Application Research of Object-Oriented Design Technology in Interior Design Cad

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Abstract: Object-oriented secondary development, and object-oriented technology is applied in the development of CAD system, starting from the requirements, with the object as the basic concept, through the determination of object, decomposition and classification, establish the corresponding object diagram is used to analyze the object oriented system. Through Abstraction and Abstractdata structure, describes the system properties, be made of the object hierarchy, form the semantic description of the problem domain integrity, complete CAD system model is designed, using an object-oriented programming language such as c + +) is to set up model into computer acceptable form, complete the programming, realize the secondary development. At present, in the open architecture of CAD system, the object-oriented technology is the main form of the API. The function of the system, data and interface exposed to the user in the form of objects, because there are a lot of object oriented programming tool, make use of these tools development applications, can be accessed through the object's properties and actions and control system.

1. Introduction

In recent years, the object-oriented technology in both theory and practice in the rapid development of object-oriented technology is the most important is the concept of "object" this "object" has certain properties and methods, in this case, the attributes of the object itself various characteristic parameters of a specific object can have many attributes and methods, object of important features of the object-oriented technology is encapsulation, for the outside world, do not need to know what attributes of objects, also do not need to know is how to implement the method of the object itself, but only need to call a method is provided to accomplish a specific function from here we can see that when the application of object-oriented technology to the programming, the programmer only when writing object methods need to be concerned with the details of the object itself, most of the time is on the object by calling the method to organize these objects work together.

Object-oriented technology has the following advantages: simple maintenance is modular and programming to objects are represented as a feature of entities in class with the same name in the space has the same function of class, we can add a class in the namespace and will not affect the other members of the namespace. Extensibility and object programming essentially support expansion, and if you have a class with some functionality, you can quickly expand the class to create a class with extended functionality. Code reuse is very easy to provide a class library because the functionality is encapsulated in the class, and the class exists as a separate entity.

Object-oriented method to overcome the original scale, the software system development cycle is long, the high cost of maintenance, the software system is too complex, application software integration difficulties such as easily as the SOP to Object programming () to the SOD to Object (design) and the BOA to Object (analysis), the development of the final form and to the Object software development method. MT (Object Modelling Technique which is a combination of bottom-up and top-down method, and based on the Object Modelling, it not only considers the input and output data structures, is actually contains all the Object's data structure of object-oriented technology in software design occupies very important position, but not to the Object and C} + languages such as patent, in fact, in the system software such as operating systems, the use of the object-oriented technology is very extensive use of C language realization of object-oriented

technology, not only the structure is clear, and the parties, such as the execution efficiency also has the language such as C} + incomparable advantages

At present, the famous general computer aided design software in the world there are many, such as Pro/ENGINEER (Pro/E), CATIA, AutoCAD, Solid works, etc. These software to provide a common method and technique, can satisfy the users most of the features and needs. However, in the process of concrete use they often can't meet the various requirements, especially foreign CAD/CAE/CAM system in such aspects as design standard, specification and standard parts library and there are many differences between domestic. Especially for special product design, users often put forward some special functional requirements of CAD system, such as pattern library, computer program, to maximize the design efficiency and quality.

For this purpose, it is necessary to customize the general CAD system, which is to develop additional special functions on the basis of general CAD system, which is called the secondary development of CAD system. In the early days of the second development process, traditional process of parametric design is a method that is applied in the more. As the design and manufacture of CAD/CAM technology demand is higher and higher, the function of the system, constantly improve and expand the traditional procedure-oriented software development methods already can not adapt to the request. The object-oriented software design methods become dominant, it is a software engineering system of structured programming, modular, data abstraction, information hiding, knowledge representation, such as the accumulation and development of the concept of parallel processing, and this method is more efficient for reflecting the intrinsic features of objective things and the inner link, in line with the engineering design methodology. Its characteristic displays in: abstraction, encapsulation, inheritance and polymorphism, the method for the large complex system design provides a good solution. The core idea of object oriented method is will all objective entities as objects, each object by data (properties) of things, and ACTS on the data of operation of things behavior () constitute an independent whole, each object belongs to an object "class". Through the messaging interaction between objects, and operational details are encapsulated in the corresponding object. Inheritance, encapsulation and polymorphism, are the basic characteristics of the object.

Object-oriented secondary development and object-oriented technology is applied in the development of CAD system, starting from the requirements, to the object as the basic concept, through the determination of object, decomposition and classification, establish the corresponding object diagram is used to analyze the object-oriented system. Through the abstract behavior and abstract data structure, describes the system properties, be made of the object hierarchy, form the semantic description of the problem domain integrity, complete CAD system model is designed, using an object-oriented programming language such as c + +) will build model into computer acceptable form, complete the programming, realize the secondary development.

At present, in the open architecture of CAD system, the object-oriented technology is the main form of the API. The function of the system, data and interface exposed to the user in the form of objects, because there are a lot of object oriented programming tool, make use of these tools development applications, can be accessed through the object's properties and actions and control system

2. Application Status of Interior Cad Design

With more features of interior design in the 21st century technology and people's life and improvement of quality of life, modern people pay more attention to architectural interior space design level, the development of modern interior design technology is on another level to improve the people's demand for modern design. The modernization demand largely embodied in the pursuit of interior more wider space, so the 3 d architectural design software to improve the effect of interior space design is the requirement of people, raising the trend, architectural interior design should be according to the requirements of the people living in the computer platform to realize the virtual space of interior design.

The realization of the computer design architecture interior design plan, the final 3 d rendering to

efficient production, the application of 3 d interior design software also makes the traditional manual drawing basic to design stage, thus in the effect of the design project, the designers communicate with customers in the design concept, design changes, etc have been greatly improved.

With the change of aesthetic concept and aesthetic value, new design concept and! With the constant friction of design concept, new design thinking and design philosophy are gradually formed. Therefore, new technology and new situation of interior design are generated and independent design ideas are created. Old photography, for example, just focus on the objects of reality, while modern photographers can according to your own choice or that decorate the scene photography concept or behavior model, adjust the lighting and post-processing technology makes pictures the result type of a painting or a photographer's own concept type. In the formation of new aesthetic standard and the application of new materials, new forms, and the progress of science and technology and combined with each other and promote each other and influence each other, and thus promote the social development, changed people's thought of aesthetic and design, on the basis of this and technology under the background of "high technology" style. Image style is the embodiment of "high technology" in architectural interior design effect, its outstanding characteristic is a highly developed industrial technology directly by the factory or laboratory production of raw materials and the original directly to decorate, reflect its science and technology with strong intuitive. The outstanding example is the Pompidou national centre for art and culture in Paris, designed by British architect piano and Rogers in 1976, which was undoubtedly a sensational work in the field of design. They believe that the Pompidou national art and culture centre in Paris is not only a flexible container, but also a dynamic communication centre. Pompidou arts and cultural centre building facing the street directly on the east facade of colours of the exposed part of the structure of the various "pipe" : traffic channel is red, the water supply system are green, the air conditioning system is blue, the power supply system is yellow; This direct intuitive to building structure features and performance characteristics of architectural interior design is to be bold innovation, Pompidou arts and culture centre of exhibition and all kinds of industrial design its own industrial design department of design and indoor display works of famous design, the most important thing is that its construction as a whole system itself, to the industrial design, architectural design, architectural interior design aesthetic concept and design ideas are brought strong impact and influence.

Use of Auto CAD drawing software process of painting construction plan with hand-painted process is roughly same, but compared with the manual drawing, Auto CAD has incomparable advantage, computer drawing fast, convenient, reproducible, easy to modify, recycled, save a lot of time for the design drawings. Painting plan often with 1:1 ratio of drawing, but considering the output drawings generally adopt different proportion, drawing on the symbol, such as the size of the text, size, elevation of symbols should also make corresponding adjustment. The size style is set according to the normal size, and the ratio is adjusted uniformly. The Scale for Dimension Features in the "adjustment" TAB is required to check "Use overall seale of:" and the input ratio. Call the LIMITS command to set the screen size.

Command: LIMITS /
Specify lower left corer or [ON/OFF] <0, >:/.
Specify upper right corer<10000, 10000>:20000, 10000/.
Command: 200 m /
Specify corer of window, enter a scale factor.
(nX or Nxp), or All/Centere/Dynamic/Extents/Previous/Scale/Window] < real time > : A,}

The size of the screen drawing should not be too accurate, only as a reference at the beginning of drawing, and resize with the zoom command at any time.

Draw the wall auxiliary line:

Set the axis layer to the current layer and set the linear scale with the LTSCAIE command: 20 draw the vertical line at the left and the horizontal axis at the bottom. The OFFSET command draws the axis in the vertical and horizontal direction according to the axis distance. Finally, TRIM the axis to the desired length with the TRIM command. The symmetric figure USES the mirror

command to draw the other half figure.

1). Set the auxiliary line layer to the current layer and set the multi-line style with the MLSTLE command. The operation is as follows:

Command: MLSTLE /

2). Press "Multiline Properties" in the" multi-line style "dialog box, and display" Line "option in" Caps "area to check" Start "and" End "items, and press" OK" button to exit. This setting can close the End of the wall.

3). Set the wall map layer to the current layer, set the auxiliary axis intersection point, and use MLLNE(multi-line) command to draw the wall line of the double line at a time. The setting is as follows:

Command: MLINE /

The Current Settings: Justification = Zero, Scale = 200, 00.

Style = STANDARD

Specify the start poet or Justification/Scale/Style /

Enter justification type Top/Zero/Bottom "Top > : Z /

Specify startpoit or Justification/Scale/Style: S} /

Enter mine scale < 0 > : 200 /

Specify start poit or [Justification/Scale/Style]:

Specify next poit:

Specify next poit or [Close/Undo]:C.

4) .use the MLEDIT(multi-line edit) command to handle the interface of the wall.

Drop down menu :Modify - Multiline.

Command: MLEDIT /

After entering the command, select the transition style in the screen display "multi-line edit" dialog box.

Select first mline: click on the first wall.

Select second mline: click on the second wall.

Select first mline or [Undo]:/.

It is worth noting here with multi-line command to draw a line wall can not use the TRM command to clip, shear, if you need to use first EXPLDE command to break it down, but can be used to cut off the multi-line editor dialog. The following operation process is to switch to different layers and draw doors, Windows, columns, balconies and so on. Drawing for the convenience of the operation, I try to use the copy, pruning, translation, mirror, equidistant editing commands and less as far as possible to use the drawing commands to complete the floor plan of each layer, more convenient and quick way of such paintings.

3. Application of Object-Oriented Design Technology in Interior Design

Professional CAD system, using computer sketching PowerCADD, SketchUp, etc., as it is difficult to sketch creation, here we analyze the CAD, it is very fine lines, are all need to pass strictly, the coordinates of the input to the graphic results of each step. So the CAD draw the line of some conceptions in the creative stage, is very difficult, although the CAD in the case of does not open to catch orders, also can draw some certain arbitrary line, but it still exists two fatal problems, first before it is made up of the mouse to control the line, the direction of the hard and heavy not consciousness, can't like hand-painted pen; Second, there is a need for programmatic input of CAD, and there is a serious lag in time.

It may take a few seconds to draw a number of structural lines. However, it takes at least a few minutes to complete the command and determine the direction and orientation of several lines. That is to say, when the CAD is working on the sketch, too much of the cumbersome man-machine dialogue factor wastes the time that the designer should devote to creating the idea. Therefore, it is very difficult to use CAD instead of hand sketching. Although some had appeared on the market now for CAD, can save the time of man-machine dialogue on a certain routine plug-ins, such as domestic "was", Autode sk PowerCADD etc, but the birth of the plug-in does not mean that the

CAD drawing can provide the function of the fuzziness and randomness.

Next, we'll talk about the Google SketchUp, through it, indoor stylist can indeed within a relatively short time, make creative solutions for white body idea, so the SketchUp is generally referred to as "SketchUp". But the graph it draws is not really a real sketch in the traditional sense, but a result of the reduction of the accuracy of the model. So it is no longer possible to replace sketching with SketchUp. Figure 1 shows the basic outline of the interior design SketchUp.
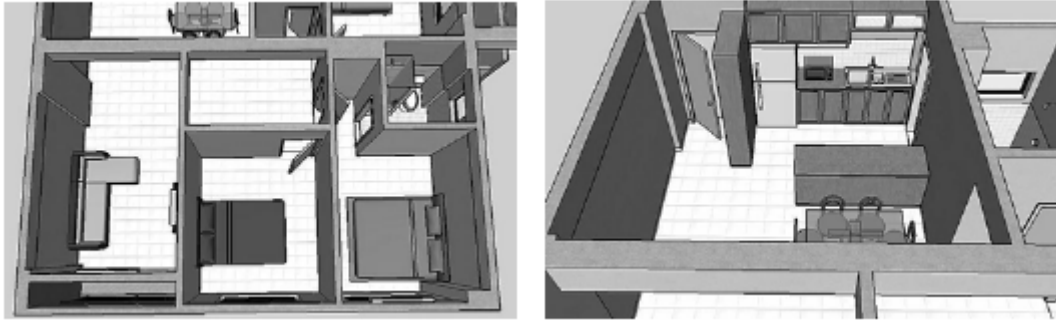

Fig.1 Sketchup Sketch.

Through the description of the above, we know the use of the mouse, keyboard interactive computer sketch system is difficult to replace traditional sketch, so we can try to convert the thinking, if use a computer drawing board, drawing pen, and the Painter to cooperate if can completely replace the traditional hand-drawn sketches? Computer graphics tablet, drawing pen to bring new technology, graphic input form highest-resolution Design Company and offer a good platform for the auxiliary Painter, cooperate with the use of the computer drawing board, drawing pen. The computer aided system can simulate the power of the pen, the brush stroke, and the texture of the paper, and display it in real time through high resolution images. But it still cannot get rid of the graphics can let all mapped the full dispersion symbols, most of the graphics, especially indoor sketch, it painted or cannot be mapped into a completely different combination of limited information units. Therefore, it is not difficult to find in a lot of details that its richness can only be imitated in a way, but cannot be equal to hand-painted.

CAD in interior design, mainly used to draw engineering drawings, so how to make a calculation drawing of engineering drawings more artistic aesthetic? This requires designers to rely on other more expressive software to work with CAD. Although CAD also has certain functional degree of artistic processing function, but the effect is too monotonous, depressing. Especially in be being designed indoors, if through the CAD to do detailed engineering drawing art processing, such as a large number of rich texture changes compared with subtle changes in temperature, etc., is pale, so for 2 d engineering drawing, need to use a few late processing art illustrations for drawing software, can ensure that the richness of drawings and plasticity.

Art illustrations software is the feature of surface with good degree of accuracy for the purpose rather than for the purpose, so the characteristics of illustration software is a kind of expression, make indoor stylist in the interface can realize the artistic atmosphere, at this point, with the operation of the CAD interface is completely different. At present is mainly used in the art of interior design engineering drawing illustrations software mainly have Photoshop, CorelDraw, In design, etc., through CAD stratified output mode, the engineering drawing according to the different layer can be input to the illustrations in the software, can better use the illustration to the effect of a series of adjustment software. And can better handle the image of the initiative to the designers themselves, designers in the use of the same feeling if the painting on the paper. Then, the advantages of such illustrative software can be summarized as follows: first, flexible and convenient expressive force, and second, data can be cross-platform.

Flexible and convenient expression is illustration class has the advantages of the software itself, because Photoshop, CorelDraw, In design, has a form of vector data saving, so the designer can't like the past manual drawing stress transition line endpoint, but often this representation can give a person more "design" in it, so the designer in illustration class software can through the layer to

adjust the linear way, change the line colour of Transparency (Transparency) it's easier to do similar visual effect, for example, when we want to give the floor of the indoor air q in drawings, make appropriate reflection effect, you can through the Gradient of such software (Gradient) or Lighting erect (Lighting effects) to simulate this subtle contrast feeling easily. Or you can use the Texture in the Filters to visualize this. The most typical example is when we want to give a carpet to make indoor effect of wool cloth with soft nap, we can give on a Noise (Noise), by adjusting its editing system of parameters easily making plush drag effect. As shown in figure 2 below, it can be seen that the software of illustration class makes the artistic expression of engineering drawing in interior design more incisively and vividly.

Fig.2 Illustration Art Performances.

Data portability is another advantage of illustrative software. This is mainly embodied in the illustrations in the software, CAD or art to save out a data format through the system to realize the white different surface effect, if the data format, or support software system incomplete, resulting in the data on the software before, to another, become unrecognizable to the software, or loss of important information. However, the JPEG, GIF, PNG data format of the art plug-in can carry out standard data exchange in various illustration software, so it can guarantee the consistency of the graphics. Even in different operating systems, such as Windows, Apple, Vista, or computers in different language countries, data can be shared across platforms.

Reasonable make good use of illustrations can be a good complementary with CAD software, overall computing machines map interior design project should not become an excuse for surface drab, inflexible, designers of comprehensive use of various computer-aided tools, clever flexible express their design ideas and artistic appeal for interior design under the information age, is indispensable.

Finally, in interior design, 3DSMax is used to conduct 3d modelling, which can stimulate the ability of interior designers to imagine the curved surface. In the era of manual drawing, stylist is through to find out some way with perspective lines, in drawing up and draw indoor air q modelling, but when it comes to depict some complex modelling as surface modelling, often can appear the phenomenon such as perspective not accurate, in fact, some surface modelling of variants in the manual drawing is hard to work out the s completely correct perspective, as a result, there are a lot of surface modelling, designers in sketching and even want to all dare not to think about it, even draw a point of view, accurate understanding of the structure of other angles, still can't do it well. However, through the 3DSMax modelling, it can not only be rigorous according to the principle of drawing, but also can make a bold new attempt on the surface modelling. In 3 ds Max has a powerful function of free deformation, and the powerful brush, not only can be arbitrary deformation of the model and adjustment, can also use the brush tool like a sculpture commonly the modelling of make any desired form. So when designers in the design of surface modelling meditation there is no new idea, might as well can be arbitrary regulation model deformation,

distortion, or let the white model of random dynamic deformation of surface modelling way to stimulate designers such as idea generation. With the change of The Times, more and more sketching ecological modelling or and concept model, used in interior design, this means that the surface modelling for interior designers, its importance is increasing. Therefore, when the designer lacks modelling consciousness in this aspect, it is better to improve the imagination ability of the white body and promote the generation of new inspirations with the help of 3DSMax's curved surface deformation function. As shown in figure 3 below, we can see that the surface modelling scene and surface modelling produced by 3DSMax can be arbitrarily adjusted and deformed.
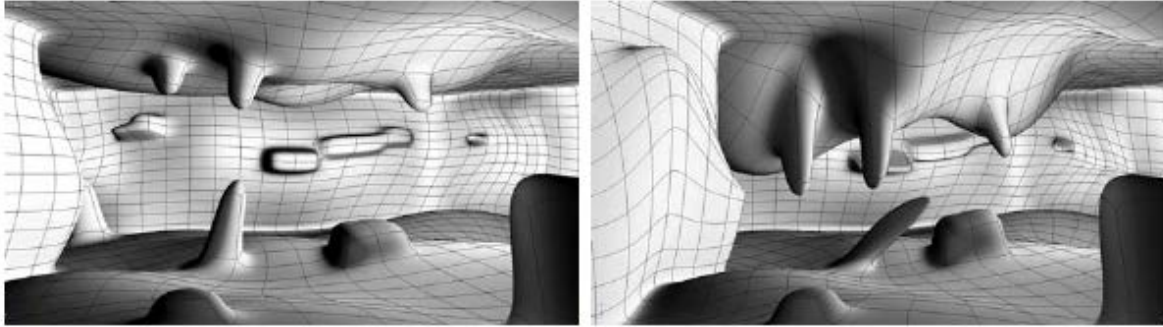

Fig.3 Surface Modelling Scene and Deformation.

In general, 3d modelling with 3DSMax can be used to promote designers' careful consideration of interior design modelling on the basis of scientific and efficient modelling. Interior designer finally no longer suffer from how to use the traditional two-dimensional construction drawing to express an empty asked three dimension complex shape, thus greatly expand the interior design to the empty ask modelling to explore practical, white is no longer on the computer screen by the form of utopia. The exploration of digital interior designers has made interior design go from two dimensions to three dimensions and go to digital construction, which is a major transformation of interior design method.

4. Conclusion

Object-oriented technology makes it easier to put complicated problem is decomposed into many sub problems, for the development of CAD system provides a good environment, and improve the development efficiency and the stability and reliability of the system, and reflects the Pro/TOOLKIT to the Pro/E powerful secondary development is conducive to the user through the development of CAD system, improve the large general software application effect in the enterprise. In addition, the development in the design of component model is just the other, need to be able to the combination of database technology, to create more basic model of standard parts library, to adapt to the diverse needs of users. All in all, the secondary development of CAD system is promising, also very arduous task.

References

[1] Shih N J, Hu J Z. The Application of 3D range images in the interior design practice[C]// International Conference Information Visualization. IEEE Computer Society, 2007, pp. 825-830.

[2] Zhu haibin, Yang guogui, liu zhong. Principle and application of objects [M]. Changsha: national university of defense science and technology press, 2008, pp. 309-315.

[3] Tang. Structural and object-oriented software methods [M]. Beijing: science press, 2016, pp.140-161.

[4] Li shuguang. Principles and techniques of painting perspective [M]. Southwest normal university press, 2010, pp. 90-105.

[5] Fang H, Zhang Q K. Study on Visual Expression of CAD Interior Design Drawing[C]//

International Conference on Intelligent Systems Design & Engineering Applications. IEEE Computer Society, 2015, pp. 782-785.

[6] Liu wen-yin, tang long, tang zesheng, et al. A general method for graphic identification on the basis of vectors [J]. Journal of software, 2017 (5), pp. 376-383.

[7] Dong chuanliang, lu jian-heng, dong weiwen, et al. Evolution strategy of equivalence mode in object-oriented database [J]. Computer engineering, 2010, 26(9), pp. 23-24.

[8] Zhang minqiang. Using data dictionary to realize the pattern evolution of object-oriented database [J]. Application technology, 2013, 30(10), pp. 24-26.

[9] Wang gongming, guan yong, zhao chunjiang, et al. Development and research of object-oriented database [J]. Computer application research, 2016, 23(3), pp. 1-4.

[10] Ma H, Zou G T, Luo W. Extension data classification mining oriented to interior design[C]// the international symposium on extenics and innovation methods, 2013.

[11] Ji Y C, Cho M H, Kozinets N. Does the medium matter in collaboration? Using visually supported collaboration technology in an interior design studio[J]. International Journal of Technology & Design Education, 2015, 26, pp. 1-20.