Research on Computer Synchronous Production Automation System of Animation Manual Based on Artificial Intelligence

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***Abstract*—This paper introduces a method of combining virtual reality and Unity3D to conduct animation demonstration of animation products. The purpose is to improve the digital display on animation products. The embedded development software based on Visual C++ realizes the virtual reality of the animation demonstration system based on Vega Prime of the visual simulation. The system includes the 3D animation module of the animation manual, including the information collection module, the database model, the 3D reconstruction module, and the visual simulation module. By using VR programming method, the 3D animation demonstration system of cartoon hand is designed in virtual reality, and the entity modeling of the animation demonstration system and the effect of the animation demonstration are analyzed by using 3 dsMAX. Simulation experiments show that the proposed algorithm has good output performance and display effect.**

Keywords—Animation manual products, 3D animation display, VR technology, visual simulation, simulation analysis

I. Introduction

Animation manual creation system is a virtual platform for simulating the design, production and sales of animation manual. The system can help anime enthusiasts, professional designers and hand-made manufacturers with a range of activities including product design, prototyping and marketing. In the system, users can use advanced 3D modeling technology and 3D printing technology to design and produce a variety of animation hands. These can be anime characters or other interesting characters or objects. In addition, this system can also help users to promote products. Users can upload their creations to the system's online store, allowing people around the world to see and buy their creations. The animation manual creation system is a digital and efficient design and sales platform, which can greatly improve the design efficiency and market coverage [1]. The multimedia information of the work, and realizes the animation-based demonstration. The 3D animation demonstration of cartoon hand is optimized. The 3D demonstration of animation production is realized on the virtual software platform. Enhanced ability to simulate visualizations of 3D animation presentations for animation production. Complete 3D animation data collection for animation production [2]. This project aims to solve the problems existing in traditional 3D animation demonstration as the background, and studies 3D animation demonstration system based on unified 3D virtual reality. The structure of the whole system is analyzed. Then, the development environment of 3D animation, and the validity conclusion is drawn.

II. Overall structure of the system

A 3D animation demonstration method demonstration library of animation works is established [3]. The function design of each subsystem and the control of data transmission are completed by integrating the technology of visual data acquisition and reconstruction. A 3D animation demonstration platform based on wireless communication technology is proposed. This paper introduces an animation demonstration system based on BS bus technology. By using the interactive editing technology based on PCI bus, the data collection of 3D animation demonstration of cartoon hand is realized. Multigene Creator is used to model an animation demonstration system based on 3D animation. In the virtual scene simulation mode, the data organization and modeling of the animation demonstration system based on 3D animation are realized. By integrating 3D information reconstruction with VR simulation, the virtual scene simulation of 3D animation demonstration of cartoon hand is realized. This project studies 3D animation presentation technology based on computer vision technology [4]. The embedded development software based on Visual C++ integrates with Vega Prime to realize the virtual reality of the 3D animation demonstration system of cartoon hand action, and draws and guides the system based on the scene situation information saved in the display screen. The relevant data (including model polygons, textures, etc.) extracted from the scene library will be drawn and presented to the screen cache, and then the 3D animation demonstration of the work will be realized in the scene picture database. A systematic software loading model is obtained by expressing its layers and attributes. Figure 1 shows the system architecture (image referenced from Virtual Character Animation Based on Affordable Motion Capture and Reconfigurable Tangible Interfaces).

Explain the environment in which the system develops ISA/EISA/Micro Channel extension bus is used to implement the instruction loading of cartoon hand 3D animation demonstration, and the decentralized control strategy is introduced into the animation demonstration to achieve the embedded modularization of 3D animation demonstration, and the Internet of Things and embedded technology are integrated to achieve the 3D demonstration oriented to animation demonstration [5]. Under IEEE488.2, based on Bus Visual, the integrated intelligent management of animation demonstration is realized, and Multi Gen Creator is used to model it. Multi Gen Creator creates a

realistic 3D modeling method for visual simulation, uses the grid structure to realize the 3D modeling of the entire field, and sets up a 3D animation demonstration area on 4 vertices. The entity module generation process of 3D Animation display system for animation products is shown in Figure 2 (the picture is quoted in Multivocal Animation Character 3D Model Design Method Based on VR Technology).

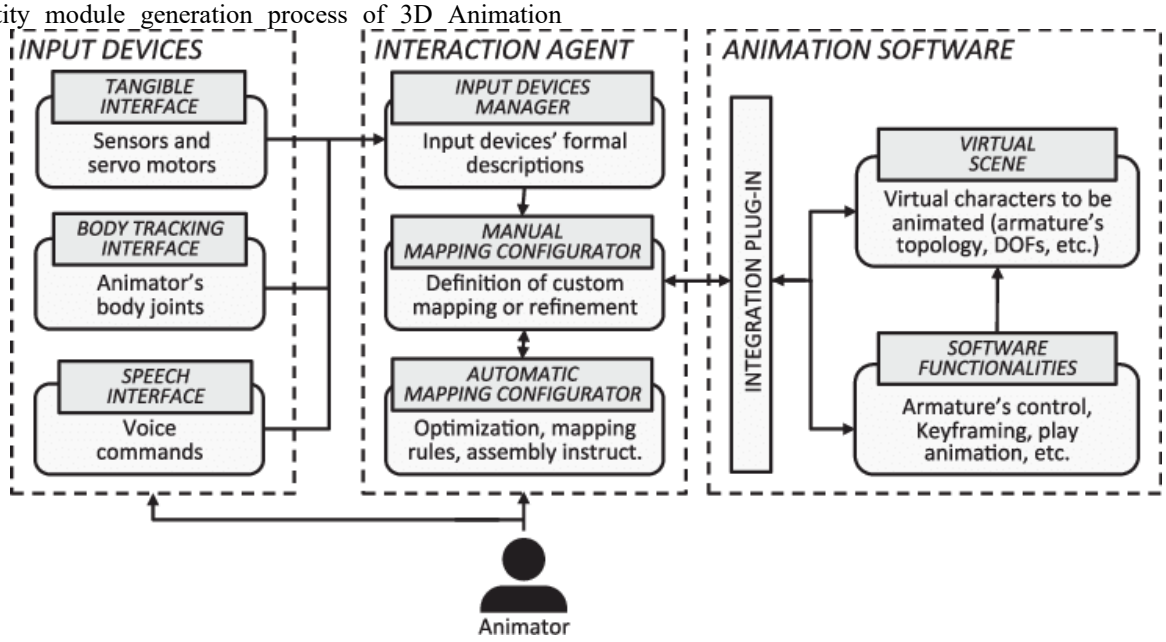

Fig. 1. Animation creation system architecture

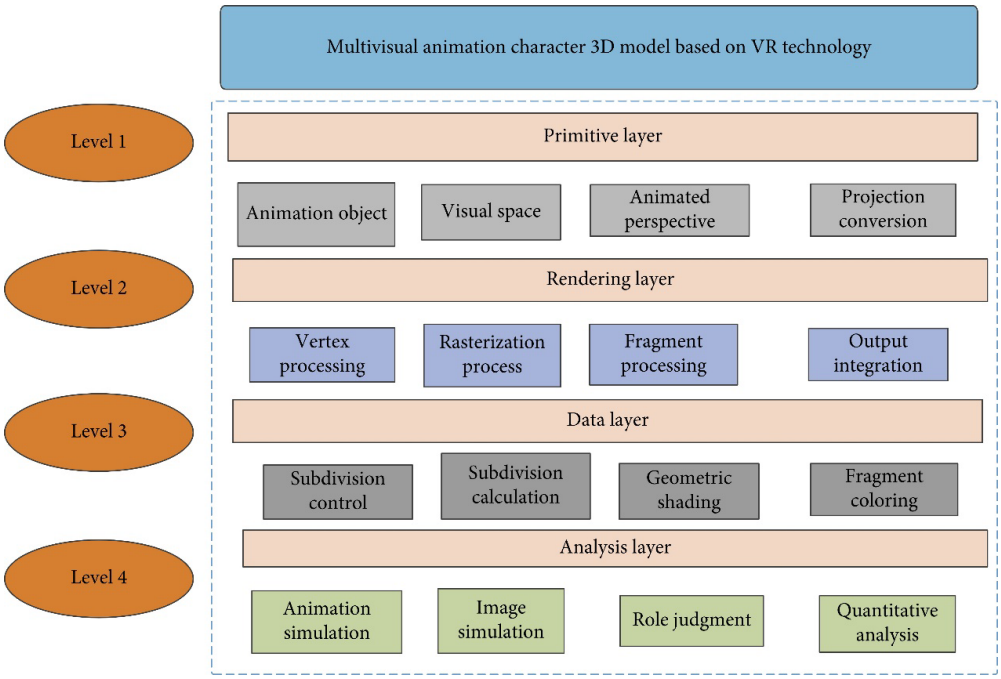

Fig. 2. Entity module generation process of 3D animation display system for animation products

In the virtual 3D animation scene, the research and development environment of the system is analyzed, and it is divided into 3D information sampling module, 3D information reconstruction module and 3D animation digital interactive module [6]. By using embedded design method, PCI bus and Unity3D simulation test were integrated to complete data transmission and monitoring of 3D animation demonstration platform based on computer network, and software development of the platform was completed on Linux platform.

III. Manual Structure Design Algorithm

This paper presents a manual information management system based on object-oriented. A three-layer structure model of manual level, component level and functional surface level is proposed. In this paper, an object-oriented function surface method is proposed to study the mating constraints, connection constraints, position constraints and dimension constraints between parts and parts, parts and surfaces and between surfaces [7]. You can see the grade information of the hand in Figure 3 (image cited in Common Concepts Underlying Safety, Security, and Survivability Engineering). From the function point of view, the model of

the hand office is modeled. After the mapping of function - structure, the 3D model is obtained. The design process can be described by the process of decomposition and reconstruction on the entity structure.

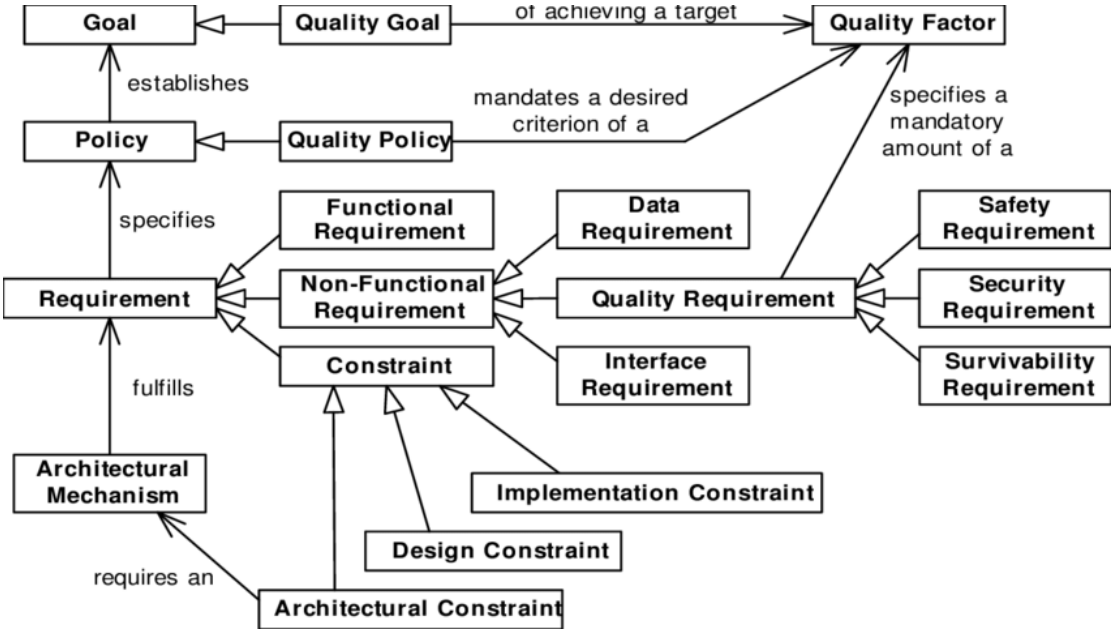

Fig. 3. Manual design information model

Aiming at interchangeable assembly and various precision requirements, a general tolerance characterization method based on functional surfaces was proposed to realize the correlation modeling among the internal surfaces of parts [8]. The tolerance model is divided into four levels: single tolerance item model, surface error model, part error model and hand office error model (the picture is quoted in An Automation ML/OPC UA-based Industry 4.0 Solution for a Manufacturing System), as shown in Figure 4.

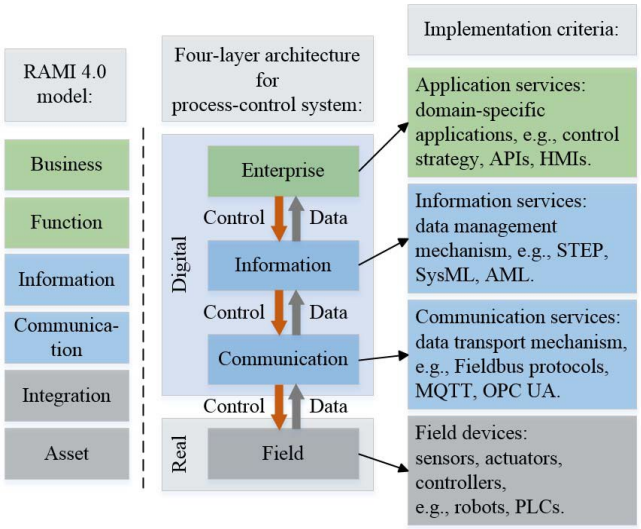

Fig. 4. Tolerance model of four-layer structure

A. Single tolerance engineering mode

The tolerance is divided into two types: dimensional tolerance type and position tolerance type, and a conceptual design method based on dimensional tolerance and form and position tolerance is proposed. Suppose that the datum of face G is D_a, the basic dimension is D_m, the deviation is δ, and the single tolerance item model is

$$K=\{K_K, G, D_a, D_m, \delta_t, \delta_b\}$$

Where, K_K is the tolerance type; G is the target surface; D_a is the reference surface; D_m is the basic size; δ_t is the upper deviation; δ_b is the lower deviation. In the category of tolerance, dimensional tolerance refers to the amount of change between a member and its design reference; The positioning tolerance relates the amount of deviation between the position of the real element and the reference point [9]. The radius, diameter, and shape tolerance are the amount of variation a component is allowed to allow, and the datum D_a can be considered as its own. A tolerance expression method based on function surface is presented.

B. Surface tolerance model

The tolerance of a single surface is the list of the total tolerances of the surface, which should contain the tolerances associated with the reference surfaces of the three orientations:

$$G=\{K_i \mid i=0,1,\cdots,n-1\}\ (n\geq 2)$$

K_i is the tolerance requirements of the surface.

C. Part tolerance model

The tolerance of a part is a list of tolerances for all surfaces included in the part:

$$R=\{G_i \mid i=0,1,\cdots,n-1\}$$

G_i is the tolerance requirement of surface i in the part; n is the number of surfaces contained in the hand. The surface in the workpiece is divided into fixed surface and fixed surface. The positioning surface is a surface capable of

completing the position of the workpiece itself [10]. This is the surface on which the rest of the pieces fit. And the positioning surface is divided into three directions of positioning datum and non-datum surface. A calculation method of form and position error based on position datum is presented.

D. Manual office error model

The manual office error model of static data and dynamic design. The static part tolerance list D_1 and the tolerance relationship list D_2 between the two parts are respectively.

$$D_1 = \{R_i \mid i = 0,1,\cdots,n-1\}$$

$$D_2 = \{C_{ij} \mid i,j = 0,1,\cdots,n-1\}$$

R_i is all tolerance requirements for part i ; n is the number of parts included in the manual; C_{ij} is the assembly tolerance between part i and part j . A new idea of calculation and error correction based on the fit degree between components is proposed. At the same time, by gradually constructing the hand handle with a certain error, the tolerance is gradually carried out based on the initial accuracy requirements, and finally a progressive evolutionary dynamic process is formed.

IV. System Software Development, Design and Implementation

The visual simulation method is used to realize the visual simulation of 3D animation demonstration, which includes 3D animation information acquisition module, database model, 3D reconstruction module, visual simulation module and so on. The generation of virtual reality was realized through VR programming, and the Configuration of components was realized through the Terrain function module of Creator (Figure 5 is quoted in Configuration management).

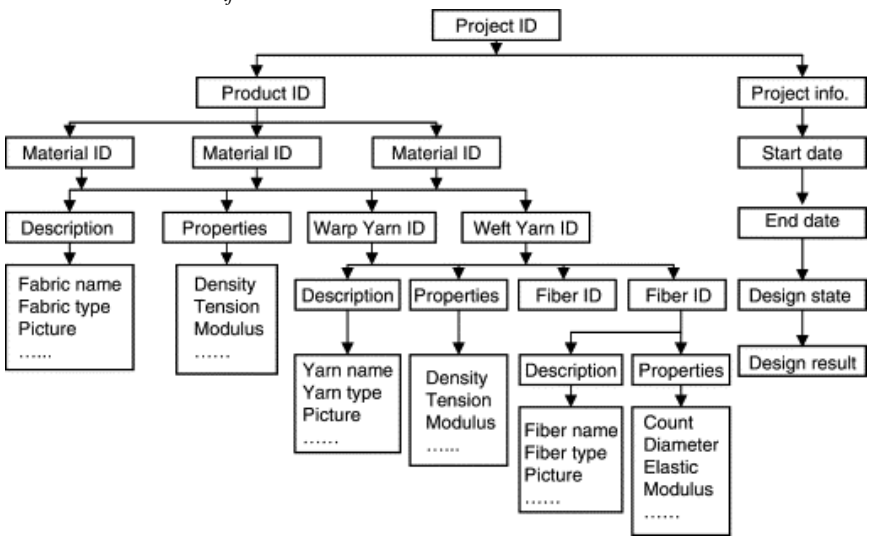

Fig. 5. Project file configuration of the system

The model library is established, and the corresponding 3D animation display module is established by using the methods of 3D deformation between neighboring LODs, and the 3D animation demonstration is carried out. Using the Vega Prime editor to 3D program the 3D software, to express the 3D animation object with different precision, and to select the position of each observation point, so as to establish the spatial layout model of 3D animation demonstration. An animation demonstration system based on 3D animation demonstration is proposed.

V. Simulation Test Analysis

Simulation experiments were used to verify the performance of the designed 3D animation demonstration system. Two examples were set up, Generator FFT and Observer Centered, which realized the drawing and output of hand-run 3D animation, and developed it using the Vega Prime visual simulation platform. the result is a 3D animated demonstration of the work, as shown in Figure 6 (image cited in Welcome to the home of Equinoxe-3D).

Using 3dsMAX software to display the animation product, the 3D animation display of the animation product is realized. The method presented in this paper can effectively realize 3D animation display of animation products. The realization of 3D animation display of animation products can effectively promote the publicity and promotion of products and improve the added value of products. The 3D animation display of animation products is an essential link in modern product display, which can attract people's attention, improve the image and visibility of products and promote the competitiveness of enterprises in the market. With the development of Internet and digital technology. Through 3D animation, the relevant information of the product is produced into 3D animation, so that consumers have a deeper understanding of the product and enhance consumers' confidence in the product. Therefore, 3D animation display has become an important means of publicity in today's society. With the continuous development of animation industry, 3D animation display technology is also improving. It can not only spread on the Internet, but also be displayed in various advertisements. Therefore, in the future, 3D animation display will be loved by more people. With the development of information technology and the popularization of 3D technology, 3D

animation display will be widely used.

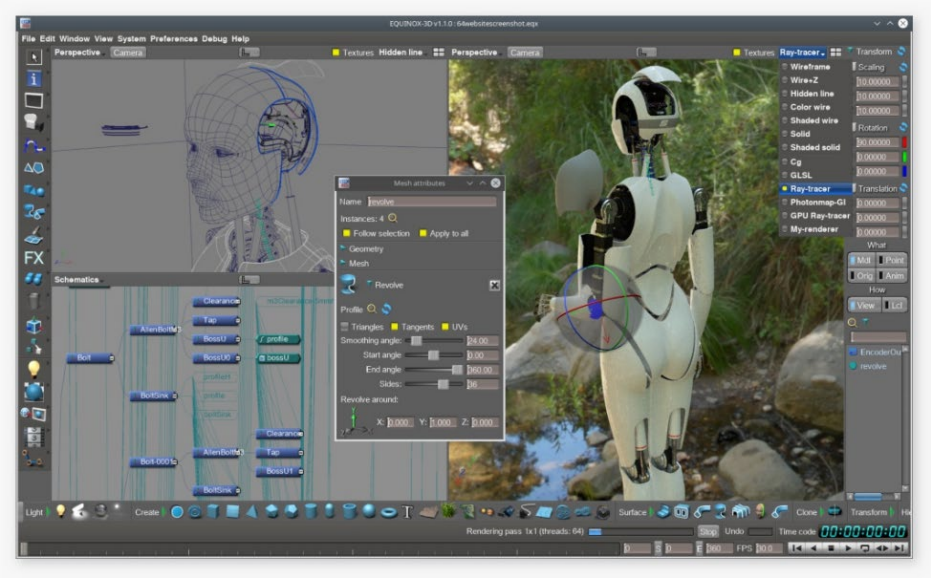

Fig. 6. 3D animation rendering output of animation manual products

VI. Conclusion

This paper introduces a method that combines Unity3D with virtual reality to realize 3D demonstration of cartoon hand. This system includes the 3D animation module of the animation manual, including information collection module, database model, 3D reconstruction module, visual simulation module. By integrating with Vega Prime, a dynamic presentation is realized based on the situation of the scene in the display list. This algorithm is used to achieve a good output performance and a good 3D animation demonstration effect.

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