

Application Research of Virtual 3D Animation Technology in the Design of Human Computer Interface

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Abstract—As everyone knows, the time of virtual reality has come, how to control and correct use of VR has become a significant topic. "In the era of virtual reality better human-computer interaction", "virtual reality interactive context and traditional context where is the difference in space", "touch interactive virtual reality experience what? Through the man-machine interface design, the use of virtual 3D animation technology, implementation of new methods and new ways of product design.

Keywords-virtual reality;3D animation;human-computer interaction;product design; industrial design

I. THE BASIC PRINCIPLES AND CHARACTERISTICS OF VIRTUAL REALITY TECHNOLOGY

The virtual reality technology involving computer graphics, sensor technology, dynamics, optics, artificial intelligence and social psychology research, is a higher realm of development of multimedia and 3D technology. Virtual reality technology is a kind of immersive interactive environment based on calculable information, is a new man-machine interface. Specifically, it is using modern technology to generate computer technology as the core of realistic visual, hearing, touch the integration of the specific range of virtual environment, users with the necessary equipment in a natural way with the virtual environment in the interaction of such interactions, resulting in the real environment of the same feelings and experience.

The virtual reality technology was developed, people have been interested in it. The virtual reality technology not only has begun in the military, medicine, real estate, design, archaeology, art, entertainment and many other fields has been more and more widely used, but also the society has brought huge economic benefits. Therefore, the industry believes that 1980s is the personal computer era, 90s is the era of multimedia, network, and in twenty-first Century will be the era of virtual reality technology.

Virtual reality technology is an important direction of simulation technology, simulation technology is a collection of computer graphics and human-computer interface technology multimedia technology network technology sensing technology, is a challenging subject of cross technology and research field. It mainly includes the simulation environment, perception, natural skills and sensing equipment. The simulation environment generated by computer, real-time dynamic 3D realistic image.

The virtual reality as a kind of human-computer interaction characteristics of man-machine interface, also can

be called "natural human-computer interface. In this environment, users see the full body color scene, hear the sound in the virtual environment, hands or feet can feel the virtual environment back to his forces, thus causing users a feeling that one is personally on the scene. In the same world and feel the way to feel the virtual world created by the computer, and the corresponding real world has the same feeling. The computer world can be beyond the virtual environment we live outside of time and space, can also be a simulation of the real world, can let a person a virtual graphical interface. Feel personally on the scene.

Virtual reality is a kind of machine interface is more ideal person between the computer and the user form. Compared with the traditional computer interface, virtual reality system has three important characteristics: Immersion, Interactivity, Imagination, any virtual reality system can be used in the three "I" to describe the characteristics of the sense of immersion and interactivity. Is the key to decide whether the system is characteristic of a virtual reality system.

Immersion called Pro sound sense. Virtual reality technology is based on human visual, auditory physiological and psychological characteristics, lifelike three-dimensional image generated by the computer, the user through a head mounted display, data glove or data clothing and other interactive device, can put themselves in the virtual environment, to become a member in the virtual environment. The interaction of various objects in the virtual environment and users, just as in the real world. When the user moves the head when the image in the virtual environment in real time to follow the changes, with the mobile object can gesture and movement, can also hear 3D simulation sound. Users in the virtual environment, everything feels very realistic there is a feeling, personally on the scene.

The man-machine interaction in the virtual reality system is almost a natural interaction, users can not only use the computer keyboard and mouse to interact, but also through the special helmet, gloves and other equipment for sensing data interaction. Computer can according to the user's head, hands, eyes, body language and movement, to adjust the image and sound system. Users through their own language, body movement or action such as natural skills, observation or operation of any object in the virtual environment. The virtual reality system with visual, listening, touching, sensing and reaction device, so the user can obtain the kinesthetic, visual and auditory in the virtual environment, tactile, kinesthetic etc. a variety of perception, so as to achieve personally on the scene feeling.

II. THE KEY TECHNOLOGY AND THE RESEARCH OBJECT OF VIRTUAL REALITY

The virtual reality system according to their different functions, can be divided into immersion type virtual reality system, enhance the reality of virtual reality system, desktop virtual reality system and distributed virtual reality system. Four types of virtual reality system with three "I" characteristics, the system mainly includes the basic group into the observer, sensor, composition effect generator and real simulator.

Essentially, virtual reality is an advanced computer user interface, it also provides to the user through such as video, listen, touch and other intuitive and natural real-time interactive means, to maximize the convenience of the user operation, so as to reduce the burden on the user, improve the working efficiency of the whole system. But the real imaginary and the reality of virtual object and high performance computing technology are 3 main aspects of VR technology.

How will the objects and events in the real world to the virtual environment, is a perception problem. Network technology is how to allow multiple users to participate in the same virtual environment. This requires a distributed mapping structure. A kind of virtual reality is the world space to multi-dimensional information space, including the basic model construction, space tracking, sound localization, the key technology of visual tracking and viewpoint induction, generate these technology makes the realistic virtual world, virtual environment detection and operation data for operation of user access is possible.

How is the real reality of virtual object in virtual environment can directly signal adults feel according to (sound, light, electricity). A display (output), but also to ensure that users get the same vision, or similar real environment from the virtual environment the key technology of haptic and auditory, tactile and other sensory perception the key factors can make the participants to produce immersive visual and auditory perception in addition, users can also manipulate virtual objects in virtual objects at the same time, feel the reaction, resulting in tactile and haptic perception. Force perception mainly by the computer through the force feedback glove, force feedback joystick of finger motion damping users can feel the magnitude and direction of force. Tactile feedback is mainly based on the visual sense of touch, pressure, vibration, electronic touch and nerve, muscle simulation and other methods to achieve the main through the basic model. Construction technology, space tracking technology, visual tracking and vision sensor technology, high performance computing technology to achieve.

The accuracy of the virtual environment. The virtual environment that is consistent with the objective world, which requires a wide variety of configurations, complex information to make accurate and complete description. At the same time, need to study the efficient modeling method, reconstruction of virtual object and the evolution rules of all kinds of relationships and interactions.

The virtual environment perception information authenticity synthesis. The abstract information model cannot be directly perceived directly to human, so we need to study the virtual environment of visual, auditory, tactile and haptic synthesis method of perceptual information, focused on solving the problem of high fidelity and real-time synthetic information, in order to improve the sense of immersion.

The nature of interaction between human and virtual environment. The real-time synthesis of perceptual information transfer to the user through the interface, the user according to the sensed information and make analysis and judgment of the events in the virtual environment and situation, and realize the interaction with the virtual environment in a natural way. This requires research based on imprecise information multimodal human-computer interaction pattern and individual natural interaction technology, in order to improve the efficiency of human-computer interaction.

In VR, the computer is from various human movements, such as changes in language information, to correctly understand the information needs to use AI technology to solve, such as speech recognition, image recognition, natural language understanding, research in the field of the intelligent interface is the basis of VR technology, VR technology is also difficult. In essence, to solve the 6 problems mentioned above allows the user to feel personally on the scene of virtual environment, so as to explore and understand the objective things. Generally speaking, the research focuses on virtual reality expansion are all around the problem of the 6 groups.

III. THE REALIZATION FUNCTION AND DESIGN RULE OF HUMAN-COMPUTER INTERACTION INTERFACE

Human-computer interaction is a study of the interactive relationship between the system and users. The learning system can be a variety of machines, can also be a system of computer software and the man-machine interface. Usually refers to the visible part of the user. The user through the man-machine interface and communication system, and operate as small as the radio play button. To the dashboard, aircraft, or control room in power plant. The design of man-machine interface to include the understanding of users of the system, it is for system availability or user friendliness.

At present, human-computer interaction is still exist many problems, mainly from the following three aspects: the use of limited range, has yet to get rid of interactive interface, information is difficult to identify. On the whole, the man-machine interactive way with networking upgrading and the development of artificial intelligence and continuously in the following three aspects: the development of user centric, biometric personalized, full range of perception. The future, communication between man and machine, will be from the mechanical interaction up to the emotional aspects of external communication, information infrastructure all specific operational equipment will naturally melt into the whole, will be replaced by a variety of sensors, everywhere. Various shapes, as well as the integration of artificial intelligence, big data cloud computing platform, they will

become more and more intelligent, considerate, real-time human-computer interaction system to provide the Everfount Information.

The traditional way of human-computer interaction, both the interaction between human and computer is through the keyboard, mouse, screen and other tools to achieve. Virtual reality is seen as a unified computing science processing object a computer generated space, and the operation of its people as a part of the space.

The interaction between man and computer space is perceived through a variety of advanced technology and display technology. People can feel the objects in the virtual environment, virtual environment can feel all kinds of operation on it. Virtual environment is man-made, is present in the computer. The user can enter "" this virtual environment, can interact in a natural way and the environment. The so-called interaction refers to the perception of the environment and intervention environment, can let the user generated in the corresponding real environment in the illusory sense of immersion, that is, personally on the scene feeling. And the virtual environment system includes man-machine interface and operator. Computer.

Virtual reality is the main method is with the necessary equipment, to achieve the information conversion between human and virtual environment, achieve natural interaction and interaction between people and environment. And the function of human-computer interaction technology determines corresponding system friendly operation, with the development of technology command more and more complex, the requirements of human-computer interaction more and more high. The history of the development of human-computer interaction is accompanied by the development of PC software platform, and products bound the body, eyes tied the hands and eyes, which means that the need for a new interactive media as the carrier, VR and AR may be the next generation of media.

In order to maximize impact and achieve the purpose, as in the conception of product positioning should be guided by the following principles: integrity, aesthetic consistency, direct manipulation, feedback, metaphor, user controllable. In the whole system, the text is legible in each size in the figure is accurate and clear. The decoration is delicate and appropriate, this is in order to guide the design of more focus on the function above. Blank, colors, fonts, graphics and interface elements ingeniously highlight the important content and effective interaction.

Sliding gestures and clear nice interface allows people to better interact and understand the content, but not overwhelming. The main contents are usually fill the screen, use more translucent and blur effect to foil. In order to ensure the light and transparent interface must use less borders, gradients and shadows. This will ensure that the content is the highest in the show the importance. The unique visual hierarchy and convey the real action level, give vitality, easy to understand. The touch, the new sense of joy, the use of new functions and new content without distortion. These changes will provide more interesting when you browse the contents of the sense of hierarchy.

IV. DESIGN AND APPLICATION OF VIRTUAL REALITY TECHNOLOGY IN HUMAN-COMPUTER INTERACTION INTERFACE OF INDUSTRIAL PRODUCTS

Before you begin to format your paper, first write and save the content as a separate text file. Keep your text and graphic files separate until after the text has been formatted and styled. Do not use hard tabs, and limit use of hard returns to only one return at the end of a paragraph. Do not add any kind of pagination anywhere in the paper. Do not number text heads-the template will do that for you.

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A. Abbreviations and Acronyms

Virtual reality has been some of the world's large enterprises widely applied to all aspects of the industry, the development of the enterprises to improve efficiency, strengthen data collection, analysis, processing capacity, reduce mistakes in decision-making, played an important role in lowering the risk of enterprise. The virtual reality technology is introduced, will make the industrial design method and the thought quality leap, more in line with the needs of social development, can be said to be feasible and necessary in the application of virtual reality technology in industrial design.

Virtual reality is the use of computer simulation to generate a three-dimensional virtual world, to provide users a visual, auditory, tactile and other sensory simulation, such as allowing users to personally on the scene move, there is no limit to observe in three dimensional space. The application of this technology can greatly enhance the human-computer interaction technology, can greatly enhance the user's experience, to further enhance the competitiveness of products.

The world industry has undergone tremendous changes, large-scale sea tactics no longer meet the development of the industry, the application of advanced science and technology shows great power, especially the application of virtual reality technology is a hitherto unknown industrial revolution. Virtual reality has been some of the world's large enterprises are widely applied to various aspects of industrial the enterprise to improve development efficiency, strengthen data collection, analysis, processing capacity, reduce mistakes in decision-making, played an important role in lowering the risk of enterprise. The introduction of virtual reality technology will make the industrial design method and a qualitative leap in thinking, more in line with the needs of social development, can be said to be feasible and necessary the application of virtual reality technology in industrial design.

The industrial simulation system is not a simple scene roaming, is used to guide the production of the simulation system in real sense, it combines the user service layer and database data to set up a complete simulation system can be set up B/S, C/S two kinds of application architecture, and enterprise ERP, seamless, MIS support SqlServer, Oracle, MySql as the mainstream database.

The scope of industrial simulation covers a very wide, from the simple mechanical assembly of single workstation to multiplayer online collaborative training system. Virtual reality provides a new mode to carry out emergency drills, the scene of the accident simulation to virtual scenes, where the manufacturing accidents artificially, make the right in response to the participating organizations staff. This deduction greatly reduces the cost, improves the deduction of training time to ensure that people face accident disaster coping skills, and can break the limits of space and convenient organization of the personnel of deduction, such cases have been applied, will be a trend in the future. Because of emergency exercise it has a simulation, pertinence, openness, autonomy, security features, construct a set of digital open digital resources for the enterprise, through the virtual space inside. When recording, construct a set of emergency drills in the library, and virtual digital environment reproduction corresponding emergency drills, improve their professional level in the virtual environment.

At present, the domestic design and manufacture of industrial products has been using computer aided design, mold making grass rapid prototyping technology, but is still the traditional product design process, the influence of efficiency of product development. Using this technique, the virtual test in product design do some feasibility in industrial design, the specific design operation based on virtual reality in the process of product design to simplify the product, product reviews can be done in real-time dynamic evaluation and virtual three-dimensional products using this technology, can observe any angle of internal and external product structure, product promotion stage, virtual reality technology can directly provide users with a variety of virtual scenes for customers to understand the morphology and visual the effect under different conditions of the product, and allows customers to experience more interactive simulation of the product with an external device, further stimulate consumer The desire to buy and upgrade the product sense of technology and competitiveness.

The design of pre feasibility test, study the needs of users, the feasibility of rapid definition of previous research using virtual reality technology, and presents a variety of forms. The sketch after local kinetic energy rapid and simple characteristics of the product, in a virtual way show, allows ID designers, product planning more clear options more clearly and modify the program.

The ID designer modeling stage, after the completion of the corresponding model can be imported into the software, do product animation design according to the characteristics and functions of products, to provide support for the later product form of display, animation display can bring different visual feelings and stimulate consumption for the user, to enhance the value of product positioning.

Product review is a creative design and production of products can be recognized by the designer, the traditional product review must do product prototype, prototype production time and cost of manpower cost is high, the kind of product prototype for the product design more intuitive, in the review to check the appearance or function model. The rationality of the structure of virtual technology compared

with hand only the defect is non physical, but also all the details view of real-time display of products, but also some details of instant change of product in the review, can use virtual technology to create a virtual space and real-time products together, to set the product according to the user's habits and character space. Product review can also create a better the user experience of virtual reality technology and physical space by hand combined. Virtual reality technology for product review more display functions, virtual body Inspection, real-time adjustment of products, products exaggerated visual experience and more interesting review.

International Conference of new products, the virtual reality technology can perfectly play the leading role on the conference, the establishment of a virtual scene in the conference to enable publishers and product integration, perfect display of products in various parts of the details and outstanding function, at the same time also shows a highly interactive. The establishment of virtual product experience center, for excellent products tailored virtual space more creative. Virtual reality display design display used in commercial products. Commercial products display the purpose is to attract people's attention by showing good design, and with the help of multimedia or network means to convey the display information.

Virtual reality interactive technology can we touch things virtual objects into, you can push, grab, and even squeeze them. It can capture the real objects in each space, virtual clone to achieve high quality by 3D modeling, a user can touch things, shorten the people of important life, locations and activities the distance by using this technology, we can achieve more amazing experience in the virtual world.

Virtual reality display design provides such a display means, and the development of computer hardware and network and computer efficient 3D operation to enhance the ability of the virtual reality technology in the display of goods has become even more widespread. The application of multimedia display previous commodity display is the way to the plane pictures, text, visitors can only get by text, voice, graphics, animation and other means of describing single commodity information and virtual reality display. The plane design can break through the limit, is not limited to two-dimensional space of the text, picture and image display methods, which well solves the commodity The lack of realistic problems in the show: on the one hand, 3D virtual display made by virtual reality technology, can let the consumer goods and form a good interaction, make it easier for consumers to grasp the commodity information in order to assess and promote consumer goods, make a purchase decision; on the other hand, instead of using virtual products product display, but also reduces the product cost, from each link to improve the display efficiency.

V. THE FUTURE TRENDS AND DIRECTIONS OF VIRTUAL REALITY AND HUMAN COMPUTER INTERACTION

With the development of virtual reality technology in city planning, military and other aspects of the deep application of interaction in modeling and rendering method, construction method and system of virtual reality technology are put forward higher requirements. In order to meet these

new demands, in recent years, virtual reality technology research follow the "low cost high performance" principle, has achieved rapid development, showing some new features and trends. The combination of virtual reality and network communication and multimedia technology, the traditional information technology is a breakthrough in the development of new technology has far-reaching potential applications. Online interactive virtual world is the direction of development of information society, is the inevitable goal of various industries. The future information network interactive virtual reality technology will change people's way of thinking, change the people of the world, their views of space and time.

Throughout the course of development of VR, the future research of VR technology will continue the "low cost, high performance" principle, from two aspects of hardware and software, the main development direction is summarized as follows:

Dynamic environment modeling technology. The establishment of virtual environment is the core content of VR technology, dynamic environment modeling technology to 3D data acquisition environment, and according to the need to build a virtual environment model.

Real time 3D graphics generation and display technology. 3D graphics generation technology is relatively mature, but the key is how to generate real-time, without reducing the quality of graphics and complexity, how to improve the refresh frequency is an important research content in the future. In addition, the development of VR also depends on the stereoscopic display and sensor technology virtual, existing equipment can not meet the needs of the system, it is necessary to develop a new generation of 3D graphics and display technology.

Development of a new type of interactive device. Virtual reality and virtual world objects people can freely interact with input and output devices like personally on the scene, the main data gloves, helmet display, data clothes, 3D position sensor and three-dimensional sound generator.

Intelligent voice virtual reality modeling. Virtual reality modeling is a more complex process that requires a lot of time and effort. If VR technology and intelligent technology, combined with the speech recognition technology, can solve this problem. We model attributes, methods and general characteristics of the description into the necessary modeling the data through voice recognition technology, and then use the computer graphics technology and artificial intelligence technology to design, navigation and evaluation, the model is expressed by the object, and the basic model of static or dynamic connection, and ultimately the formation of the system model.

The prospect of distributed virtual reality technology. Distributed virtual reality is an important direction for future development of virtual reality technology. With the emergence of many DVE development tools and system application, DVE itself has penetrated into all walks of life, including medical, engineering, training and teaching and collaborative design. Simulation training and teaching training is another important application areas DVE, including the virtual battlefield, assisted teaching.

VI. CONCLUSION

As a comprehensive reflection of the frontier of modern science and technology, VR art is a new art form of language visualization and interaction of complex data through man-machine interface, it is important to attract artists, in close combination of artistic thinking and technology tools and two deep penetration of the new cognitive experience. Compared with the traditional the windows operating under the new media art, interactive and extended dialogue is the key to VR art has its unique advantages. From the overall sense, VR is a new man-machine interactive art based art form, its biggest advantage is that the construction works and participants of the dialogue, through dialogue and reveal the significance of the process generation.

In combination with the existing work mode and work content, the introduction of virtual reality technology will be one of the highlights of the industrial design, the SKYWORTH brand will also enhance the sense of science and technology, further reflect the focus on health technology. Virtual reality is the future of human-computer interaction, product design, display the development trend.

The application of virtual reality technology, the product design must take an important role, not only on the product design, should also actively explore some new areas, so that the virtual reality technology in industrial design involves more areas. Science and technology development today, virtual reality technology is constantly improving. The continuous development, continue to play a greater value in the design, produce the maximum energy, the majority of users to the most perfect products and most people enjoy the visual perception and experience.

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