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Design and Production of 3D Animation Short Film “Relict”

By

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A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Fine Arts in Visual Communication Design

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Abstract

Relict is a science fiction 3D animated short film that surrounds a fantasy of future Beijing, the capital city of the People's Republic of China. The short film critically explores three important problems, which are heatedly discussed nowadays in Beijing, of large population, environmental pollution and declination of people’s living standard through a fictional point of view of several Landmark buildings of the metropolis.

These three issues I hope to discuss in this short film are closely related to each other. Firstly, the large population problem is caused by the fact of its greater resources in politics, economy and education as the center and capital city of China. More and more young people seek to settle in Beijing for splendid development which unavoidably leads to the problems of cheaper labor, higher pressure and the rising of the housing prices and causes living standard going constantly down in Beijing. The great air pollution is mainly caused by large number of automobile exhaust and coal heating in winter which is also closely related with overpopulated problem.

The author of the thesis made this short film to arouse his audience's reflection on these issues through modeling and rendering by 3D technology, using realistic visual style and science fiction story setting. The duration of the short film is 2 minutes and 20 seconds. This thesis would faithfully record the creative thinking and film production process of this animated short film.

Keywords

Beijing  Science Fiction  3D  Animated Short Films  Concept Art


**Introduction**

In contemporary Chinese society, Beijing is the most typical case of first-tier cities. The representative problems such as overloaded population, rising of house prices and declination of people’s living standard in all the first-tier cities exist and worsen every day in Beijing. The three seemingly independent issues are actually interacted and related to each other, so it is impossible to discuss them separately.

In the Conceptual Stage of this project, the author of the thesis hopes to express in the final present of the works his independent reflection on these three issues; as well as his creative aesthetic taste and practical competence in 3D technology through incorporating some detailed Chinese aesthetics concepts of composition and color into the works so as to create his works that can mix Chinese classical aesthetics and western modern design theory together.

This kind of collision is both visual and ideological. On one hand, through this kind of collision, the author of the thesis combines several Chinese aesthetics ideas into his modern western design structure to create a unique visual style. On the other hand, he attempts to express some cultural and social problems in China through a western perspective.

On one hand, the author of the thesis would elaborate his thoughts of expression the above three problems in the short film through visual design in the Conceptual Stage. A detailed illustration of the thinking process and the design of the emotional feeling of the project would be introduced in the thesis. On the other hand, the production process of the film on the technical aspect would be explained in an interesting way, especially on the technical way of visualization of the creative ideas to the audience. A detailed introduction and explanation of the rendering would be introduced as well as some specific planning methods in the production of the project. Finally, the author would summarize the core idea of the film, and analysis through dialectical methods the value as well as the parts that should be improved of the film in both conceptual and technical aspects.

The purpose of this thesis is to record the production process of this film in detail, explain the ideological concepts and meanings expressed in the film, and introduce professional and technical methods involved in the project. The author also would list and introduce the peripheral design works and products of the films. The thesis intends to consummate the records and summary for the whole graduation thesis work, and also provide further interpretation of the theme and ideas of the project for its future appreciation.
Context

Market economy which was introduced into People's Republic of China in the end of last century, has gone through ten years of development. The rapid development of material and economy has also caused three serious social problems which have been brought to people’s attention. Firstly, the problem of overloaded population caused by the beneficial policies granted and large resources flowed in to first-tier cities for their fast development has also aroused rapid growth of housing prices in Beijing. Secondly, air pollution has seriously threatened the inhabitants in Beijing. Most of all, people’s living standard is obviously harmed by those are the three problems. These three issues seem to be independent to each other, however they are closely related to one another, and they exist among all the first-tier cities, especially in Beijing which is the capital city. In this thesis, the author hopes to use 3D techniques through conceptual design and scenario design in order to complete an animated short film, describing how these social problems would influence Beijing and lead to its future with further development of science, technology and economy in hundreds of years.

Methods

In the graduate study stage, as a student in 3D direction of visual communication design, the author has mainly focused on 3D modeling, dynamic design of three-dimensional concept, to achieve the best technical expertise in conceptual design and motion design about objects and lights, although he also has a comparably and slightly weak point on character design and animation skills. Thus, for the content of the short film, the author chooses Beijing as a rather familiar cultural background because of having been studying and living in the city for almost ten years. The valuable learning and working experiences in it enable the author to truly feel the beauty of the city at different levels. In addition to all these, lots of professional knowledge about Chinese aesthetics learned in the undergraduate age also give him another reason to choose the theme about China and Beijing in order to achieve a better work.

To sum up, the author of the thesis chooses the theme of reflecting on the most popular social problems in Beijing, China, as the topic of the project, and adopts 3D modeling through conceptual design of a series of sci-fi-style scenes in Beijing as the form of expression, at last edits these scenes together to form a short film, thus can maximize the conceptual and technical advantages of his entire resources.
In the specific production process, the author would firstly design the narrative logic of script, then select the most representative elements from Beijing for my artistic recreation according to the script. The next step is to finish the storyboard and the specific conceptual design of each scene by following the narrative logic and using the chosen elements. After completing the conceptual design, the dynamic expression of each scenes and shots would be created. Finally, all the completed materials would be combined together according to the storyboard to finish the short film.

This short film tells us a story about future Beijing. Reflections on current social issues, such as environmental pollution, imbalances in social resources, overloaded population and housing problem, are fictionally expressed through certain imagination of future Beijing. The short film itself would adopt a prose narrative style, without character creating and a storytelling linear narrative method. It uses a series of thoughtful redesigned indoor and outdoor scenes in accordance with certain logic and a unique sequence of editing to bring great visual and emotional impact to its audience. Within two-minute clip, the design and editing of these scenes would allow the audience to rethink profoundly those social issues affecting Beijing greatly, as well as make the audience go through emotional changes from depression to liberation, from confinement to grandeur.

Firstly, according to the original design, the author wants to focus the narrative logic of the script on expressing the three current social problems mentioned above and how they would affect Beijing in the future, thus to create a relatively depressive and heavy emotional tone at the beginning of the film. Many indoor, closed space scenes are chosen to be expressed at the very beginning with the color pellet mainly in a cold and grayish tone. The color pellet and composition are especially useful and more suitable to describe the daily depression of people working in Beijing. In the middle of the film, outdoor scenes begin to appear, and the color is gradually saturated to show a change indicated the other side of Beijing, the bustling metropolis produced by people working under high pressure, making a contrast with the previously depressed scenes at the beginning. Symbolic scenes are described at the last part of the film, suggesting air pollution in the great city. Finally, the camera returns to a group of still scenes, suggesting that all problems can ultimately be solved in people’s effort to establish order and make development. The film's timeline is from night to sunrise and then to daytime, suggesting that despite all the problems, Beijing's development will always move from darkness to dawn and brightness. This emotional tone from darkness towards brightness emphasizes the
core idea the author wants to express in the film and adds to the theme the positive expectations, weakening its negative satire and criticism.

Regarding to the representative materials, the author has chosen several most representative landmark buildings in Beijing, including Beijing's financial center such as China World Trade Center and Pangu Plaza, Beijing's Cultural and Art Center 798 and several famous ancient architectures such as Temple of Heaven, Zhengyang Bridge and the Palace Museum. On the one hand, these landmarks make the theme of Beijing even more distinctively. On the other hand, the use of these landmark architectures can best reflect the conflict between cultural heritage in Beijing as long as its development and how they fit in with the modern architectural landscape. The conceptual idea of the film expresses, just as Beijing has dealt with the contradictions between old and new in urban planning and development since the founding of People's Republic of China, that Beijing would continue to develop in spite of severe contradictions in future days.

Just like its name "relict", all scenes in the film are totally empty; though they are full of results of people’s continuous work and becoming relics. Such visual style is aimed at showing to the audience the other side of this ever-flourishing city in great contrast to bring a sense of both familiarity and strangeness. The ghost town feeling is also an expression of the idea that even if people work constantly to create unlimited material wealth, when everyone is gone, all the prosperity will be meaningless.

For example, the centered composition is a very balanced and elegant way to organized objects in Chinese culture. Because many Chinese historical buildings and art pieces preferred to use symmetric structure, and Chinese urban planning also likes to plan in a symmetric way. Therefore, sometimes only the centered composition can best show its charm for the view of Chinese streets and houses. In our final design, there are many scenarios using centered composition, such as Zhengyang Bridge.
About the style and details of our film, we have also learned many of the most classic details from ancient Chinese elements. For instance, the special wooden structure such as cornice and dougong, the highly decorative architectural style and some special Chinese color palette. Many streets in Beijing now coexist with both ancient and contemporary buildings, so in our design, there will be such conflicts in Beijing in the future too. In the short film about ancient buildings, we carefully investigated the design details of the existing ancient buildings, and applied them to our design, hoping to reproduce the unique aesthetic perception of Chinese architecture.

As for the conceptual design of these existing landmarks, the series of office scenes from at the beginning of the film, Beijing subway, 798 Art Center and Zhengyang Bridge would be used as examples to illustrated more about the project.
The most representative and gathering places of immigrants are the office buildings in the most popular financial business center in Beijing. People working there are those mainstays of the labor who are usually called the Beijing floaters coming from other places in China. Though seemed doing some decent jobs and working really hard, they could only get rather lower salary. In China nowadays, there is a certain working mode called 996, which means working from 9 a.m. to 9 p.m. every day for a total of 12 hours, working six days a week. Such high-intensity work model has gradually become sometimes a rigid rule of the major companies in Beijing. Employees can only choose to obey, otherwise they have to choose leaving. Moreover, companies with such rules would give basically no pay for their employees’ overtime working. Therefore, white-collar employees in Beijing are under great pressure with even not enough salaries to pay their accommodation. Their busy figure appears everywhere in the giant buildings as I depicted in the early part of the film, jailed in the dense workplaces, shuttling in the office hall, worrying about whether the crowded elevators is coming or not. In order to express those scenes of large office building in the beginning of the short film, the author mainly creates an extremely depressive and cold atmosphere through the composition of the frame, the position relationship between objects, the using of the light and color, which lays an emotional tone for the whole film.

Although there are subways in big cities all over the world, Beijing's subway is very unique. Because of urban planning and overloaded population, many people can only travel by subway during rush hours. Some of them are white-collar with no savings; some are not without private cars, but cannot tolerate the abnormal traffic congestion in Beijing that may cost them too much time. Beijing's subway runs every 2 minutes during rush hours, but it still cannot withstand
the huge pressure of passenger flow. Many stations with large traffic in Beijing Metro have special staffs that constantly use loudspeakers to urge passengers getting on and off the train efficiently when it is necessary. Sometimes, their duties even include pushing passengers crowded in doorways into carriages so that doors can be closed and the subway can operate normally. Because of the large scale of Beijing's city area, the average commuter who travels through subway needs to spend 1.5 to 2 hours of commuting every day.

This scene depicts Zhichun Road subway Station, a transfer station connecting Beijing subway Line 13 and Line 10. Zhichun Road Station is a necessary station connecting Haidian District, in which several universities are located in, with Chaoyang District, where many white-collar office buildings are concentrated in. Countless people come and go at this transfer station every day.

798 UCCA Exhibition Hall

798 is the most distinctive art and design industry center even known around the world, which is developed from an abandoned industrial plant in Beijing. At the end of 20th century, a group of poor but talented artists in Beijing gathered in these abandoned factories for artistic creation, and spontaneously started to organize some exhibitions of contemporary art. Later, more and more art and design industries gathered there and gradually formed the 798 Art Center. The most representative exhibition hall in 798 is UCCA Center for Contemporary Art, which is been chosen by the author to present in the project. I placed a dense but empty iron lung in this special architectural design exhibitions hall, which symbolizes that if Beijing's air pollution issue becomes worth, people who walk in the streets wearing protective masks now would eventually have to rely on ventilators to live in the future.
Another scene is Zhengyang Bridge, which is a part of a defensive ancient building built in Ming Dynasty. Nowadays, behind Zhengyang Bridge is a long commercial street, one of the first choice of entertainment places for Beijingers and tourists. Due to advantage of abundant social resources in Beijing, more and more people come to the city to seek jobs and opportunities for individual development causing house resources becoming increasingly rare. If Beijing needs more space to accommodate urban residents in future, it is one choice to have ancient buildings like Zhengyang Bridge surrounded by buildings to provide accommodation to people. Therefore, the design of the project is to fill the space below and behind Zhengyang Bridge with residential buildings that even block out the sun. These residential buildings are extremely giant in contrast with the size of each single room is condensed into especially small to accommodate more people.
In addition to these scenes, the conceptual design of other indoor and outdoor elements has also been carefully expressed. Among them, the use of Chinese character as a special element is also an interesting thought added in some scenes. For example, "计划生育" on the wall of the nightclub refers to the slogan of one-child policy. The two lines of the poem written on the wall of the Palace Museum imply that over deliberate pursuit would result in vain, suggesting that blindly pursuing the speed of development may lead to more problems. The four words above the 798 Hall describing the extreme beauty of various landscapes in the world are designed in sharp contrast to the iron lungs below them, giving the scene an odd and ironic feeling.

Referring the technical aspects, the film adopts C4d software modeling, Arnold material and lighting system rendering. The making of all scenes involves lots of various materials, involving many mapping and lighting work. In order to achieve the best effect, the author finds abundant references that can be used to restore the details as much as possible of the existing landmark buildings expressed in the short film, as well as re-create all the scenes through rich imagination and thoughtful interpretation of theme-centered ideas. The visual style of the re-creation not only pays tribute to the light, shadow and composition of the classical sci-fi artworks (such as Star Wars and Blade Runner), but also incorporates some Chinese aesthetic color using and composition methods. For example, the author uses the perfect axisymmetric composition in Zhengyang Bridge scenes and vermilion red on the wall in the scenes of the Forbidden City etc.
In the rendering process of all the scenes, considering the limited time can be used in making the graduation project, the author uses 2.35:1 screen ratio and 2350x1000 pixel screen size in the rendering stage, which is close to 1080p screen size in the wide screen ratio. While in order to show the most realistic visual effect in some special scenes in material and lighting design, the highest single-frame rendering time has reached 18 hours per frame, the average rendering time of all scenes was controlled within 5 hours. Through scattering the rendering work on different computers, the rendering work of all shots are successfully completed within two months. Next, the video frame is enlarged to 4K and carefully de-noised and color graded to achieved a pretty good visual quality on the premise of the resources that can be utilized.

Movie used as color grading preference

As for the color grading of the film, the author of the thesis refers to the color grading of many classical films with similar themes such as Blade runner and Matrix, as well as some Chinese films like Hero and Crouching Tiger, Hidden Dragon. After consulting them, in most of the shots, the author chooses to dim the brightness, create a clean dark area, increase the contrast, and emphasize the visual hierarchy of the scene. In terms of hue, he chooses to reduce the overall saturation of the scene, make the scene grey, then unify the tone of each scene, select the highlighted part in each scene to enhance the brightness and saturation of the color, and finally get the visual effect presented in the film.
In the color grading, we also carefully considered the relationship between the editing sequences and the tone of each individual shots. In our editing ideas, the video initially hopes to create a depressing cold atmosphere through a series of cold tone and low saturation shots, so that the audience can feel the tension of these social problems in Beijing. As time goes by, we hope that the scene will become brighter and more colorful, depicting the magnificent side of Beijing. The shots at the end should be warm and bright, which indicates that Beijing's social issues will eventually be solved and that Beijing will continue to make progress.
According to the above editing thoughts, we keep a series of shots at the beginning of the film in the dark cold tone with low saturation. Then the shots gradually became bright and warm, some bright colors appeared. The last few shots are all warm and bright. This color change can be seen by the following chart. The chart analyses the changing of the main tone of each shot in the whole video in three aspects: hue, saturation and brightness which intuitively present the above editing and color grading ideas.

The hue, saturation and brightness of each shots.

**Result**

The final design was completed in the form of a short film, named "relict". The Chinese name is "孑遗", which has the same meaning as its English version, referring to the remains left by people struggling and striving in Beijing, as well as many problems accompanied the social development. The project of the design includes not only a short film, but also a pictures album and illustrations of the short film, as well as posters introducing the design. In the album, the design ideas of all the scenes are carefully interpreted, and the static pictures of these scenes are color-graded and displayed in printed versions. The poster contains the title and exhibition information of the design, in which two scenes of Zhengyang Bridge and the Palace Museum were chosen as the main elements.
Conclusions

In terms of the footage and volume of a video clip, a certain length and volume should be achieved to ensure and help
the audience to engage successfully in the emotional feeling created by its designer in the viewing process. According
to the original plan, we hope that under the premise of excellent quality of each shot, the length of the short film should
be guaranteed for more than two minutes. The duration of the final production is 2 minutes and 20 seconds, which
achieves the original goal perfectly.

On the aspect of the content, all the conceptual design scenarios to express the central ideas fulfill the original design.
The plot and timeline are carried out in full accordance with the original storyboard and reach the expected level from
the perspective of emotional building of the whole story. It creates emotional changes from depression to liberation,
from despair to hope, and also highlights the geographical characteristics of Beijing itself. Through rebuilding and
redesigning of the familiar scenes and landmark buildings in Beijing, the design goal of emotional resonance with the
audience, especially people living in the metropolis are wonderfully achieved.

In terms of the frame and visual effect, from the aesthetic point of view, the short film illustrates perfectly the
characteristics of classical Chinese aesthetic in composition and color pallet. Among the ancient buildings, Zhengyang
Bridge, Forbidden City and Qinian Palace were chosen to be used in the film, which are especially difficult to restore,
whether in structure or color. With our great effort, they were excellently presented in the short film, and closely
redesigned for the expression of the problems discussed, thus to achieve the combination of the western sci-fi style
and Chinese aesthetic tastes.

Other supporting design works of the film, such as picture album and posters, also successfully achieved the original
goal of peripheral design. The album not only shows all the scenes of the whole short film, but also interprets the
ideological design of these scenes to its audience. The design of the poster uses two of the most striking scenes of
Chinese ancient buildings as the main visual elements. On the one hand, it would show a strong flavor of classical
Chinese aesthetic; on the other hand, it can also arouse the audience's interests in watching the film. In addition to the
album and posters, we also produced an illustrative video explaining in great details the production process of the
short film. In this particular video, we list the pre-design reference pictures used to make the film and a brief technical
implementation process of it.
Nevertheless, the thesis project still exists a few shortcomings in its process of production and rendering, because of the limitation of the time and rendering resources. A few details of the conceptual design are slightly hasty. Even if we have tried our best, some parts of the quality of the picture still have space to improve. In the future, the author of the thesis would like to, if conditions permit, continue to explore more deeply about this theme. It is also hoped that some scenes and shots can be redesigned and repaired on the premise that the equipment can support them.

Meanwhile, many scenes in the short film through conceptual design create emotional resonance in its audience, lead the audience feel the opinions and emotions the author wants to express. Such unique and special techniques determine that the expression of the central idea of the film depends pretty much on the choice and redesign of the scene. Lots of the designs are really successful because of the choice of those typical and representative landmark buildings, which can help the audience feel and agree with the author’s design ideas.

For example, Zhengyang bridge is the most representative Chinese ancient architecture, which is also the most representative and famous landmark in Beijing. In design of the scene, the overwhelming residential buildings in front of it are borrowed from the shape of the dense housing building in Hong Kong, which is another famous city with housing problem. The combination of the two different elements emphasizes the theme. As for the redesign of the Forbidden City, the author uses the most common red wall and cyan brick elements of the architecture, in order to make a contrast with the complexity of Zhengyang bridge, the concise and elegant side of the Forbidden City is chosen to be shown in this scene. The radiation particles are designed in the ground and walls to create a feeling that these radiation particles are eroding the Palace Museum, like bacteria, making the scene spooky and attractive.

There are some scenarios still lack of perfection and failing to achieve the desired goals. For example, the scene of Yanshan Petro-Chemical Industry Corporation, which is the biggest and most important chemical plant in Beijing, was originally designed to show that the smoke from chemical plants would finally spreads over large part of the sky of Beijing in the future, reflecting the serious air pollution problem. However, due to lacking of enough background knowledge in chemical industry and rendering time of real smoke effect, the final rendering of the scene does not feel like smoke billowing, resulting a rather too clean a sky. If there is a chance for the author to give a further investigation of Yanshan Petro-Chemical Industry Corporation, as well as he gets more time to render the smoke, the shot would be more convincing and more able to show the seriousness of air pollution.
The original plan is to make the family planning sign on the wall in the nightclub scene as the close-up shots according to storyboard, however, considering the special cultural background in mainland China nowadays, the author eventually decides to avoid these sensitive, political elements. As a result, we finally deleted the family planning close-up shot, only retained it in the edge of the nightclub establishing shot. If a 2-second feature of the family planning sign can be made in future, the whole film will be more ironic.

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