Renaissance of the Mogao Grotto
New Media Methods in Exhibition Design

Yang Liu

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Dane Webster, Chair
Deborah A. Sim
Simone W. Paterson
Thomas J. Tucker

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Dunhuang, an oasis city in the desert, preserved the flourishing, vanished and renaissance of the Silk Road in the past two thousand years. Due to the significant position located at the nodes of the routes on the Silk Road, Dunhuang has experienced a variety of cultural influences. Given its cruel desert climate where caravans were threatened by unpredictable dangers, Dunhuang became a religious center, especially for the development of Buddhism. Renaissance of the Mogao Grotto is an exhibition designed to use digital media and traditional drawing to re-create the ancient cave art in Northwest China. These virtual representations enhance the experience of real visitors of the cave, allowing them to discover the history of the caves.

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ABSTRACT

Dunhuang, an oasis city in the desert, preserved the flourishing, non-remembrance, and renaissance of the Silk Road in the past two thousand years. Due to the significant position located at the nodes of the routes on the Silk Road, Dunhuang has experienced a variety of cultural influences. Given its cruel desert climate where caravans were threatened by unpredictable dangers, Dunhuang became a religious center, especially for the development of Buddhism. Mogao Grotto is forever a shining pearl of Dunhuang. There are a total of 735 caves that have been identified and stretch the length of a 5,578-foot cliff, which includes the 492 grottoes decorated with murals and statues in the southern section. Its construction began around the 4th century and it remained under construction for more than 1000 years.

Renaissance of the Mogao Grotto is an exhibit designed to use digital media and traditional drawing to re-create the ancient cave art in Northwest China. These virtual representations enhance the experience of real visitors of the cave, allowing them to discover the history of the caves. In particular, the 3D visualization environment of Cave 275, one of the oldest existing caves in Mogao Grotto, is a strong immersive experience for audiences to appreciate the delicate Buddhist cave art. At the same time, all traditional works, such as drawing, sketching, photos, audio, and video illustrate the understanding of Mogao cave art in modern aspects. This re-exhibition powerfully demonstrates the heritage of Asian culture in multiple approaches, which are a special opportunity for visitors to experience and witness the treasure of Chinese culture.
Mogao Grotto is a rich repository of Buddhist art and has a high reputation in scholarly circles. However, the Mogao Grotto complex is not widely known by the broader general public. The aim of my MFA exhibition, *Renaissance of the Mogao Grottoes* is to help the audiences to understand the value of the artworks in Mogao Grotto. Due to the harsh environment condition in the desert, the murals will probably disappear in the future. Therefore, protection is another responsibility of the project to show the information of the inside of the caves through digital media.
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1. Introduction

Mogao Grotto is forever a shining pearl in the Silk Road. The Buddhist artworks within the caves, which are located at the edge of many cultures geographically, are of especially high value. It is the delicate treasure for scholars worldwide. I visited Mogao Grotto four times between 2013 and 2017 to collect the information and data to support my MFA final project. *Renaissance of the Mogao Grotto* is an exhibit designed to use digital media and traditional drawing to re-create the ancient cave art in Northwest China. These digital artworks allow visitors to experience the history and beauty of the real caves virtually. In particular, the 3D immersive environment of Cave 275, one of the oldest existing caves in Mogao Grotto, allows audiences to appreciate the delicate Buddhist cave art. At the same time, all traditional works enhance the personal understanding and feeling of Mogao cave art through a contemporary viewpoint. Through multiple approaches, the exhibit powerfully illustrates the heritage of Asian culture, and provides a special opportunity for visitors to experience and witness the treasure of Chinese culture.
2. Silk Road

2.1 History of Silk Road
The Mogao Grotto would not have evolved if it were not for the important trade route of the Silk Road. Before the Silk Road existed the most famous Han emperor, Wu (140-87 BCE) decreed that Zhang Qian ride at the head of a mission of 100 soldiers to make allies with other nomadic states in middle Asia. As part of the military strategy toward the Xiongnu, Wu heard of a tribe called the Yueh-Chih that might partner and plan to communicate and cooperate with the Han dynasty. With 10-years of effort Zhang Qian finally reaches the Yueh-Chih, although the alliance was never formed. However, the reports back to the emperor about the middle Asian countries encouraged trade and greater communication.

In 1877, Baron Ferdinand von Richthofen, the German geographer, uses the term “Silk Road” for the first time to highlight the route taken by Zhang Qian on his map\(^1\). (Figure 1) The Silk Road leads to the union of eastern and

![Figure 1: First time Silk Road highlight on the map of Baron Ferdinand von Richthofen in 1877](image)

western religion, language, nation, art and new technologies. The Silk Road became the network of trade routes across Asia and Europe.

2.2 Desert Gateway to China
The Silk Road is the 4,000-mile road, beginning in Xi’an, the capital city of Han Dynasty. It extends from the Great Wall to the northwest, traverses the Gansu Corridor, crosses the Taklamakan Desert, Pamirs Mountains, Afghanistan, and then reaches the Levant. (Figure 2) After merchandise shipped across the Mediterranean Sea, it arrived in European countries. People often think that silk was the only trade good that traveled the Silk Road. However, there were many other goods such as spices, metals, saddles, leather products, glass and paper that also travelled around to communities along the Silk Road.²

According to Hansen, silk was introduced to the Roman Empire in the 1st century BC. It was an imported luxury good and became popular after edicts were issued to control prices. Paper was also one of the chief exports of China via the routes of the Silk Road. Firstly, the paper began arriving into the Islamic world in the eighth century, then to Sicily and Spain through the Islamic portals. Residents north of the Alps made their own paper after the fourteenth century.³

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Due to the high quality of paper, thousands of documents survived. Chinese archeologists found several pieces of paper in a tomb near Turfan. After connecting the different parts of these papers, the following story was revealed. (Figure 3) Below is a court record of the testimony of an Iranian merchant living in China around 670 CE. The Iranian merchant asked the assistance of the court to recover 275 bolts of silk that belonged to his dead brother. As the evidence presented, on the business trip, his brother disappeared in the desert with two camels, four cattle, and a donkey. Depending on the rules, as the survivor of his brother, the Iranian merchant was eligible to have the silk. Unfortunately there were no further materials to show the end result. However, these papers show the integration of ethics, which influenced the development of Mogao Grottoes.

2.3 The Treasure of Silk Road
As a cross-culture place with multiple nationalities, the Silk Road acts as a dictionary and textbook to sustain the ancient languages of history. It is crucial to help the contemporary world learn about a delicate culture of the past.

Travelling along the Silk Road immigrants brought to China their immigrants brought their language, religion, habits, and customs to their new home. Buddhism, originating in India and flourishing in China, played a significant role in this stage of history. Immigrants not only taught dying languages but also translated the dying languages, but also to translate and modified the belief system that influenced the local civilization. (Hansen, 2012) The residents living along the Silk Road proved highly tolerant to

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different perspectives and beliefs. People who lived in the oasis of Kucha, located on the northern route of Silk Road around the Taklamakan desert, had more unique opportunities than others. Their native language Kuchean belongs to the Indo-European language family as Sanskrit. Kucha is the gateway to enter China. At the same time, it provided Buddhists the opportunities to translate their religion to many travelers. This spread of Buddhism along the route of the Silk Road is essential to the development of the Mogao Grottoes located in the city of Dunhuang.

2.4 Forever Pearl of Dunhuang
Dunhuang, an oasis city in the desert, preserved the flourishing, vanished and renaissance of the Silk Road in the past two thousand years. Due to the significant position located at the nodes of the routes on the Silk Road, Dunhuang has experienced a variety of cultural influences. Given its cruel desert climate where caravans were threatened by unpredictable dangers, Dunhuang became a religious center, especially for the development of Buddhism. However, due to the prosperous Maritime Silk Road, Dunhuang gradually became forgotten after the year 1000.

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3. Mogao Grotto

3.1 Library of Mogao Grotto

In 1900, a Daoist priest, Wang Yuanlu, (Figure 4) accidentally discovered the “Cave Library” with more than 5000 items, which included silk, paper painting, embroideries, and manuscripts, books, and ritual objects. It began the new chapter of Mogao Grottoes in the Silk Road timeline. (Figure 5)

In 1907, the expeditions of Sir Aurel Stein crossed the Asian continent to Dunhuang. Stein heard a story from Urumchi trader that Wang Yuanlu, a guardian of sacred Buddhist caves, was raising money for the cave’s restoration work. Due to the excuse of a small "donation," Wang was deceived. Stein spent 130 pounds to get 25 cases fulfilled with manuscripts and another 5 cases with packed paintings and embroideries, which are now safely collected by the British Museum in London.

There are several other archaeologists that carried off thousands of cultural artifacts in the earlier 20th century from Dunhuang. Undoubtedly the Hungarian-British Aurel Stein is the most villainous archaeologist in the history books, then following are the French archaeologist Paul Pelliot (1878-1945), Albert von Le Coq (1860-1930) from Germany, Langdon Warner (1881-1955) from America, Sergei Oldenburg (1863-1934) from Russia, and Otani Kozui (1876-1948) and Zuicho Tachibana from Japan.

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7 [http://public.dha.ac.cn/content.aspx?id=598699867894](http://public.dha.ac.cn/content.aspx?id=598699867894), Dunhuang Research Academy


9 [http://public.dha.ac.cn/content.aspx?id=041266812176](http://public.dha.ac.cn/content.aspx?id=041266812176), Dunhuang Research Academy
These archeologists would say they were "rescuing" the cave art in order to destroy and steal the artworks from the Mogao Grottoes. Sergei Oldenburg removed 16 murals and 61 fragments from the caves. (Figure 6) Langdon Warner used a special chemical material like glue to detach the wall paintings in order to remove several murals, as well as a three-legged Bodhisattva Statue made in Tang dynasty. Because of their actions, it is hard for the people to return and protect the artworks, which is upsetting to the Chinese people who wish to preserve their own history.

After the 1930s, the Chinese government became involved and began protecting murals and statues. But a large group of archeological artifacts had already been transported illegally out of China. Mogao Grotto is forever a shining pearl of Dunhuang, which is situated in Northwest China where a small amount of manuscripts are found in the Cave Library and remain in China.

3.2 The Art Gallery in the Desert
In Dunhuang there are a total of 735 caves that have been identified and stretch the length of a 1700-meter cliff, which includes the 492 grottoes decorated with mural and statues in the southern section. It began being constructed around the 4th century and remained under construction for more than 1000 years. Due to the influences of religious practices from India and middle Asia, there are three main constructions of Grottoes: the meditation cave, central-pillared cave, and assembly hall.10

10 http://public.dha.ac.cn/content.aspx?id=185436748917. Dunhuang Research Academy
3.3 The Unparalleled Caves

The meditation cave is the oldest style and the size is one or two square meters. It is suitable for only one person sitting meditations. For example, the cave 285 (Figure 7) is one of the typical meditation caves that were constructed between 538 to 539 CE.\(^1\) As shown in the image on the right, is the largest Vihara statue and two meditation monks statues on the west wall. There are only four total existing meditation cells on the south and north walls. The ceiling is a truncated pyramidal shape, which is widely used in the following caves construction as well.

The central-pillared caves were widely constructed during the Northern Dynasties (420 to 589 AD). Cave 428 (Figure 8), is one of the largest central pillared cave in the northern Dynasties, show a typical decoration inside the caves: a stupa built in the centre with a gable ceiling in the front and flat ceiling in the back. The red painted roof is inspired by the traditional Chinese wooden architecture. Many interlocking patterns of florets are drawn on the flat ceiling. The

\(^1\) [http://public.dha.ac.cn/content.aspx?id=164733419009](http://public.dha.ac.cn/content.aspx?id=164733419009). Dunhuang Research Academy
Buddha mural on the north wall is identified as the unique universal Buddha Vairocana (Figure 9). The new style of faces featured in the cave is called “the rounded and ravishing face” which was popular around China and central Asia. The style emphasizes the talent and aesthetic of painters from different cultural backgrounds coming together.

The assembly hall style is a rectangular room with a niche, which is the place for Buddhists to gather together. It is a popular style of cave layout and decoration from the Tang Dynasty and was widely constructed for the next 800 years. The layout consists of a primary statue that is located opposite of the entrance to the Assembly hall, as well as an even number of statues on both sides of the central sculpture. The ceiling of the caves, named Zaojing, is a pyramidal shape decorated with fabulous patterns. (Finger 10)

The Mogao Grottoes are also known as the Thousand Buddha Caves. They are the most representative caves of ancient Buddhist art, marking the unparalleled overview of one thousand years of understanding Buddhism through Chinese painting. The 2,415 statues remaining in Dunhuang also help us to understand the development of Buddhism and how they reflect particular art styles. (Figure 11) Murals are another significant part of Mogao cave art. All the murals are painted on treated walls, which are based on three

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smooth plastic layers. The murals are painted both in the cave walls and ceilings, as well as on the cliffs outside of the caves. There are seven types of murals in Mogao Grotto: Buddhist images, narratives of Buddhist stories, historical stories of Buddhist Events, narratives from the Sutra, decorative patterns, Zaojing, Apsaras, portraits of Donors, as well as Yun-ran.14 (Figure 12) The murals and the statues show the talents and technical abilities of artists in the multi-cultural society.

3.4 Artists of Mogao Grotto
As shown in the photo below, the artisans of Mogao Grotto are from different areas, which includes the central plains, central Asia, and western regions.15 (Figure 13) At the same time, the styles of statues and murals of the Mogao Grotto show the background and culture of the painters and artisans who designed them.

Figure 12: Apsaras, Cave 39.

14 http://public.dha.ac.cn/content.aspx?id=185436748917. Dunhuang Research Academy
15 http://public.dha.ac.cn/content.aspx?id=256662270199. Dunhuang Research Academy
Meanwhile, at Mogao Grotto, artisans were divided into various departments. For example, the chiselers, the advanced workmen, focused on hollowing out the caves from the cliff face. Stonemasons worked with stone materials and stone tools, while the tasks of bricklayers were to build wooden structures. Carpenters designed the structures and conserved the wooden tools, and sculptors would concentrate on modeling and coloring the primary clay, finally painters painted the murals.\textsuperscript{16}

The sponsors hired and invited the painters of high reputation and artisans to commission the cave construction, which means the powerful families had the financial support to build the larger size caves. From the murals of Cave 61, (Figure 14) it demonstrates the portraits of Cao family, who was the ruler of Dunhuang from 848 to 1036 AD.\textsuperscript{17}

\textsuperscript{16} \url{http://public.dha.ac.cn/content.aspx?id=256662270199}. Dunhuang Research Academy
\textsuperscript{17} Xianling, Ji. \textit{Dictionary of Dunhuang}. Shanghai: Shanghai Lexicographical Publishing, 1999
Along with the rich families, temple monks and nuns also constructed caves. Compared with the style of caves that were supported by the powerful families’, the caves built by the general public are smaller and simpler. Because Mogao Grotto was used for prayer for a thousand years, it illustrates the unique heritage and the cultural diversity of the area.

3.5 Cave 96

Of the total 735 caves, Cave 96 is the landmark of the Mogao Grotto, also known by another famous name, the Nine-Storey Building. (Figure 15) We know that the storey building was built to protect the colossal Buddha statue in the cave. Due to the archeological evidence, the four storeys were constructed in the late 7th century. The fifth storey was built in 966, the seventh storey was completed by 1898, and finally, the ninth storey was completed by 1935. The total height of the nine-storey building is the same height of the cliff, which serves as a guard to protect the Mogao Grotto.

The statue inside is one of the tallest Buddhist statues in the world and almost 31.4 meters tall (103 foot). (Figure 16) The faith of Maitreya, the future Buddha, in China began in the 4th century. According to the Buddhist story, Maitreya will achieve Nirvana and will transfer the pure Dharma to the general public. After the sutras show the stories and his paradise, a great many of huge Maitreya statues were

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widely constructed in China. Buddhists believe they would gain great merit after they showing their loyalty by building a statue. This Maitreya statue was constructed under the edict of the unique Empress Wu Zetian at Tang dynasty around 650s, which was actually the fourth largest Buddha statue in the world. (Figure 17) After the second and third largest statues, built in the 6th century, were destroyed in 2001, then it became the second largest.20 Wu Zetian was a faith Buddhist and believed she was the reincarnation of Maitreya. Every April 8th of the lunar calendar, Buddhists visit Cave 96 for circumambulation. Males walk in a clockwise direction around the statue, and females walk in a counter-clockwise direction to pay homage.

3.6 Cave 275
Cave 275 is one of the oldest caves in the Mogao Grotto, which was constructed in Northern Liang dynasty, 421-439 AD.21 It has survived for more than 1,500 years. Even though the size of the cave is small, 11.75' x 11' x 18.4' (H x W x D), the delicate large statue of Maitreya in the front of the west wall illustrates the aesthetic and style of art in Liang. (Figure 18) The statue of Maitreya, is 11' height, has a round face, long ear lobes and a big eyes, which is looking down on all prayer. This sitting statue with a crossed-ankles-pose is one of the favorite styles in the early period. The fashion style of Central Asia influences the decoration and the clothes on the statue.

20 http://public.dha.ac.cn/content.aspx?id=177263794633, Dunhuang Research Academy
21 http://public.dha.ac.cn/content.aspx?id=316892906589, Dunhuang Research Academy
There are three niches on each of north and south wall. (Figure 19) The inner two of each wall constructed the Chinese Traditional building with roofs and tiles. (Figure 20) There is a Buddha statue sitting in each niche with a different pose.²²

Murals in the Cave 275 present the stories of Buddhist. In each rectangular space, it shows the different chapters. The style of painting was affected by central Asia, such as the clothes, hairstyles and jewelry decoration. Unfortunately, many colors have oxidized in the past 1,500 years, the reddish brown turned into dark grey, and the highlight on the Buddha's face from white is now to off-white. (Figure 21) We have not chance to see the original bright color, but it is still a

treasure for the development of civilization. The Cave 275, built on 421 AD, witnessed the union of culture and nation in the timeline of history.  

3.7 Mogao Artworks in Museums
There are many exhibitions of Mogao Grotto opened in worldwide. In the summer of 2016, Getty Museum organized an exhibition named Cave Temples of Dunhuang to show the fantastic cave art and the protection and conservation efforts of the past 25 years. The artists and scholars from both Dunhuang Academy and Getty Conservation Institute replicate the 1:1 scale of Cave 275, Cave 285 and Cave 320. The preparation time was long and provides a unique experience for all audiences in North America to appreciate the beautiful murals and statues of the inner caves. (Figure 22) No doubt, it was a successful and special experience for the audiences and forced me to think about design and organizing my own exhibition of the Renaissance of Mogao Grotto.

Figure 22: Poster of the exhibition Cave Temples of Dunhuang, Getty Research Institute, 2016

http://public.dha.ac.cn/content.aspx?id=316892906589. Dunhuang Research Academy
https://www.getty.edu/research/exhibitions_events/exhibitions/cave_temples_dunhuang/replica_caves.html. The Getty Research Institute
4. Renaissance of the Mogao Grotto

4.1 The Purpose of the Project

Mogao Grotto is a rich repository of Buddhist art and has a high reputation in scholarly circles. However, the Mogao Grotto complex is not widely known by the broader general public. The aim of my MFA exhibition, Renaissance of the Mogao Grottoes is to help the audiences to understand the value of the artworks in Mogao. Due to the harsh environment condition in the desert, the murals will probably disappear in the future. Therefore, protection is another responsibility of the project to show the information of the inside of the caves through digital media.

Renaissance of the Mogao Grotto is a temporary exhibition to demonstrate the retrospective and understand the artwork of Mogao Grotto through digital media and contemporary drawing. (Figure 23) In other words, this exhibition is a revolution to interpret the experience of the Mogao Grotto. In particular, the model of the cave 275 not only creates strong immersive details visually, but also provides the experience of visiting the real cave. The experience serves as a powerful. Thus, this project is a long-term sustainable attempt to protect the caves of Mogao. At the same time, it is an opportunity for the individuals
who are unfamiliar with the background of Mogao Grotto and have not visited Dunhuang to know the treasure of the Chinese Culture.

4.2 Methods to Present the Cave 96

As an MFA student of Creative Technology, digital artwork is the most important part of the exhibition. There are two digital models of caves to show the details in the real world: Cave 96 and Cave 275. The attracting piece that visitors will first look at the exhibition is the still image of the cave 96 in front view. Cave 96, also named the Nine-Storey Building, is the landmark of Mogao Grotto. Under the almost one thousand years construction, the storeys show the soul the traditional Chinese architecture. (Figure 24) Liang Sicheng, Father of Modern Chinese Architecture, clarifies in his book A Pictorial History of Chinese Architecture that the typical characteristic of the building is based on the platform, then

![Figure 24: The structure of the set of columns, Chinese Traditional Architecture](image)

![Figure 25: Names of all parts in Chinese Traditional architecture](image)
constructed with a timber post-and lintel skeleton, which supports the pitched roof with overhanging eaves.26 (Figure 25)

As shown in the image, the storeys show the basic characteristic of the traditional Chinese architecture, which includes the primary platform, columns and walls, intermediate set with tenon-and-mortise joint, pitched roof and eaves. The model of Cave 96 not only displays the whole nine storeys building in the immersive world but also shows the working process of construction. There are different decorations on each floor. For example, on the first floor, there are two windows on both sides, and nine murals surround each window. (Figure 26) There is a door on each floor, which act as the main lights for the Buddha statue inside.

The model of Cave 96 was a challenge for both the understanding of architecture as well as the rendering settings required. Texture and materials are the primary sections for rendering. There are mainly four types of materials in nine storeys: wood, rock, tile, and mural. The photo of cave 96 (Figure 27) which I took outside records the details in real time. According to the picture, the set of columns in red are the attraction part of the building. To transfer the impression to the rendering section, the setting of color is almost the same in the real image. Meanwhile, the texture of wood added as the PxrNormalMap in RenderMan enhances the feeling of the wood material.

Due to the depth of field, which means the distance from the camera to the building, I decrease the details on the outside clay wall. The average number of the roughness is 0.4 to reflect the surface material. (Figure 28, 29)

Tiles are the most complicated part of the model. There are 430,886 faces, 440,222 vertexes, and 859,099 edges on one roof. It is heavy for Maya to render it. Hence, I only added color and the PxrNormalMap of the tiles. (Figure 30)
Light is also essential in the immersive environmental construction. There are six lights in the scene: one DomeLights, one DistantLight, and three DiskLights. The DomeLight act as the primary environmental light for the scene. I added PotalLight in the DomeLight, which create the blue sky behind the mountain. There are different intensity and exposure numbers in the set of lights. (Figure 31) Meanwhile, I use the temperature to increase of the color of lights. The lights with varying temperature, angle and distance would enhance the impression of the space. Furthermore, there are two Polygons with the material names PxrVolume, which creates a slight fog feeling in the image. (Figure 32) The effects of fog improve the immersive feeling of Mogao Grotto located in the desert.
Aside from the digital model of Cave 96 showing the details outside building in Maya, the 3D printing model of Cave 96 is an opportunity to illustrate the digital model in physical space. These models not only show the technology of 3D printing but also construct a strong feeling of the outside building of Cave 96. Due to the restriction of the model size, which the high, width and length are no more than 8 inches, many of the details in the building are missing. The 3D printing machine was unable to print out the objects smaller than 1 millimeter. But many of the tiles are smaller than 1 millimeter. (Figure 33)
4.3 Methods to Present the Cave 275

Cave 275 is one of the oldest caves in Mogao Grotto. To emphasize the historical feeling, I loaded the digital model in two software programs to try to create the immersive environmental construction as close to the feeling of being the real cave. As the special cave, Cave 275 is not normally open to the general public. Last summer, people would access the Cave 275 through appointment only. Due to the door to the cave being closing for a long time, when the guide opens the door, the light filters in the cave and the dust floats in the space. It was in this atmosphere that I first came to appreciate the artworks in the Cave 275 in person. Different than the feeling of reading or looking at images in a books or on a Website, standing in the Cave 275 gave me the illusion of traveling back thousands of years ago, when artists held the candles to draw the murals. This encounter gave me definite ideas to transfer my experience to all audiences through the rendering of images, video, and Virtual Reality.

Figure 34: Cave 275

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Both the six still images and short video included in the exhibition show the stories in the cave 275 through the camera and lights. Due to the main Buddha statues on the west wall, most of the key frames of the camera records the details of west murals and statue. In other words, the moving camera act as a guide to assist the audience to follow the designed narrative in the cave. Meanwhile, the animation of four lights also supports the movement of the camera and the changes of the depth of field. (Figure 35, 36) Especially the IES lights were added, which creates a historical effect of light and shadow in the murals and statues. So, both the still images and video clearly express the inside details of Cave 275, which is important for the audience to fully feel within the immersive environment of VR.

Figure 35: Render image, Cave 275
Exporting the all the data from Maya to Unity, which includes the model of the cave and seven statues of Buddha, materials and textures, and reset all lights in Unity independently was a challenge. Different than the animation of lights in Maya, the narrative of the lights in Unity follow the background sounds of the subtitle. As the begin of my wandering in the Cave 275 in VR, the audience first experiences 5 seconds of black, then the intensity and exposure numbers of lights increase slowly in the cave and focus on the main Buddha statue. The audience listens to the explanation and looks at details of murals and statues in the cave in five minutes, which is like a short trip back to China a thousand years ago.

4.4 Visual Design of the Exhibition

The Renaissance of the Mogao Grotto exhibition is a project that has taken eleven-years of preparation. 2007 was the first time a professor highlighted the value of Mogao Grotto in my Chinese traditional painting class. In particular, the murals and statues in the Mogao Grotto present the stories of Buddha and bodhisattvas visually. Meanwhile, the artists and artisan combine the styles of arts with the foreign religion tales. From this exhibition, I mainly transfer the high impression of the Mogao Grotto in my experience through visual and exhibition design.
The poster is the most powerful media for the general public to understand the critical information of the Project. There are eight versions of the poster designed in size 11" by 16". (Figure 37) To emphasize the historical feeling of the exhibition Renaissance of the Mogao Grotto, I develop the background image in deep black with many small pictures of different sitting Buddhas. (Figure 38)
Then added the title, in particular font named 321Perfect on the top line. There are original six versions of logos I designed for the exhibition, and the final logo with the red background with the white Chinese word “Gao” at the top is the winning one and was added at the end part of the title. (Figure 39)
One of the powerful rendered images is at the central part of the poster. Below the major image, there is a short paragraph introduction to the project and secondary rendering image of the inside cave 275. At the bottom of the poster is the information including the defense time and location.

**Renaissance of the Mogao Grotto**

The concept of the banner presents similar information from the poster. Due to the special size requirement, the layout of the image and texts are different than that, which are shown as the image below. (Figure 40)

4.5 Exhibit Layout

The exhibition layout design is the critical section in the *Renaissance of the Mogao Grotto* project. According to the image below, the gallery is divided into two spaces. There are twenty-two artworks displayed in the first part, which is the primary part for the audiences to know the introduction of the Mogao Grotto. Firstly there are three sketches that records the information of Cave 96 made during my visit to the caves there. (Figure 41)

Following an anticlockwise path, there are eight prints of renders done within Maya and one charcoal drawing to illustrate the personal understanding and experience of the main statue on the west wall. (Figure 42, 43)
Figure 41: Drawings

Figure 42: Inner display in gallery

Figure 43: Inner display in gallery
The two Chinese traditional paintings, under the title on the wall, drawn in 2007, are the copies of my original artworks. (Figure 44) It is the start of the research project of Renaissance of the Mogao Grotto. There are five new works displayed on the wall facing the windows, which includes two oil paintings and three drawings. This group of works demonstrate the idea of Modern meets Ancient, with more than one face on the canvas or paper in the different compositions. The Buddha’s face represents the history, the young face refers to my own face, meaning that the whole feeling and information of Mogao Grotto is based on my personal experience and understanding. (Figure 45)
Following the narrative, the audience enters the second space of the gallery: the digital world. (Figure 46) The short animation of Cave 96 in front view is the first artwork shown in the area. The bell under the corner of the roof is a typical decoration in Chinese traditional architecture. The rear projector is working on the back and displays the video on the screen.

4.6 Virtual Environment in Real Space
Moving to the next stop, a dark space built to the same size of the Cave 275, 11' by 18'. This space contains the VR of digital cave 275. After several testing of lights in the VR goggle, I decided to animate the lights to follow the dubbed audio. There are five minutes of dubbed audio as a guide for the audience to understand the history of the Cave 275, the introduction of the seven statues of Buddha, and the story of murals on the walls. Following the guide of the lights, the audience looks at the details of the murals and statues as close as they could, which is impossible in the real cave. The VR
experience is an opportunity for audiences who have not visited the Mogao Grotto to know what the cave looks like inside. (Figure 47)

![Audience play the VR](image)

Figure 47: Audience play the VR

4.5 Publicity for the exhibition
The development of a VR experience of Cave 275 is a necessary practice for me to know, that is, to transfer the ancient cave arts into a contemporary language. It is an efficient general introduction for people worldwide. They do not need to take a long trip then arriving at Mogao Grotto and stay 3-5 minutes in the Cave. (Figure 48) The VR Cave 275 is the introduction or primary step, or a rehearsal for the audience in the cave, which will help the researcher and scholar to know genuinely once they have had a chance to visit the caves in person.
Figure 48: Inner display in gallery
5. Conclusion

The exhibition *Renaissance of the Mogao Grotto* is special for me. After 10 years of preparation, I found a fantastic method to express the original feeling and understanding about the ancient caves. It is a challenge for me to use various art languages to present the same theme-Mogao Grotto. At the same time, for the audience, they can access different information and a highly effective impression of cave art through multi media, sketching, drawing, oil painting, rendered images, 3d printed models, short video, and VR.

It is new for the exhibit designer to use the latest technology in exhibition to enhance the interactivity between the artworks and audience. The audience will experience the atmosphere and feelings, which I was exposed to through this immersive exhibition. With the use of VR, the audience will be part of an enjoyable experience.

*Renaissance of the Mogao Grotto* is a long-term project and continually constructs the digital data of Mogao caves and traditional drawings. The upcoming works will not only inherit the concepts of artworks shown in the exhibition but will also transfer the new understanding of the cave art. Therefore, I plan to display the new artworks regularly in the gallery and update the data on my personal website:

https://lyliuyang.wixsite.com/portofolio

From this exhibition, I show respect to all my ancestors, who contributed their abilities in the construction of caves. Mogao Grotto is an unparalleled heritage for the world. This new way to present the murals and statues inside caves is also a new method to record the amazing details and protect the delicate legacy.
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