The Realization of Three-dimensional Visual Effect of Ink Painting based on 3d Model

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Abstract: In the field of ink and wash animation art, along with the development and transformation of animation production technology, a large number of excellent ink and wash animation art works have been emerging. It enrich and expand the traditional visual expression form of ink and wash art to a large extent. This paper will analyze and refine the visual art language of traditional ink animation, as well as the advantages and feasibility of three-dimensional virtual interaction technology, then it will make a conceptual design and case making so as to provide powerful reference and reference value for the new development of traditional Chinese ink animation art form in the future.

1. Introduction

In the 1990s, the emergence of three-dimensional ink animation enriched and enhanced the artistic expression and appeal of traditional ink animation from the visual art level. Based on the application of the three dimensional animation software, by creating the 3d models with the ink element, ink rendering texture and rich variety of roles lens change in order to show the 3d real stereo visual space, it greatly expands the traditional ink animation art visual art language and shows the traditional two-dimensional ink animation that can not present the three-dimensional motion space outspread and lens change. Due to the fact that most of the current research on ink animation is a summary of its artistic characteristics, historical status quo and trends of the basic theory overview, its research lacks a certain practical, contemporary and innovative. At the same time, virtual interaction experience with immersive reality is an art form rarely attempted by ink and wash animation at present. Therefore, this paper can draw some valuable conclusions by interdisciplinary cross combination of traditional ink and wash animation and 3d virtual interaction technology[1].

2. Visual Artistic Features of 3d Ink Animation

2.1. Visual element features.

The visual elements of representation in 3d ink animation mainly include characters, scenes, materials, maps and so on. First of all, the characters in the animation are designed virtually, and their images and props should conform to the creation theme and expression ideas of the animation. Secondly, in order to highlight the free and easy ink painting, the creator can use four feature means of white, map, line and overflow color to cooperate. For example, the diversity of lines can effectively simulate the uneven thickness of lines caused by different moisture on the xuan paper, and overflow color will overflow the outline of the color, which can fully reflect the visual characteristics of traditional Chinese ink painting that is not stick to one pattern and is freehand. This is also not paid attention to the place long time before[2,3].

2.2. Dynamic languages.

In the traditional ink painting art, it shows the artistic feeling of nimbleness and rhythm in the static painting style. Three-dimensional ink animation is through the late setting of the skeleton and the speed adjustment of the movement in order to make a three-dimensional artistic expression. That is, the artistic expression of action directly determines the overall artistic level of 3d ink animation

works. Among them, the language of action art mainly includes the dynamics of character models, the dynamics of light and shadow, the dynamics of lens and space and the dynamics of animation effects. And for ink animation, the most prominent is the role model and shot space dynamic performance.

2.3. The expression of artistic spirit and theme.

Chinese ink painting is a pure ink painting, that is, using rich changes of the coke, thick, heavy, light, clear of the ink color to show the image to make it has a unique artistic effect. It is particularly good at showing the space and artistic conception of the picture. At the same time, ink painting uses brushwork as the leading in the technique and gives full play to the role of ink. The intrinsic and essential significance of ink painting lies in that it is not a formal problem of color application and technique transformation, but the final destination and embodiment of the artistic spirit of landscape painting.

At the same time, the artistic creation pursued is "carving many shapes but not being skillful", that is, it is skillful to forget it, and it is creative to forget it. Then creation can fully accord with the essential property of things. Therefore, as the creator of ink painting art, we should reflect the essence of art with our own unique understanding and painting method, and achieve the highest artistic creation through continuous cultivation of spirit and skills.

3. Limitations of the Visual Effects of 3d Ink Animation

3.1. The popularization and simplification of visual form.

The making of ink animation art is the visual combination of art and technology. At present, most 3d ink animation is simply an art form constructed by using animation technology. Although the form of 3d animation has its unique advantages, many creators have not really served the technical advantages of ink and wash art, that is, the depth of the combination of the two remains to be improved. However, the lack of specific depth is mainly reflected in that it is not from the ink art itself as the core and starting point, it is more to pursue the three-dimensional representation of the visual form. So many animation shows works pale and rough simple. It makes the visual form appear popular and simple.

3.2. Lack of interactive experience.

From the two-dimensional ink painting animation such as "Tadpoles looking for their mother" and "landscape", as well as today's popular work such as "xia", "double down", "peach garden" and so on, they are the traditional animation film visual forms of inheritance, which make the viewer to one-way, passive viewing. So the public's concerns have focused on audio-visual level. Nowadays, there are many 4D or even 5D animated movies. At the same time, many product designs or user interfaces are paying more and more attention to the design concept centered on user experience. In addition, architectural exhibition, game entertainment and other fields are also starting to perform new artistic performance in the form of virtual tour.

Therefore, from the perspective of ink and wash art itself, 3d ink and wash animation can try to show the unique charm of ink and wash art through virtual interaction.

4. The Overall Architecture and Characteristic Advantages of 3d Virtual Interaction Technology

4.1. The interaction process.

The application interaction process of 3d virtual interaction technology can be divided into three parts, that is, user operation, sensor equipment and virtual model. The user interacts with the model in the virtual 3d scene through relevant sensors and conducts real-time detection and feedback of the virtual and real environment during the interaction. It is as shown in figure 1[4].
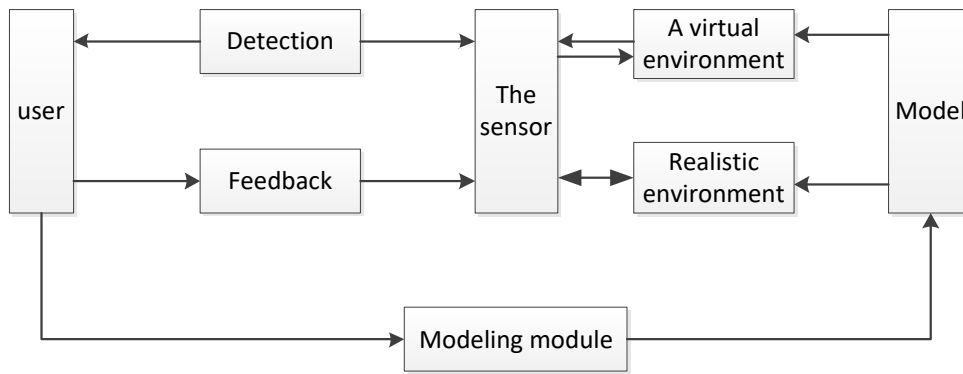
Fig. 1 The interactive flow of virtual reality system

4.2. The hardware architecture.

In the task process of 3d interaction, hardware device is an important support for implementing interactive technology and facilitating user experience. Today's 3D interactive devices are still in the exploration stage, and there is no mainstream 3D input device. Domestic research has just started with only a handful of relevant scientific and technological achievements.

According to the classification and summary, 3d interactive hardware devices are mainly divided into three categories, that is, input devices, output devices and location tracking devices. The current types of virtual interaction hardware devices can be classified as shown in the figure 2 below.
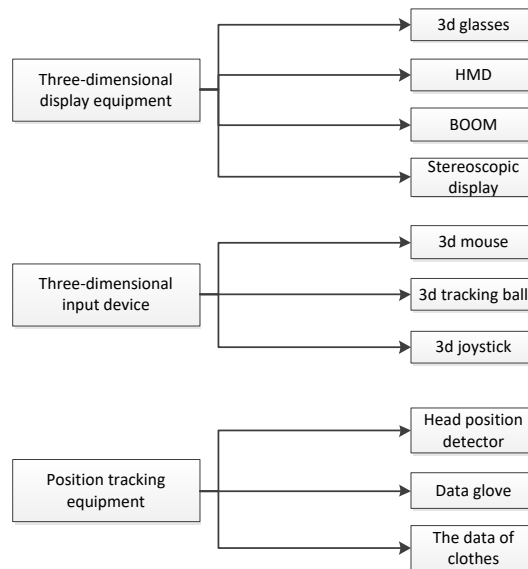

Fig. 2 Virtual interactive hardware device classification

Generally speaking, different types of interactive devices can be used to achieve an interactive task, but the interactive effects displayed by them are quite different. Therefore, in the process of virtual interactive tasks, first of all, appropriate interactive devices should be adopted to facilitate the observation and enhancement of interactive experience on the basis of interactive tasks.

4.3. Characteristic advantage.

As a 3d virtual interaction technology with interaction as its prominent feature, its functional features are mainly reflected in the following aspects. Firstly, selection and manipulation. That is, the user selects, moves, rotates, scales and cancels the objects role in the virtual environment by using relevant interactive devices during the interaction. Secondly, point of view control. The user moves the viewpoint position in the virtual space through relevant interactive devices, and its common functions and manifestations include navigation and virtual tour and so on. Thirdly, system information control. The dynamic operation of non-human-machine interaction in virtual space can be classified as the control range of system information.

5. Virtual Interactive Ink Animation Production

The 3d production stage in the early stage of virtual interaction mainly includes modeling, material, animation and other links. The specific production process is shown in the figure 3 .
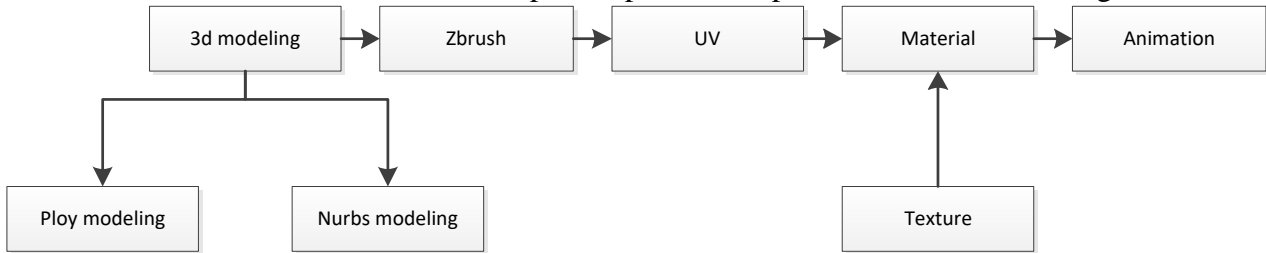

Fig. 3 The specific production process

5.1. Ink rendering effect of the production.

The material and texture production of ink effect. Before making ink effect, we need to divide the Ploygon model that has been set to map. When dividing, we can use relevant software tools such as UV layout. At the same time, we still need to pay attention to the relevant principles and skills. For example, the area, shape and symmetry after it is expanded should be fully considered when dividing the model. In the main visual part of the model, its UV distribution should occupy a large area, so as to facilitate the maximization of drawing and display of mapping details in Photoshop. Taking the ink rendering effect of lotus leaf in the animation "summer" as an example, the final rendering visual effect is as shown in figure 4.
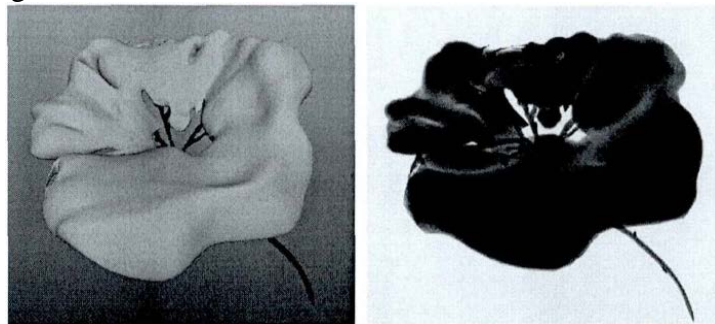

Fig. 4 Ink material rendering effect of Lotus leaf

5.2. The plane effect production of ink rendering.

Because of the aesthetic characteristics of decorative plane and painting art form of traditional ink painting, it will need to get rid of lighting in Maya. And the parameters of the corresponding property will be set. At the same time, maximize the preservation of the object's own inherent color. The inherent color shows the shading change of ink art through the Ramp shader material.

5.3. 3d stroke effect production of ink rendering.

Firstly, select Rendering's add cartoon outline command from the Toon menu in the Rendering module and render a better Rendering by default. However, in the art of ink painting, what we pay attention to is the technique of artistic expression, which is virtual and real, thick and thin, thin and dense. What we express is the intangible and tangible inner artistic feelings. This requires adjusting the visual effects of the 3d stroke by setting and modifying the property parameters. In the final design case, the ink rendering effect of lotus is shown in figure 5.
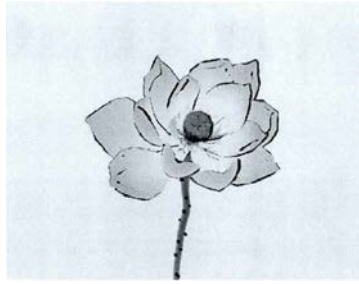
Fig. 5 The final rendering effect of the stroke of the Toon material

6. Summary

This paper studies the artistic characteristics and visual expression needs of 3d ink animation and explores its effective integration with virtual interactive technology. Finally, it demonstrates the innovation of this research with the case of ink animation design with virtual interactive experience.

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