



A Product Dynamic Design Model for Personalized Customization Based on Computer Technology

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Abstract. With the development of computer technology, most of the products in the current market design use computer systems. On the computer system, designers can find the design template, match the design elements arbitrarily, and complete the product design in an easy way. This paper uses virtual reality technology and modeling methods to construct a product dynamic design model for personalized customization. In the product design model of this article, the designer can communicate with the user, freely modify the product design draft, and extract the corresponding elements from the database to complete the personalized requirements of customers. This system is practical for designers and can complete the product design efficiently on the computer.

Keywords: Computer Technology · Design Model · Product · System

1 Introduction

Personalized customization refers to the manufacture of products based on the needs of customers and the overall structure, modules, shapes and connection methods of products according to customer needs [1]. Nowadays, the product models of enterprises are constructed through computer technology. Computer technology has played an important role in the product design process. In the traditional concept, personalized customization requires expensive prices and lengthy production cycles [2]. But with the development of computer technology, the process of product design can be completely completed by computer. Computer technology can help designers design quickly and meet the needs of users to participate in design. The product design dynamic model constructed in this paper can quickly adapt to the product design deformation, and quickly adjust dynamically according to a change in a certain place [3].

2 Theoretical Explanation

2.1 Virtual Reality Technology

The concept of virtual reality has been proposed in the 1980s, and it has become a science and technology often used in people's lives [4]. Virtual reality technology integrates

computer simulation technology, artificial intelligence, reality technology, computer graphics technology, sensing technology, and network parallel technology. Virtual reality is a high-tech simulation system generated by computer [5]. Virtual reality technology can construct a virtual environment for users through a computer, which is a three-dimensional digital model formed by computer graphics. In the virtual environment, the system mainly stimulates the user's visual experience, so that the user can directly observe, touch, detect the internal changes of the surrounding environment and mistakes, and generate interactive actions in the virtual environment [6].

This article mainly discusses the desktop-level virtual reality, which is the most practical for product design. Desktop-level virtual reality can be simulated using personal computers and low-level workstations. The item of the computer is a window for the user to observe the virtual world, and the user can interact with the virtual world through the mouse and keyboard. The most commonly used technology in virtual reality technology today is VRML [7]. VRML is a very promising technology on the Internet. VRML can use descriptive text language to describe the shape of basic three-dimensional objects, and combine these basic three-dimensional shapes into virtual scenes through certain control. Scenes. The biggest feature of VRML is that it uses text to describe three-dimensional space, which greatly reduces the amount of data transmitted on the Internet, so that virtual reality that requires a lot of data can be realized on the Internet. Of course, desktop CAD systems are also very common in virtual reality technology today [8]. Use Open GL, DirectDraw and other desktop 3D graphics rendering technologies to model the virtual world, observe through the computer monitor, and have viewpoints and perspectives that can be freely controlled. This technology is also a kind of virtual reality technology in a sense, it generates a three-dimensional model through computer calculation, and the complexity and real feeling of the model are determined by the user [9].

2.2 Modeling

Modeling is the establishment of a model, an abstraction of things in order to understand them, an unambiguous written description of things. Establishing a model is an important means and premise for researching a system. The definition of modeling is very cool, as long as the model is used to describe the process of British relations or interrelationships of the system, it is data modeling. The modeling method discussed in this paper is to use the system for three-dimensional modeling, and the model is presented in the form of three-dimensional graphics. Product design modeling is the use of computers to mathematically describe objects and their spatial relationships. For example, computer-aided design (CAD) programs can generate objects on the screen, using equations to generate lines and shapes that are precisely placed according to their relationship to each other and to the two- or three-dimensional space they are in [10].

3 The Overall Structure of the Product Design System

The product design system in this paper can support designers to perform 3D modeling in the system, render the model, and finally present a complete digital model of product

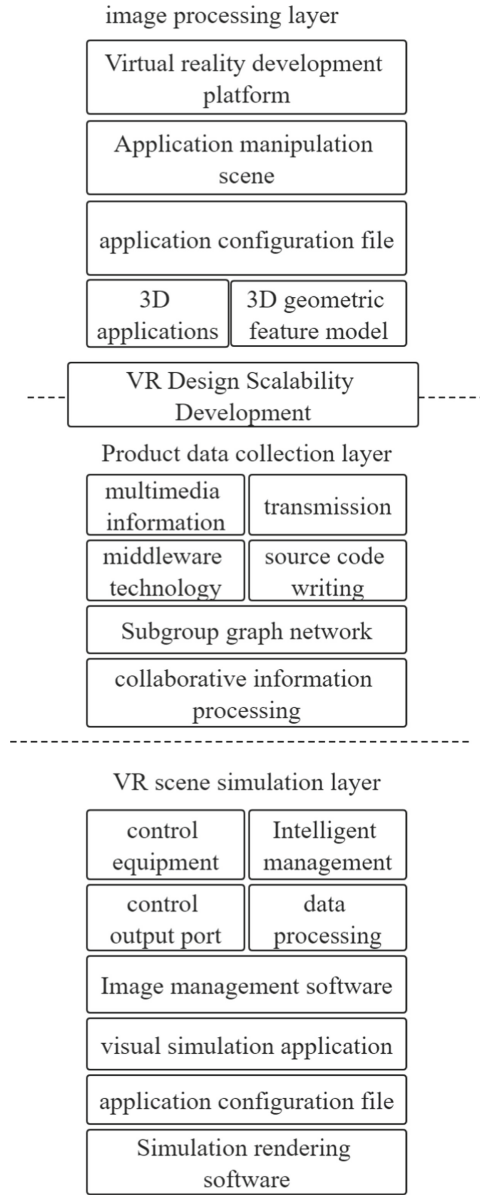


Fig. 1. Overall structure of product design system.

design. In order to support the designer’s design requirements, the system has multiple functional modules, including image processing module, 3D graphics modeling module, program loading module, image editing module, VR virtual simulation module, cross-editing control module, and graphics rendering module [11]. The system collects and transmits information on the 3D virtual design through the bus development technology

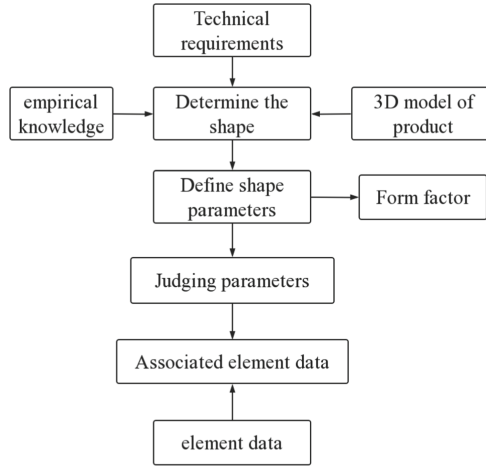


Fig. 2. Defining the Shape Process.

of human-computer interaction [12]. The overall structure of the system is shown in Fig. 1.

4 Product Design Process

In the process of producing a product, usually the parameters and structural form of the product shape based on the needs of the production book should be determined first, and then the 3D collection characteristics of the product should be constructed. The process of defining the product shape in the system is shown in Fig. 2.

Based on past experience, the designer first determines the rough geometric characteristics of the product, and then performs refined operations on the product. Setting the product shape can be defined in the system by adding 3D geometric features of the product, such as defining the smoothness, height and so on of the product [13]. Designers can interactively input the required parameters in the system account, and the system will automatically correct the unreasonable places and judge whether the shape parameters are reasonable. After obtaining the characteristic parameter data of the product, it can be used in modeling [14].

5 Product Dynamic Design Model for Personalized Customization

In order to make the product design meet the customer's customized needs and meet the production conditions, it is necessary to integrate and modularize the demand characteristics and product structure in the system. In order to make the system meet the concept of personalized customization, the system needs to establish a product dynamic design model according to the needs of users [15] (Fig. 3).

When designing, it is necessary to conduct research on the needs of users, and determine the first-level needs of users A, needs B...

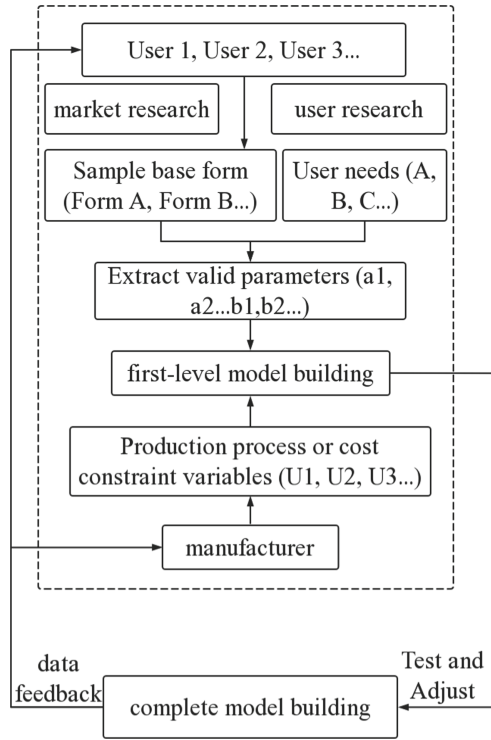


Fig. 3. Dynamic Design Model Data Diagram.

After determining the user’s needs, the design team should conduct market research to understand the form of the existing products in the market, and then obtain the user’s preferred form, that is, sample form A, form B...

According to the user’s needs and the shape of the sample, the changed attributes can be determined, and the effective parameters $a_1, a_2, \dots, b_1, b_2, \dots$ Can be extracted.

The next step in product design is to analyze the relationship between product functional form parameters and processing technology. According to the limitations of current public welfare, determine the ranges U_1, U_2 in which the parameters in the model can be changed...

In the process of product design, each parameter will change the shape of the product, so it is necessary to conduct a feasibility analysis on the product design model, determine the rationality of the variables, adjust the model, and improve the design output.

After the design is completed, the model data should be transferred to the database to provide more extensive examples for subsequent designs.

6 Conclusion

The personalized customization dynamic product design system constructed by text emphasizes the importance of user needs, expounds the process of product from static

single description to dynamic and diverse adjustment design, and proposes a personalized customization-oriented product dynamic design model. This system attaches great importance to To meet the needs of product design, virtual reality technology is applied in the system, which provides product designers with a 3D modeling method and a channel for modification, which ensures the intercommunication between design information and 3D models, and can effectively improve product design models. High user satisfaction, and has a strong practicality for product design.

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