tours/Cd3C\\_zQx-4a/edit](https://app.cloudpano.com/tours/Cd3C_zQx-4a/edit)



**Fig. 3.** Website for online virtual tour of Hung Vuong museum

### 2.3. Result

The authors have proposed and successfully applied the process of building an online virtual tour model to build the "Virtual model of Hung Vuong museum online" with products created:

Video file: BTHV.MP4, with 4K quality, this file can be played on any electronic device such as: Computer, phone, TV, etc., can open the file with common music player software Use on computers and phones, especially products that can be posted on websites, social networks, etc. This product can be used to promote the whole view inside and outside of the museum to tourists. .

The virtual interactive model "HUNG VUONG ONLINE MUSEUM" is installed and running on the website address [https://app.cloudpano.com/tours/Cd3C\\_zQx-4a/edit](https://app.cloudpano.com/tours/Cd3C_zQx-4a/edit); can be used for visitors to visit the museum online, interactively to learn the details of each part of the museum.

Currently, this model has not been used in practice, so its effectiveness cannot be evaluated. However, the authors have some subjective assessments as follows:

Virtual model is 90% similar to real model;

Currently, the online tour model has been built on many websites through images and videos. However, visiting online through this virtual model will make a difference: The quality of 3D graphics will give visitors an "immersive" feeling like they are visiting on a real model; In particular, the ability to interact directly with the virtual model will increase the enjoyment for visitors.

### 3. Conclusion

The article presented the process of designing an online virtual tour model on a computer using 4 design software: Sketchup, Enscape, Adobe Premiere, cloudpano virtual interaction creation tool. The authors have successfully applied and built an online virtual tour model of Hung Vuong museum. This model can be used as an online tour

model. The product of the research has great significance and value in preserving the historical value of the relics. In addition, this article is also a useful reference for graphic designers.

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