



# Design and Implementation of 3D Panoramic Technology in Virtual Tourism System

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**Abstract.** With the improvement of people's material level and their requirements for quality of life, the tourism industry has gradually become the main force driving the rapid development of economy. The frequency of travel has been increasing, and tourism has gradually become a normal state of national life. In the era of big data, virtual tourism emerges as a new business mode in order to relieve the shortage of tourism resources. And because of its unique characteristics of autonomy, immersion, multi-sensory and transcendent space and time, it has become a popular industry.

**Keywords:** 3D Panoramic Technology · Virtual Tourism System

## 1 Introduction

With the improvement of people's material level, the spiritual needs are also more pursuit. Tourism has gradually become a popular form, and virtual tourism, as a new form of tourism, attracts the attention of the industry and tourists, it has immersion, autonomy, multi-perception, super time and space characteristics, with good interaction and economy [1]. Virtual tourism can effectively improve the new level of the industry, truly optimize services, and achieve the reasonable allocation of resources. Therefore, the application of three-dimensional panoramic technology in virtual tourism should also be supported [8].

## 2 Overview of 3D Panoramic Technology

Three-dimensional panorama, also known as panoramic circumnavigation, mainly uses digital equipment to take multi-angle circumnavigation of the scene, and finally forms a three-dimensional simulated display after post-processing. Through programming, the size of the winter image can be adjusted. 3d panorama technology can adapt to the release of JAVA Flash and other formats, both formats do not need to download other plug-ins, 3D panorama is mainly produced on the real winter films shot, so the sense of reality is relatively strong, the production results can be played through the computer, its advantages are short development cycle, low cost, strong interaction. It is suitable for application in virtual tourism system development [2].

**Table 1.** Characteristics and advantages of virtual tourism system.

| Characteristics and advantages of virtual tourism system  |  |  |
|---|--|--|
| Real-time tour of simulated scenic spots  | Line recording is supported  | With independent design and editing functions of process diagram   |
| A series of roaming operations can be realized through the combination of software and keyboard and mouse, and the travel progress can be controlled. | Through the virtual tourism system, tourists can record the process of autonomous travel, and further understand the landscape and meaning of tourist attractions by combining with the explanation of each scene by the interpreter, and the recorded content can be repeatedly played. | The virtual tourism system can design and edit the work flow and scenic spots of relevant posts independently, and can add, modify or delete the nodes of the process at will, and can add pictures, texts, films and other elements in each node. |

### 3 Characteristics and Advantages of Virtual Tourism System

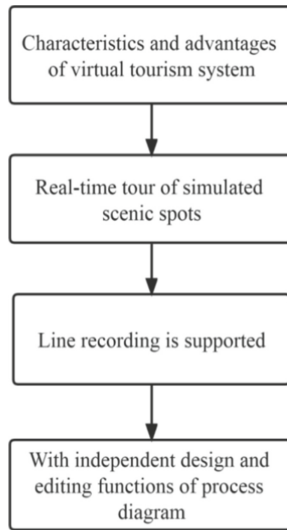
The biggest characteristic of 3d interactive simulation platform in virtual tourism system is that it has low requirements for hardware and fast processing speed of winter shape [3]. It can realize real-time simulation on network platform through dynamic scheduling of blocks and intelligent change of object detail level. Through the multi-layer texture technology to render objects more realistic [4]. In the aspect of database, it can effectively dock with existing data, achieve effective docking between visual objects and background data information, and realize data management and query [5] (Table 1).

#### 3.1 Real-Time Tour of Simulated Scenic Spots

Through the virtual tourism system, you can tour all the contents of tourist attractions and watch them from multiple angles [7]. The 3D scene has the function of fixed route and independent browsing. A series of roaming operations can be realized through the combination of software and keyboard and mouse, and the travel progress can be controlled [6] (Fig. 1).

#### 3.2 Line Recording is Supported

Through the virtual tourism system, tourists can record the process of autonomous travel, and further understand the landscape and meaning of tourist attractions by combining with the explanation of each scene by the interpreter, and the recorded content can be repeatedly played [10].



**Fig. 1.** Advantages of virtual tourism system.

### 3.3 With Independent Design and Editing Functions of Process Diagram

The virtual tourism system can design and edit the work flow and scenic spots of relevant posts independently, and can add, modify or delete the nodes of the process at will, and can add pictures, texts, films and other elements in each node.

## 4 Navigation Function of Virtual Tourism Scene

The navigation function of the virtual tourism scene needs the support of visible sensors. From the position of the observer, it needs to perceive whether a cuboid area in the space is visible or not, and these sensors can be used to start and stop animation or control other actions. In addition, real-time navigation has a role to play [9]. It is assumed that the tourist is traveling on the ground plane, so the value of y coordinate representing the height of space is always zero; When the viewer changes position in the virtual 3D scene, it is displayed on the flat map. Real-time coordinates of virtual scene in plane roaming map are displayed in HTML, so as to facilitate users to grasp the scene. Relevant codes are as follows:

```

<SCKIPT Language="Javascript">
function start()

timerID1=setTimeout("displo",300)

function displ()
ux=CortonalEngine.Nodes('PS).Fields('position_chn
ged).x ;

uy=Cortonal.Engine.Nodes('PS).
Fields('position_changed).y ;

uz= Cortonal.Engine.Nodes('PS). Fields('position
changed).z;;

image3style.left=10*ux+360;      image3.style.top
=10*uz+160 ;

document.F1.T1.

value=Mathround(100*ux)
document.F1T3value=Mathround(100*uy);

document.F1.T3.value=Math.    round(100*uz);;
timerID3==setTimeout("displ()", 300);

</SCKIPT>
..

```

## 5 Realization of Virtual Tourism System

Its technical means mainly through GPS positioning, THREE-DIMENSIONAL panorama, multimedia, GIS and other modern information technology means, combined with pictures, sound, video and other information, although the operation is simple and convenient, the effect is efficient and powerful [11] (Table 2).

### 5.1 Material Collection

By using the information content of scenic spots and combining the scenic spot map, scenic spot interpretation, node connection and other facilities and equipment such as panoramic camera, panoramic pin-top combination and UAV aerial photography, effective shooting and collection are completed through overall planning, planning and analysis, so as to realize the collection of panoramic image materials to ensure the accuracy

**Table 2.** Realization of virtual tourism system

| Realization of virtual tourism system |   |
|---------------------------------------|---|
| Material Collection                   | By using the information content of scenic spots and combining the scenic spot map, scenic spot interpretation, node connection and other facilities and equipment such as panoramic camera, panoramic pin-top combination and UAV aerial photography, effective shooting and collection are completed through overall planning, planning and analysis, so as to realize the collection of panoramic image materials to ensure the accuracy of information content. |
| Panoramic Stitching                   | When making the panoramic image of scenic spot, the original image of scenic spot is first imported into PTGui Pro software, which can be automatically spliced after image registration  |
| Post-Processing                       | The assembled panoramas need further post-processing. Since uav photography cannot take a full picture of the sky, it is necessary to use Photoshop to splicing the panorama with appropriate sky materials to complete the filling of the sky and synthesize the panoramic image without showing traces  |
| Panoramic Tour                        | As a professional virtual tour display production software, tour master level in the panorama industry in the leading position. The scenes can be automatically generated by importing the Mosaic panoramas in batches into The Roaming Master software, and the scene sequence can also be adjusted by dragging pictures at will.  |
| Release                               | Flash VR format is suitable for PC viewing, because it has a hierarchical block mechanism to ensure the speed of online viewing, and it is the most recommended format on PC. Html5 files can be published as a simple APP for mobile viewing.  |

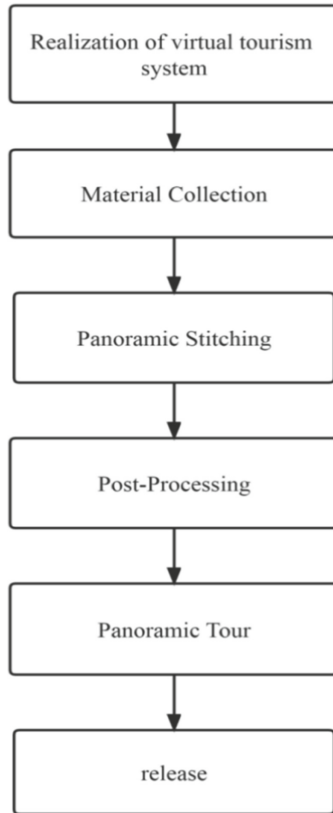
of information content. To ensure seamless stitching for later software recognition, each photo needs to maintain about 35% overlap.

$$(x + i)^t = \sum_t^n x^i a^{n-k} \quad (1)$$

## 5.2 Panoramic Stitching

Panoramic Mosaic is the fusion of multiple single images into a 360-degree panorama [12]. Image Mosaic is the main technique for making panorama. PTGui Pro panoramic stitching software, as a popular panoramic making tool, can use the visual interface to complete the stitching work of images and create high-quality panoramic images. Let users through a unique perspective, feel the majestic tourism scene. When making the panoramic image of scenic spot, the original image of scenic spot is first imported into PTGui Pro software, which can be automatically spliced after image registration [13].

It's a panoramic image. In order to improve the accuracy of image Mosaic, users can manually add control points for automatic Mosaic, optimization adjustment, seamless



**Fig. 2.** Realization of Virtual tourism System.

fusion and other image processing, weaken the Mosaic trace, so that the transition natural panoramic image is generated. PTGui Pro features rich, image file input compatible with a variety of media data formats, simple and easy to use. The output file selection uses images with a high dynamic range, which can well reproduce the rich brightness and color of real life to achieve realistic effects [14] (Fig. 2).

### 5.3 Post-processing

The assembled panoramas need further post-processing. Since uav photography cannot take a full picture of the sky, it is necessary to use Photoshop to splicing the panorama with appropriate sky materials to complete the filling of the sky and synthesize the panoramic image without showing traces. You can also simply adjust the tone or add a reasonable filter, adjustment should be true color, clear tone, make the panoramic picture more beautiful.

## 5.4 Panoramic Tour

The prototype of panoramic roaming technology was born at the end of the 30th century, integrating multiple disciplines in the field of computer. Panorama tour is made on the basis of panorama and can be free in the constructed panoramic space.

Switch and browse different scenes. Once the panorama is made, all you get is a view of a single viewpoint. Only through proper spatial editing and planning can a panorama be called a real virtual reality scene [15]. As a professional virtual tour display production software, tour master level in the panorama industry in the leading position. The scenes can be automatically generated by importing the Mosaic panoramas in batches into The Roaming Master software, and the scene sequence can also be adjusted by dragging pictures at will. Add pictures, video, audio, Flash and other multimedia elements into the scene to realize the immersive interactive virtual scene roaming simulation effect. The panoramic image is matched with the real scene model of the scenic spot to realize the free crossing between the virtual world and the real space. Panorama system is used to generate display items that can run independently on mobile phones, tablets, computers and other network communication devices.

## 5.5 Release

After stitching together the panorama, the final release can be made. SWF files, also known as Flash files, are popular and can be viewed in a browser or any other operating system with the Flash plug-in installed, regardless of network speed limits. Flash VR format is suitable for PC viewing, because it has a hierarchical block mechanism to ensure the speed of online viewing, and it is the most recommended format on PC. Html5 files can be published as a simple APP for mobile viewing. The default tiering and blocking function does not affect the opening speed or generate too much data traffic due to large release files. You can publish different formats for different functions, or publish all three file formats at the same time. Users can choose according to their own needs and realize virtual browsing on different clients.

## 6 Conclusion

3D panoramic technology has great value and market potential in the design and application of virtual tourism system. Control the virtual scene through video, Flash, audio and other media elements to display a vivid visual experience. It is the trend of information technology development to create panoramic display and promote two-dimensional publicity to three-dimensional. The real scenes displayed have greatly improved the user's sense of experience and won the favor of the society. With the arrival of 5G era and the rapid development of information science and technology, panoramic roaming technology will be applied in more fields and show a good development trend.

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