

Design Adapted with CINEMA 4D Modeling

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Abstract: With the change of the environment, the interior design of modern architecture gradually develops into diversification. A variety of interior design comes into view, and design has become one of the indispensable research objects at present. Apartment, as one of the most popular buildings, has caused a lot of research on the interior design of modern apartment. This paper first study the overall application of Cinema 4D technology in interior environment design, design a modern apartment interior design and implementation based on C4D. With Cinema 4D technology to show its functionality and innovative design concept, the interior environment design of Cinema 4D is different from other planning layout, presented in a unique style. Secondly, interior design often needs visible light, so it is also important to master visible light communication technology. Orthogonal frequency division multiplexing (OFDM) is a popular key technology used in visible light communication, which plays a huge role in optical communication system. Therefore, this paper takes the dimming technology of interior design as the basic point of research, and in the fourth chapter, the light plate is designed and the OFDM technology of visible light is applied. Thirdly, the preliminary design is completed through sketching, modeling is carried out using Cinema 4D technology, and then the details are further improved. Adobe Photoshop CS6 is used for mapping and appropriate adjustment, and finally the 3D effect display is realized by using Cinema 4D technology for rendering, which can show the characteristics of traditional national style.

Key words: Apartment; Modern; Interior; Design; Nation; Protecting the Environment

1 Introduction

1.1 Rationale for the Research and Its Importance

Due to recent advances in science and technology as well as the expanding scope of human society, interior design has emerged as a major issue. Several factors must be considered throughout the environmental design process. One of the most important parts of any design is the interior space, which must consider the designer's intent, the designer's idea, and the needs and desires of the people who will be using it. Creative concept is the reference design premise of the indoor environment, of course, to provide people with sufficient functionality, space overall comfort of the living environment, to relax the user's heart, so that they feel a sense of visual satisfaction and increase the degree of spatial interest^[6].

Architectural interior design, it is inevitable to fully control the use of color elements in the form, by the rendering of color to highlight the individual atmosphere of the interior, the formation of the overall sense of coordination of the interior, the color matching in contemporary

architectural interior design has gradually formed a solidified pattern.

As a decorative and functional element in contemporary home design, partition art also conveys deep spiritual and cultural meaning. The reason and artistry of space division is growing in significance as the need for space rises. This article explains where partition art comes from, how it evolved in China, how it's categorized, what role it has in modern interior design, and how Hegel's "components of beauty" might inform our understanding of the current needs for partition in modern aesthetics.

To create a beautiful interior environment and place for others to experience, contemporary Chinese interior designers generally put their own aesthetic vision and knowledge to good use. While thoroughly comprehending the interior design elements' embellishment, complement, echo, and other requirements, in the color of each other and collision, displaying varying degrees of indoor mode, the current interior design color application still lacks innovation, and a comprehensive muted color palette should be used. With the aim of eliciting a pleasing emotional response via color ^[1].

1.2 The State of Development in the United States and Abroad

The "Ten Great Buildings of Beijing," constructed between 1958 and 1959, are examples of early 20th-century Chinese interior design; following the reform and opening, the focus shifted from simple interior decoration to space design; after 30 years of rapid development, people's expectations of interior design have changed. Following 30 years of fast growth, people's awareness of their physical surroundings has progressively grown, and their demands for the environment and their physical surroundings have become more comprehensive, elevating spatial design to environmental design. Interior decorating gave way to spatial design, which gave way to environmental design, and so on through the many stages of China's contemporary interior design. Interior design can be broken down into three distinct phases, or "decoration," "space," and "environment," depending on the extent to which the man-made and natural environments are blended. These phases also serve as a barometer of the public's growing interest in and demand for environmentally friendly dwellings. Considering this, it's clear that eco-friendly indoor design is a growing movement, right in step with the current fashion for eco-friendly outdoor spaces and the ever-present drive for environmentally responsible building practices ^[3].

Gothic, Classical, Baroque, and Rococo forms of architecture and their interiors have evolved and matured in Europe since the Middle Ages and the Renaissance, and the exquisite ornamental styles and methods of the previous generations continue to inspire our own work. The Bauhaus School, established in Germany in 1919, proposed novel ideas for architectural and interior design that were suitable for industrial society by rejecting the traditional and promoting the significance of function. Gropius, who established the Bauhaus movement, said at the time: "Major life changes are occurring right now. A new civilization is taking shape after the old one was blasted to pieces by technological advancements. As our lives and our designs progress, it is essential that we adapt and adjust our methods of expression accordingly." The Gropius-designed Bauhaus school building from the 1920s and Mies van der Rohe's Barcelona exhibition hall are both excellent examples of the innovative approach.

The meaning of modern indoor environmental design has been elevated with the incorporation of the notion of sustainability. Sustainable interior environments, while maintaining the

fundamentals of conventional interior design, consider the following sustainability features: the construction and operation process should minimize energy consumption and environmental damage; the spatial effect of artificial environment harmoniously and uniformly blending with the natural environment; the spatial environment should create a spatial environment that is beneficial to physiology. Ecological and spiritual considerations should be given more weight in the design of interior spaces. Simply put, a sustainable interior environment has qualities like being organic, semi-enclosed, close to human nature, balanced and open in design, etc. [8].

1.3 The Study Design

In this article, we will examine Cinema 4D's widespread use in interior design and utilize it to create a cutting-edge CINEMA 4D model and implementation for an urban dwelling. Cinema 4D's interior environment design stands out from other planning layouts because to the way it uses the technology to showcase its useful and inventive design idea. A contemporary apartment's Cinema 4D interior environment design should be broken down into five primary modules: master bedroom, guest bedroom, living room, kitchen, and bathroom [5].

Sketching, modeling with Cinema 4D technology, further perfecting the details, mapping, and appropriate adjustment in Adobe Photoshop CS6, and rendering with Cinema 4D technology all contribute to the final product, a 3D effect displays capable of showcasing the distinctive features of traditional ethnic style.

Finally, the application value of various colors must be considered in conjunction with the surroundings and orientation of the living space in order to accommodate various theme styles and expose the design flavor of the modern period. This study takes a hybrid approach, fusing ideas from China and the West, to create a sustainable, contemporary apartment interior design with strong national characteristics. When completed, it will provide a visual effect and a sensation of searching to experience a new ethnic style of apartment-style architecture, breaking the previous idea of layout in the process with its apparently unjustifiable design with the enrichment of ethnic style.

2 Related concepts

2.1 Concepts related to modern apartments

One kind of residential real estate in the commercial real estate market is condominiums.

The first apartment buildings were manufactured elsewhere. It's a better financial and logistical choice than a detached home. In the past, urban apartments were large structures with many separate units (complete with bedrooms, living rooms, and kitchens) on each level. These flats catered mostly to government workers, senior officials, and government employees with middle-class incomes. political leaders Several hotels had flats that were leased out to transient guests, such as Chinese and international business people. There are two main types of contemporary apartment complexes, both of which get their names from the word condominium. A business or real estate apartment is one example. The first is a commercial or real estate investment building that looks like any other building: four apartments per floor, shared hallways and bathrooms, and so on. The other is designed primarily for use as housing for, or as an office for, enterprises. Because of their reasonable price, convenient location, and spacious

but compact design, many of them double as hotels or villas that may be used by their owners or leased out to the general public. We may define a contemporary apartment as a structure that has both the features of a condominium and the aesthetic standards of today. The sort of diversity sought for has been attained. People now have a higher level of living than in the past, and as a result, they are more concerned with enhancing the quality of their clothes, food, homes, and modes of transportation. During the last several years, housing has been increasingly more of a priority for the general public, according to surveys. People are increasingly drawn to apartment homes because they come in a wide range of sizes, can accommodate a wide range of populations, and may be decorated in a wide range of styles ^[4].

Some commercial apartments can be shared, and the rent price is relatively cheap; plus, they can also learn to get along with people and socialize during the sharing process, which is the best of both worlds, as the survey found that many young people in big cities choose to live in apartments due to the pressure of buying a house. The villa type of housing, however, not only covers a large area, but also typically necessitates the construction of two to three floors of space, is not very convenient for cleaning, and even requires a lot of money for decoration, so the apartment has become the new choice for some families with large families. Several builders are now providing "senior community" condos specifically for the elderly. This demonstrates that contemporary condos are quickly becoming the norm in the property market.

2.2 Ideas relevant to interior design

This so-called "interior design refers to the process of conceptualizing, planning, and executing the aesthetic, technological, and functional elements of a building's interior. Use of technical means and knowledge of plastic art, ergonomics, etc. to create a comfortable, aesthetically pleasing interior environment to meet the use and aesthetic requirements, considering the nature of the building's use (production or living) and the environment and corresponding standards. The design mostly consists of interior elements such as layout and space planning, surface art treatment, and furnishings including tables, chairs, and lighting.

The field of interior design is expanding and becoming more popular in recent years. As people's lifestyles evolve and their aesthetic sensibilities mature, designers on both sides of the Atlantic are beginning to introduce novel approaches to interior decoration and increasing the standard for the field. Whether you're looking to break the mold or just update your space, knowing the four fundamentals of interior design is essential ^[7].

A. Interior Design Organization

The arrangement and size of an interior space are common examples of this. The first step in structural design is to gather all the appropriate resources and start sketching out the design only once you have a firm grasp of the design's overall framework. The blueprint of the building is the most crucial aspect of the design process. It is important to divide the area and the structure into sections according to their relative importance in the grand scheme of things before beginning to sketch the structural drawing. The key is intelligent space use in building design.

B. Home Furnishings

Definition - the process of setting up a room with furnishings and other decorative elements. There are two levels of furniture furnishing: the simplest and the most intricate. Although Western architecture is known for its use of straightforward furniture, Chinese architecture is

more often associated with ornate, ornately detailed, edifices. The furniture may be adorned with paintings, flowers, tiny items, etc. No matter the building type, enough living and working space must be preserved throughout the outfitting process. Take care of the connection between the furniture and the interface and the connection between the furniture and the interior space.

C. Kind of Interior Decoration

It serves a spiritual and aesthetic purpose in the home's interior design. There is a direct correlation between the local climate, geography, and cultural traditions and the resulting aesthetic. Because of this, there will be a wide variety of architectural forms to choose from. There are many ways to decorate your home, such as the modern, rustic, European, traditional Chinese, Chinese classical, ancient Roman, Gothic, Japanese, Italian, French, Scandinavian, and so on. Nonetheless, there are a plethora of styles that are now popular. Three of them are the French, classical Chinese, and Nordic contemporary. The fashion is up to the individual's interpretation and creation.

D. Color Schemes for Interior Decoration

Color choice is essential to the design idea. Decorating with color is a key priority. The direction of a style may be seen in the careful pairing of colors. Color combinations are also an option for interior design. The primary goal of choosing an interior color scheme should be to create an atmosphere where people feel relaxed and at ease. Color choices used for the inside of a building should adhere to compositional guidelines for effective use of space, a pleasant aesthetic experience, and harmonious interactions between foreground elements and their surroundings. Using complementary colors in a tasteful manner is a fundamental principle of home design.

3 Decoration of Inner Space

3.1 Architectural planning

The local climate and geography are known to have a significant role in shaping a building's blueprint and construction. In general, a condominium is defined as a building with five or more individual units, while an apartment building is defined as a structure with two or more stories ^[10].

Size is the primary differentiator between a contemporary apartment and a conventional home, and it may be modified to suit the available space. In this piece, we'll design a generic, contemporary flat with two bedrooms and two bathrooms and a single story of construction. The apartment has a master suite, a guest suite, a living room, a kitchen, and a bathroom. In order to accommodate the reduced family size, the building is "rectangular in form," and the spatial symmetry of the architecture is used to split the apartment into two primary zones. Two-thirds of each half will go to the left side and one-third to the right. Kitchen and dining areas are separated to protect diners' health and for efficient meal preparation. Without a solid wall between them, the living room and dining area serve as one large open space. The two bedrooms are located on opposite sides of the house, the bathroom is in the middle, and the balcony overlooks the living area and a little garden outside. The apartment's essential structure is respected, and the space is used rationally; likewise, the influence on furniture is minimal.

3.2 Interior Decoration

The furnishings of today's flats are modest in design while yet providing all the necessary supplies and amenities for residents to live comfortably. Also, a significant number of green plants are planted in each location to cleanse the air and provide a sense of warmth and comfort. Ethnic patterns are used to design various goods, such as murals, beds, flooring, and other objects, giving each area a distinct ethnic feel. Also, certain decorative accents have been strategically arranged to complement the overall aesthetic of the room and to mirror the practicality of its furniture. Optimal and reasonable use of available space is guaranteed.

3.3 Fashion and layout

After five thousand years of ups and downs, it's clear that China's traditional culture is the most significant aspect of the country's history and heritage. There are 56 recognized ethnic groups in China, each with its own unique language and set of cultural practices. Because of the way the world has developed and changed in recent years, our ethnic culture has been profoundly impacted. The national culture of certain groups is being lost at an alarming rate. It has begun to be implemented in daily life in an effort to preserve its values and essence. Certain forms of folklore are being kept alive and handed down via the hospitality, tourist, and souvenir industries. The notion of incorporating ethnic style into the design comes from the belief that ethnic culture is a symbol of our culture and should be dispersed across all urban areas rather than confined to places with a predominance of a particular ethnic group.

As the world's technological capabilities expand, so too does the scope of design innovation. Throughout time, we've seen the development of architectural styles ranging from traditional Chinese to Western to a synthesis of the two. We all know that today's flats are designed with simplicity and functionality in mind. As the contemporary minimalist aesthetic places a premium on functionality above ornamentation, the home's interior will be laid out in accordance with the idea of functional differentiation, and the furniture's color modeling will likely follow suit. Certain pieces of furniture are styled in line with a more intricate design, but even those pieces manage to strike a nice, minimalistic balance with their models.

The design style is a fusion of Chinese and Western architectural models, with ethnic traits added for a fresh take on contemporary apartment living. As environmental safeguarding is such a topical issue nowadays, it's important that this be considered while designing. The paper borrows its central subject from current minimalism and European style, before putting an emphasis on the design's inherent solidity and cultural specificity. The design departs from the standard convention of having each room be decorated in the same color as the national theme, with a total of five color themes, each of which reflects a distinct country character. Black to create the bathroom, the bathroom is used for washing, black has a lazy and casual symbolism, but is extremely attitudinal; red for the master bedroom, representing passionate fire; green for the living room, representing the feeling of spring and vibrancy; red for the living room, representing the feeling of spring and vibrancy; and green for the rest of the house. Blue is used in the guest room because it symbolizes the hope and tranquility that everyone longs for, and yellow is chosen in the kitchen because it is not only young but also bright, warm, attractive, and reminiscent of the sun. A new ethnic style is created by fusing the five themes ^[2].

There's a perception that those of a certain ethnic background are bold, authentic, and impulsive. The outdoors evokes feelings of warmth, freshness, and comfort. Material reductions, in keeping

with the spirit of sustainability, will see the same mappings used again. Our new "green ethnic style," which will include abundant natural light and lush vegetation, will be informed by certain exaggerated elements of traditional ethnic design as well as Chinese and Western architecture. People will notice a change in aesthetic, one that is fresh and full of creative nuance.

3.4 Color Scheme

Color is both the primary focus and the most integral component in contemporary design. We all know that the spectrum of colors is wide, and that each kind of classification has its own unique set of hues. There is a lot of finesse put into the color coordination, which includes cold, warm, and medium tones. The overall color tone will be fresh and original thanks to the skillful pairing of colors. Here the national nature of color, that is, in the development of color, the use of the process reflects the national culture, national psychological traits, and is thus an important reflection of social and regional culture.

Many people incorrectly associate traditional ethnic colors with the main and secondary hues. Ethnic design, on the other hand, makes use of a rainbow of hues in a complex pattern. Given that this paper has an ethnically inspired aesthetic, the range of colors used in its design reflects that. Colors such as yellow, green, blue, and red serve as the primary colors, while white, black, and gray serve as the secondary colors in this paper. Taking cues from traditional ethnic culture's architectural color palettes, the five themed rooms are meant to blend in with the ethnic and natural aesthetics. Wallpaper with a basic texture of hue comparable to the yellowish marble pattern was chosen to complement the overall feeling of cleanliness and coziness inspired by the design's fusion of Chinese and Western architectural elements. Flooring is also done in the Bai marble style to match the wallpaper, which is a combination of cream and dark yellow stickers to give the impression of being in Dali, Yunnan. Ethnic style pattern renovated stickers are used on the couch and the carpet in a variety of colors to emphasize the rich cultural and artistic ambiance. Several artwork depicting various ethnic groups are also shown on the murals. Wooden cabinets are painted a sunny yellow, while glass fronts are blue, cream, and black, and sometimes there are even ethnic designs added to the mix. The bedroom is decorated in a subdued and understated fashion with red and white and blue and white ethnic design decals and white lines made of patterns pasted on to various furnishings. The bathroom is decorated in mostly black and white tones, with additional touches of black and white on the washing machine and sink to emphasize the room's ethnic character. Using wooden components, I want to assemble a few little things in shades of brown, green, and brown. Each space is decorated with black and white decals that reflect the minimalist aesthetic. The abundance of greenery and the contrast between colorful and uncolored areas improve the aesthetic appeal. The hues of the ethnic style designs are brought out with greater imagination.

3.5 Indoor visible light OFDM technology

As for OFDM technology, we know that this baseband signal is usually expressed in the form of complex, and some will be in the form of bipolar, which is determined by its algorithm. However, in the wireless communication, especially in the visible light communication system, the "real and positive" modulated signal must be used as the baseband signal for transmission, which is the mandatory requirement determined by the method and must be met. Therefore, we need to real-number the complex modulated signal, that is, it becomes the "real, positive" modulated signal we need. Through the study, we found that the method of discrete Fourier

transform can meet our needs, and the characteristic of this method is that it has conjugate symmetry. Through this discretization method, we can change the OFDM signal in the plural form into the real form, but the real form also has the difference of positive and negative, which is still bipolar. Therefore, we also need to change the bipolar signal through the unipolar processing, so as to change the signal into the unipolar signal. Such unipolar signal is the modulation signal needed in visible light communication.

An integral part of the OFDM system. Its transmission processing process can be understood as: the optical signal is mapped after OFDM modulation, the commonly used method is QAM modulation, and then the signal is processed for single polarization, generally through the transformation of IFFT and single polarization, through these two steps, you can get the modulated OFDM signal. After the modulation signal is amplified, the signal can work in the linear working interval of LED, and it is converted into optical signal and transmitted by LED, to complete the transmission of data.

Its processing can be understood as the reverse of the sending process: The photodiode detects the optical signal, which is the LED light. At this time, because of the physical quantity of light, the light intensity needs to be converted into electrical signal to be recognized and processed, and then converted into digital signal through A/D, and then the multipath signal is transformed through parallel/string transformation into a single-path signal, and then demodulated by OFDM. That is, the FFT transformation is the reverse of the modulation, so that you can interpret the data that's being transmitted.



Figure 1 Block diagram of OFDM system

As shown in Figure 1, this is the block diagram of visible OFDM system. IFFT and FFT are what we call the modulation and demodulation step, which has a very important significance in OFDM algorithm and is the core of the technology. The output vector in the demodulation process is the time domain signal. The definition forms of IFFT and FFT algorithm adopted in this paper are respectively:

$$x_m = \frac{1}{\sqrt{N}} \sum_{K=0}^{N-1} X_K \exp\left(j \frac{2\pi km}{N}\right), 0 \leq m \leq N - 1$$

$$X_K = \frac{1}{\sqrt{N}} \sum_{m=0}^{N-1} X_m \exp\left(-j \frac{2\pi km}{N}\right), 0 \leq k \leq N - 1$$

(1)

The reason why the algorithm is defined in this way is that the whole algorithm can be simplified and optimized to some extent. By doing this, we can see that the total energy of the whole signal is the same before or after transformation, whether it is in the time domain or the frequency

domain, that is, there is no energy attenuation, and their average power is the same. It also indirectly shows that this algorithm is effective.

Suppose that the channel noise of the visible light communication system is AWGN (additive white Gaussian noise), then the relationship between the received signal and the sent signal is:

$$y_m = x_m + \omega_m \quad (2)$$

When the receiving end demodulated

$$Y_K = \frac{1}{\sqrt{N}} \sum_{M=0}^{N-1} y_m \exp\left(-j \frac{2\pi km}{N}\right), 0 \leq k \leq N-1$$

$$Y_K = X_K + \omega_K \quad (3)$$

Where,

$$\omega_K = \frac{1}{\sqrt{N}} \sum_{m=0}^{N-1} \omega_m \exp\left(-j \frac{2\pi km}{N}\right), 0 \leq k \leq N-1 \quad (4)$$

It can be seen from the above formula that this is the relevant calculation in the demodulation process. Is the noise on the subcarrier of the seventh channel. At the beginning, we assume that the noise is Gaussian white noise, so the noise is also based on the sampling value of N-channel mutually independent synthesized signal. Since each channel noise is not independent, and FEC (forward error correction) is used in the algorithm, the impact of the noise on the transmission performance of the whole system is reduced.

OFDM symbols obtained after the modulation process generally appear in the form of complex numbers, specifically one or more discrete complex numbers. Through the discretization method, we can change the OFDM signals in the form of complex numbers into the form of real numbers, but the real number forms also have positive and negative differences, and are still bipolar. Therefore, we also need to put the bipolar signal through the unipolar processing, so as to turn the signal into a unipolar signal, such unipolar signal is the modulation signal needed in visible light communication.

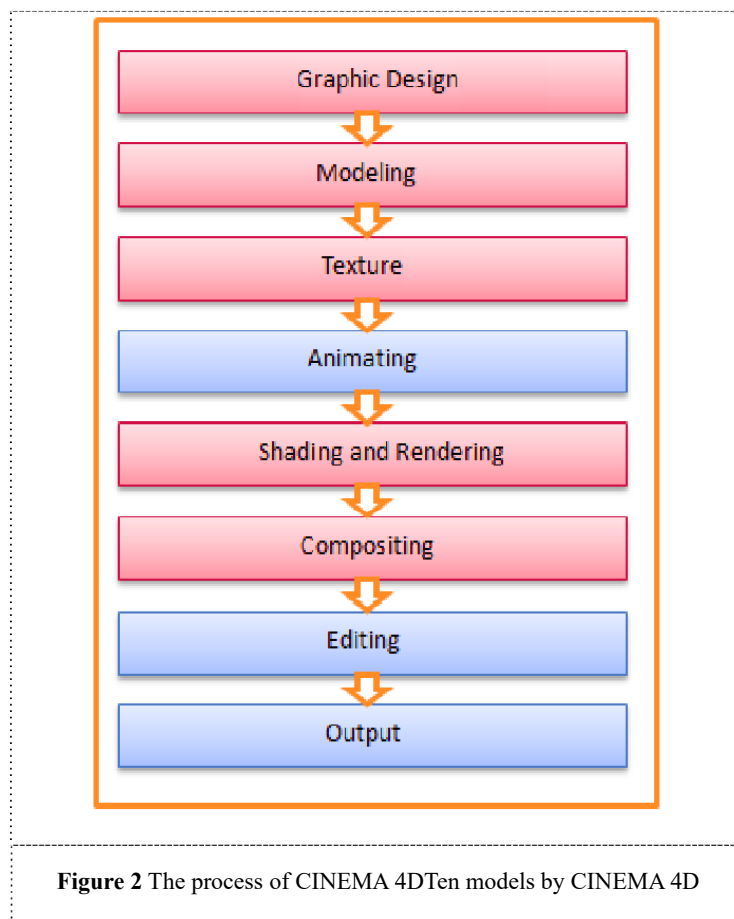
4 Implementation of an Interior Design

4.1 Modeling

Based on the data provided as a reference and the overall floor plan of the flat, the total area is calculated to be 495 square meters in this document ^[9].

Again, per the module breakdown, Cinema 4D will be utilized for all module production, as shown in Figure 2. These are five ways in which CINEMA 4D excels above similar 3D modeling programs: To begin, the vector graphics program Illustrator is a fantastic fit for the flat visuals used in the title word design link. Furthermore, chamfered typefaces may be modeled quickly. It's simple to use an Ai path to make a chamfered typeface in 3D; all you must do is put the path on the "Extrude" layer and adjust the chamfering and mapping selection settings. The process

of making chamfered characters in three dimensions is substantially simplified by this. Finally, it has a powerful rendering engine that doesn't drain your battery. Designers may see the rendered rendering in real time by using the "Render Window," while the "Quick Render" function makes it easy for them to inspect the rendered rendering as it is being operated.



CINEMA 4D, at the fourth place, is open to external plug-ins. Software like Hangover may provide an immediate notification to the designer as the rendering is complete.

Finally, it's compatible with After Effects, so you may work together on projects. It is no longer necessary to manually transfer rendered files into compositing software; instead, they may be imported directly from CINEMA 4D into After Effects by way of a plug-in built independently.

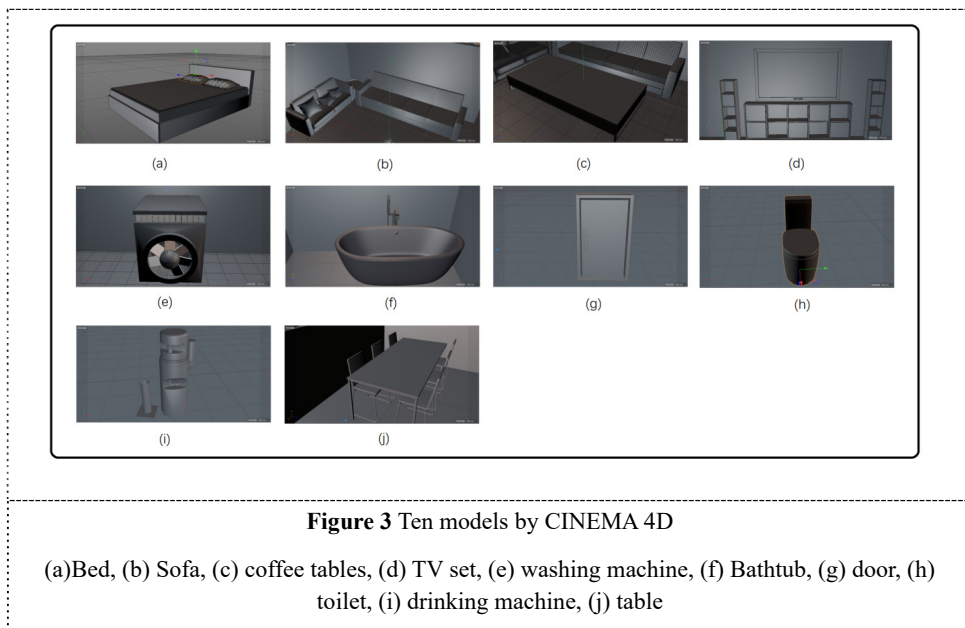
Initially, there are five distinct buildings, including a master bedroom, guest bedroom, living room, kitchen, and bathroom, as indicated by the surrounding space. Kitchen includes a dishwasher, dining table, range hoods, frying pans, cutting boards, refrigerators, lockers, and some kitchen utensils; bathroom includes a toilet, bathtub, sink, washing machine, brooms, etc. Master bedroom includes a piano, balcony, ceiling, carpets, etc. Guest bedroom includes doors,

beds, desks, ceiling, carpets, etc. The floor width and height are calculated at 2200 and 2250 centimeters, respectively, based on the entire area, and the cube is utilized to produce the overall room structure wall. Some of the most important models' development procedures are outlined here.

a. Fabrication of the bed assembly:

One, make a new cube with the XYZ coordinates (450, 50, 350). Then, replicate the shape, rotate it by 90 degrees, and adjust its X, Y, and Z measurements to 150 by 25 by 350 centimeters. Make a new cube with the X, Y, and Z coordinates of 445, 25, and 345, respectively, and shift up one place. Make a brand-new one with the X, Y, and Z measurements of 440, 20, and 340 centimeters, and then elevate it. Afterwards, establish the rounded corners, with a radius of 0.16cm and a subdivision of 2.

Starting at the peripheral (2), a new cube was created with the following dimensions: (X, Y, Z) = 5 cm | 53 cm | 360 cm | rounded corners | corner radius of 0.16 cm | rounded corners divided by 2. Next, I copied it, rotated it by 90 degrees, set its X, Y, and Z dimensions to be 150 cm, 25 cm, and 350 cm, and went to the very end to make the bed's head. Figure 3(a) illustrates this.



b. Manufacturing Sofas:

(1) Construct a new cube with X, Y, and Z values of 100, 85, and 22, with Y set to 10. Round the corners to a depth of 0.5cm and a division of 5. The options are: "impact, or, alternatively, the "expansion" effect Choose the "swell" effect, place it within the "cube," then choose "match to parent," and set the intensity to 8%.

(2) Make a brand-new cube with the following dimensions: X = 85cm, Y = 18cm, Z = 95cm, and X, Y, and Z segments = 15. Next, establish the rounded corners; their radius should be

0.67cm, and their subdivision should be 5. shift it about as needed so that it looks right in all three perspectives. To apply the FFD effect, first place the "FFD" into the "Cube" drop-down menu and then choose "Analogy to the parent Click the "Match to Parent" option. Just make the cube an editable object, pick out the points, and tweak them as you want. Make a copy of it and "rotate" it before making the necessary changes.

(3) use the cubes. After incorporating the "symmetry" effect and the "blank group" into the "symmetry," as well as dragging and pulling the "blank group" to the sides, a cluster of couches materialized. Figure 3(b) depicts the situation.

c. Manufacturing coffee tables:

Put together a brand-new cube with X, Y, and Z values of 300, 25, and 120 centimeters. b After the three cubes is properly aligned and brought to their final location, the workstation may be assembled. Next make eight more cubes, and shift to the four corners of the table. Tabletop model for coffee consumption shown in Figure 3 (c)

d. Television Manufacturing:

(1) Make a new cube with the following XYZ dimensions: 250cm, 150cm, 15cm; this will turn the cube into an editable object; (3) choose "internal extrusion" and "extrusion" and then "split" to separate the cube into two pieces; (4) change the settings of the "extrusion" operation as desired. Rename the cube's wall-mounted face "TV," then relocate it to the wall.

Make a new "text," type "SM SUNG," and then go to the middle of the screen just below the location (2) on the TV. Figure 3(d) shows one example of this.

e. washing machine manufacturing

Make a new cube with sides of 230cm, 200cm, and 200cm (1). At the middle of the cube, draw a new circle with a radius of 80cm.

Tap the edge to perform a linear cut, then hold Ctrl and cut off the circle after the cube has been transformed into an editable polygon. Views may be flipped, and the circle can be turned off, by pressing the corresponding buttons. Choose the face mode with a tap, press and hold Ctrl, and then choose the internal extrusion option. Adjust the outer ring by tapping "facial mode," "ring selection," and then "dragging." Keep pressing Ctrl down.

Make a new capsule with a 300-centimeter diameter and a 200-centimeter height, and then spin it to the desired location. Make a new cube with X, Y, and Z measures of 3 cm, 53 cm, and 31 cm, then move it to the desired location. Replace the original cube with a copy that has been rotated through 15 degrees, has a radius of 37 centimeters, and operates in radial mode with a number of 7. Convert the cube into an editable polygon by placing a new rectangle on top of it with dimensions of 230 cm in length and 200 cm in breadth. Make a new cube with XYZ measurements of 15 cm, 23 cm, and 15 cm. Make a copy of the cube, switch to object mode, and then attach the rectangle. Standardize it to 44. Shift it around and enlarge it. Construct a new cube with XYZ coordinates of 200, 10, and 200, and place it atop the stack. In keeping with what is shown in Figure 3(e).

f. Bathtub manufacturing has increased

Make a new cube with sides of 210 centimeters, 175 centimeters, and 425 centimeters.

Make it a polygon you can modify, go into point mode, select everything, hit optimize, go to edge mode, select everything again, hit the taper button, drop it into the cube, make sure it's a perfect match for the parent, open the deformer, and place the intensity at 30%. To remove and connect things.

To achieve this, go to the face mode, choose the top surface, apply the "internal extrusion" effect, hold Ctrl to extrude downward, and then scale the object slightly. Keep holding Alt when you make a circular cut to give the "subdivision surface" effect. The tub must be carved out specially. Figure 3 (f) shows the results of this.

g. Creating Doors,

Make a new cube with X, Y, and Z values of 30 centimeters, 270 centimeters, and 165 centimeters; convert it into an editable polygon; switch to face mode; add "Internal Extrusion," then add "Extrusion;" then resize it.

Make a new pill and scale it to fit. Next, make a new cylinder, convert it to a polygon you can manipulate, and use FFD to shape it into a door handle. Toss in the "Symmetry" filter and tweak the settings to taste. Figure 3(g): Here is how it all breaks down.

h. The process of creating a bathroom

Deform it with FFD once you've created a new cube, turned it into an editable polygon, then rounded and smoothed it out using points and lines. Then, make a copy of one and scale it up to the desired height to get the bowl. Make a brand-new cube, scale it to the right size, and give it slightly rounded edges. Adjust the placement and size of the duplicate and make a new copy. Figure 3(h) shows the results of this.

i. Water dispenser manufacturing

Make several brand-new columns and adjust their widths. After the points, lines, and connected faces have been passed, the hollowed-out faces may be deleted, and the polygons can be moved in accordance with the three perspectives, finishing the base. Start with a fresh cube, transform it into an editable polygon, then use FFD to give it the proper shape for the water dispenser's hot and cold-water buttons. Make a new cylinder and flat surface to use as the water dispenser's ornament. The evidence may be seen in Figure 3(i).

j. the dinner table's construction

As can be seen in Figure 3(j), the dining table is fashioned in the same manner as the coffee table. In the end, the layout design (shown in Figure 4 is what yielded the final model effects.

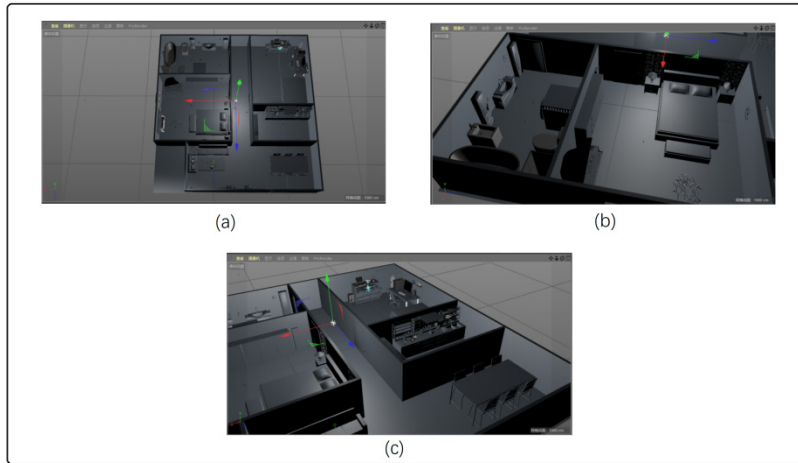


Figure 4 Interior design models

Front view, (b) wide angle view, (c) top view

4.2 Mapping

(1) After the prototype was finished. I gathered some digital stickers after consulting the data. Afterward, in Photoshop, you should get rid of the watermark and arrange the dimensions and clarity, shows in Figure.5.

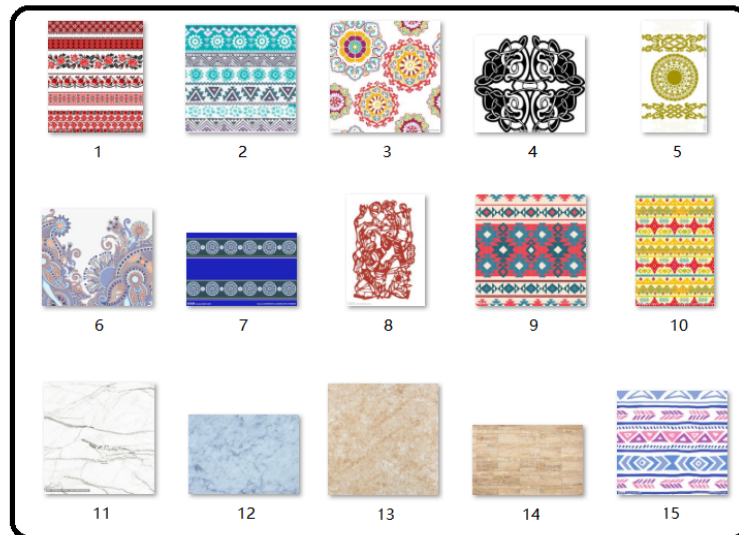


Figure 5 Ethnic style stickers

The CINEMA 4D mapping procedure. Start by making a new material sphere, uploading the ethnic style mapping, tweaking the parameters, and finally dragging the sphere onto the corresponding object, which uses the same technique to finish the mapping by dragging the material ball to the appropriate objects, shown as follows.

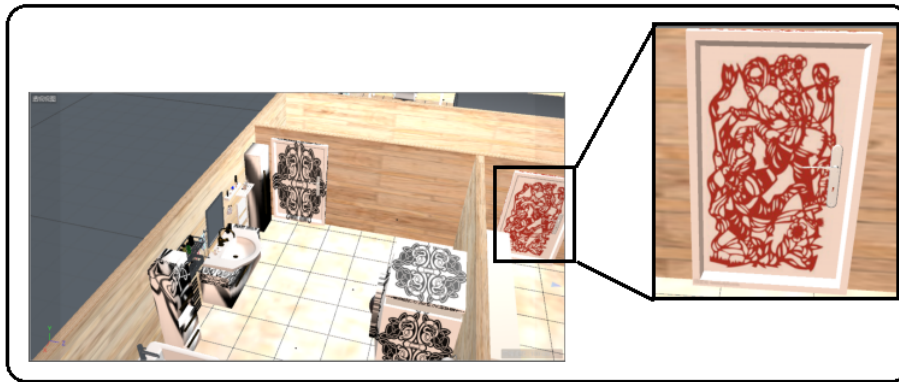


Figure 6 mapping effect

New material balls are formed and their characteristics and textures are established in order to accommodate the demand for a variety of materials when fabricating certain objects. In Figure 7, it depicts the action you should take to finish the mapping by dragging the appropriate elements to their correct locations.

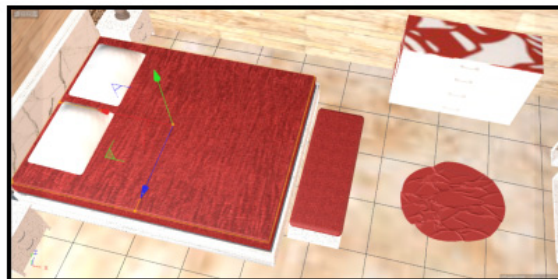


Figure 7 master bedroom paste effect

4.3 Lighting

Base on equation. (1-4), the modules need artificial and natural lighting because of the OFDM-LEDs included inside them. Adjust the three new lights' intensity and hue so that they complement the yellow marble pattern that serves as the room's backdrop. Then, Figure 8 depicts the three-view interface in which two of the views may be moved and the third left unchanged.

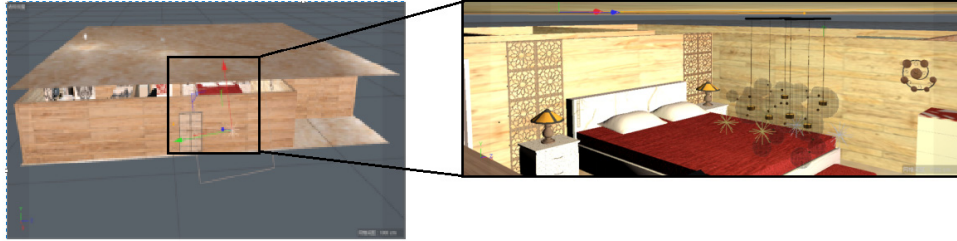


Figure 8 Lighting effect

As a third point, you'll want to make sure there's enough of natural light, since artificial lighting is seldom utilized throughout the day. Bring in fresh daylight by adjusting the window's location and angle so that natural light may enter the room.

4.4 Visualization

After the mapping is complete, the next step is to begin rendering in CINEMA 4D, choose the desired camera angle inside each room, render, and wait for the rendering to complete; the completed product is seen in Figure 9.

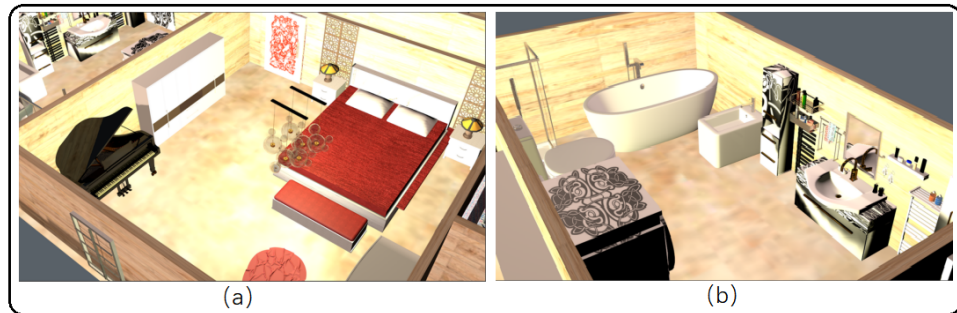


Figure 9 Bedroom rendering

5 Conclusion

The basic shape of the model was based on that of several contemporary, simple furniture pieces; from there, it was adjusted and modified utilizing lines, cubes, capsules, and rectangles to get the desired result. The mapping design was developed after the modeling was finished, and the discrepancy was discovered during the mapping processing in Photoshop. In this paper, we use modeling technology implemented in Cinema 4D software to bring the interior of a contemporary apartment to life; the viewer is free to move around the space with the click of a mouse, allowing potential buyers or investors to get a feel for the apartment's layout in a matter of minutes. Finally, the effect is generated using Cinema 4D mapping, mural mapping, and

pattern mapping in an ethnic manner. Meanwhile, orthogonal frequency division multiplexing (OFDM) is used in visible light communication, both Cinema 4D and Photoshop were used extensively in this work; the former for the creation of the major structure and effects, the latter for the editing of the mapping images.

Overall, the work may lack technical substance due to a lack of depth in its design brought about by Cinema 4D's insufficiently robust practical application ability. The 3D rendering result may be subpar due to factors such as imperfect mapping picture processing, model complexity, and low-end hardware. There is a lack of thoughtful, individualized design in the interior's layout and planning, and the resulting color scheme is dull and unappealing.

In sum, this article improves the aesthetic experience visually, employs a novel method to finish the design, and shows some understanding of the knowledge and application of interior design, which is a suitable basis for further work in this area.

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