

## **BScCM Final Year Project 2021 – 2022**

### **Phase I Final Report**

**<< Group Name:KANGMISAMA ; Group No.: 29 >>**

**<< Azalea >>**

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## 1 Introduction

This project will be presented in the form of 3D animation. The length of the video is 3 minutes and ten second.

The art style of the animation is similar to the music video of 1925(T-pocket, 2017). It combines the Eastern and Western styles to express that this is an era of the impact and integration of Eastern culture and Western culture. In addition to a combination of art and technology, this project will incorporate other interdisciplinary knowledge, including history, geography, politics, and semiotics.

The theme of the story is anti-war and anti-oppression. The main background of the animation takes place in a virtual East Asian country in the twentieth century (a fusion of all East Asian cultures). The events that occurred are based on real histories, such as the Sino-French War, Showa Revolution and the Gwangju Democratic Movement... But they did not follow the sequence of time and space in real history, so the endings of the story are different from the real world.

The story is told from the perspective of the heroine Azalea and her doll. The lens moves along with Azalea's steps. It begins with Azalea bids farewell to her father who left home to participate in the revolution. Then, foreign enemies invaded and the feudal government was overthrown until the military government collapsed and the democratically elected government was in power. Symbols, images, and scenes are used to symbolize specific things. The visual expression/storytelling technique of I, Pet Goat II (Heliofant, 2013) can be an appropriate reference.

### 1.1 Objectives

The artistic objective is to use various techniques related to visual art to symbolize a certain era or historical event, such as the Taisho style kimono to represent the ten years of the Taisho democratic period. There are many metaphors in the content of the animation that reflect realistic historical events, but the sequence of these events is disrupted, leading to different endings. And many symbolic figures will be inserted into the animation based on the study of semiotics. The art style of animation will combine the culture of the three East Asian countries in the early twentieth century.

The technical objective is to use CG technology to establish a complete character model, scene model, and complete the binding and animation of the character model, as well as the production of animation 2D and 3D special effects. Toon rendering technology in making animations, which is also called the cartoon rendering. The scene models/character models in the animation are all 3D, but use a special toon shader to render them to look like 2D animation.

### 1.2 Deliverables

After a semester of research and continuous improvement of the script and storyboard, I gradually discovered that there may not be enough time to make it into a game or interactive animation, so the

final project will be presented in the form of an animated short film. The submitted format will be H264, which is mp4 video.

## 2 Work Plan/Milestones/Gantt chart

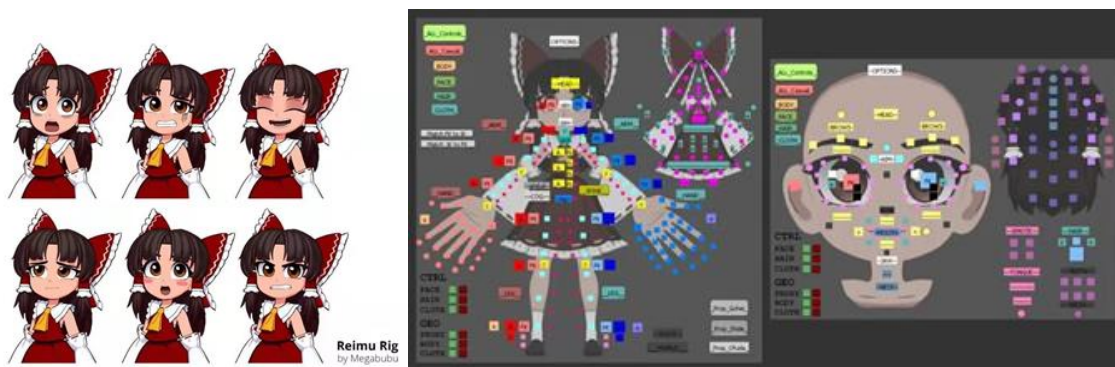
15. Production Schedule (Including Pre-Production, Production and Post-Production)													
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MM/YY – MM/YY	W k 1	W k 2	W k 3	W k 4	W k 5	W k 6	W k 7	W k 8	W k 9	W k 10	W k 11	W k 12	W k 13
Character Design Proposal													
Animatic Proposal													
Stagging/storyboard													
Scene modeling													
Character modeling													
Rigging													
Audio editing													
Animation making (next semester)													
Rendering (next semester)													
Movie editing (next semester)													

The completed part: character design, animation and script storyboard, most of the scene model, character model and rigging. But the character has not been put into the scene yet. The character model can be taken into use during the Christmas holidays. At present, I have tried to render more than 600 images. Since the toon shader is used, the rendering time of most scenes is still within the acceptable range, so the rendering time in the next semester can be saved. The main task of the next semester (sem B) is to make animation, including keyframes and timeline, rendering, completing the audio track, and the final synthesis of the video, as well as the final report.

### 3 Background research

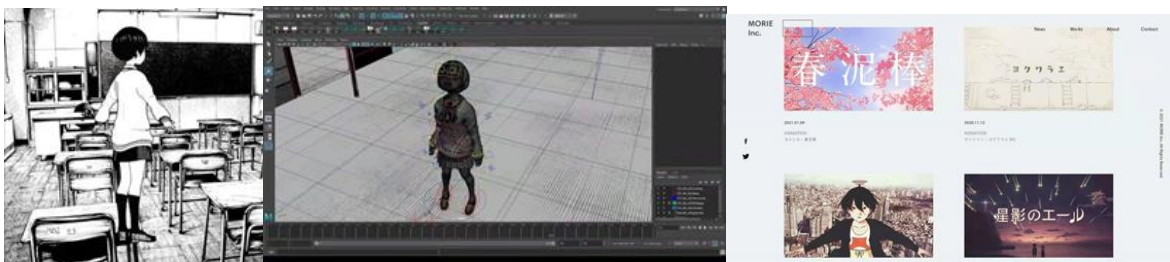
As early as 2003, Anjyo and Hiramitsu researched the use of shaders to make highlight-shapes and animations in cartoon style. This is done by using Blinn's traditional specular reflection model to make the initial highlight shape. Then, it interactively modifies the initial shape through geometry, style, and Boolean transformations until the final desired shape is output. This does not require the use of texture maps, and the current cartoon rendering has been simplified. With the advancement of algorithms and software updates, rendering time is shorter, and users need to configure fewer parameters by themselves, and it is more convenient. Not using texture maps greatly speeds up the efficiency of making models and also speeds up rendering.

I am more interested in the creation of characters in 3D animation than in the animation itself, and a very important part of it is character rigging. In the 3D animation industry, rendering 3D into 2D effects is also a new aesthetic. Because the 2D characters rendered with 3D technology are more unique, compared to rendering other real 3D characters, this saves rendering time, and compared to 2D animation, this saves the time-consuming drawing frame by frame. I have been following the work of the animator Chonlawat Thammawan because he provides some free animation models that are bound together. As a technical animator, he recently released a set of characters made in Maya with a very simple animation style, such as Reimu's rigging model as shown below.



Rigging of Reimu by Chonlawat Thammawan

With the existing cartoon materials, Maya can easily render various animation style animations. According to him, this binding is only for offline animation work, because the character is too big to be used in the game. If you reach an ideal state, you can get a more animated character through step tangents. This character not only has a mixed FK/IK (forward dynamics/inverse dynamics) dynamics of the spine and limbs, the face, hair and clothes can also be animated. The production of the face and body can be achieved through the AnimSchoolPicker plug-in. Although it can be rendered and output by Maya's hardware renderer, this character is designed to be animated by Maya's Viewport 2.0, and includes the ShaderFX cartoon material with outline width properties.



Some 3D to 2D render productions by company Morie Inc.

Actually 3D rendering 2D animation technology has also been widely used in the industry. For example, the mv produced by Morie.inc production company for many Japanese music producers are short films of this similar style. Compared with the original 3D animation, they are more distinctive and look more like Japanese manga.

## 4 Framework

### 4.1 concept

To create a story of a girl living in a turbulent era, the story is told from the perspective of the heroine Azalea. The lens moves along with Azalea's steps. It begins with Azalea bids farewell to her father who left home to participate in the revolution. Then, foreign enemies invaded and the feudal government was overthrown until the military government collapsed and the democratically elected government was in power. Symbols, images, and scenes are used to symbolize specific things.

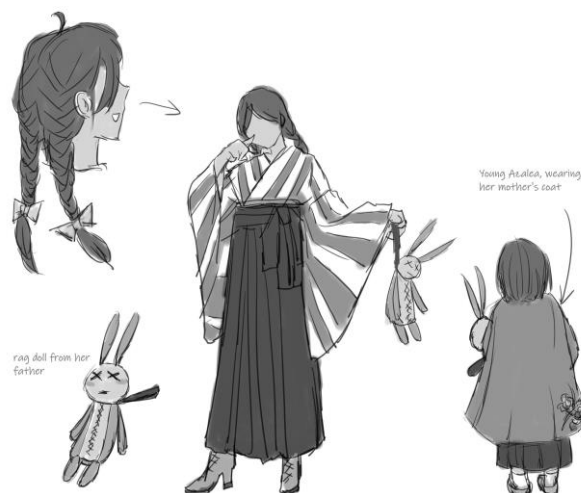
Time / Period	Location / Country	Culture / Genre
Since this is a fictitious history, it is not in Japan. The Taisho era is just a reference for style here.	It is also not a specific country, but a visual reference as East Asia style.	War Genre and Historical Drama

Visual Theme & Visualization

#### 4.1.1 Style Frame

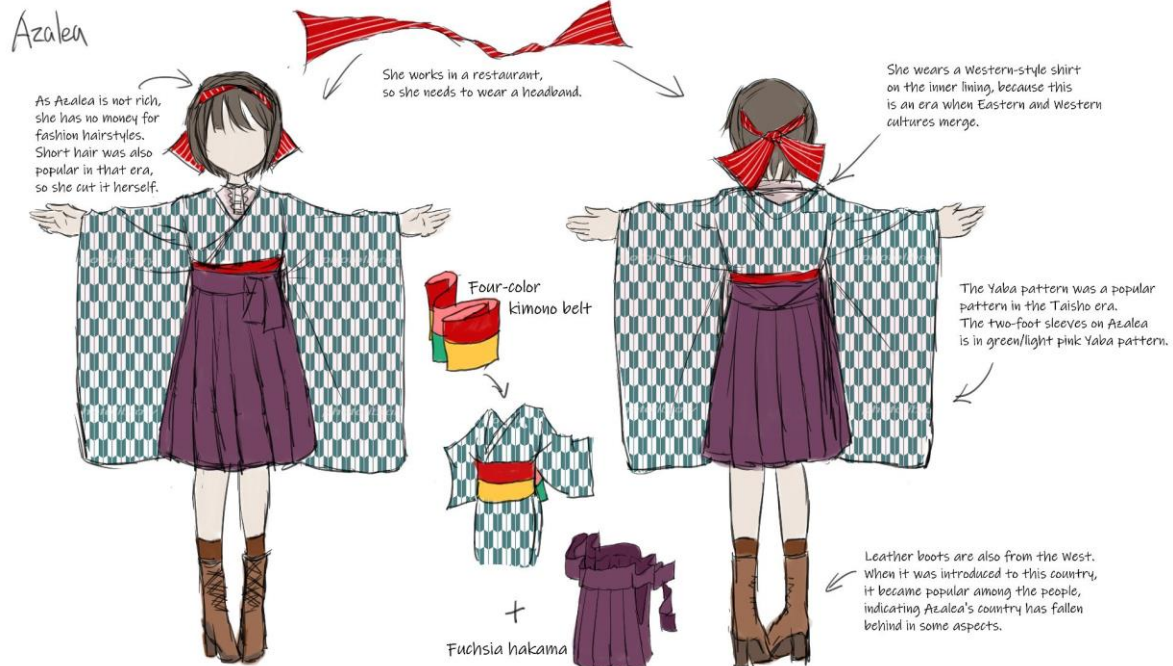


#### 4.1.2 Character Design

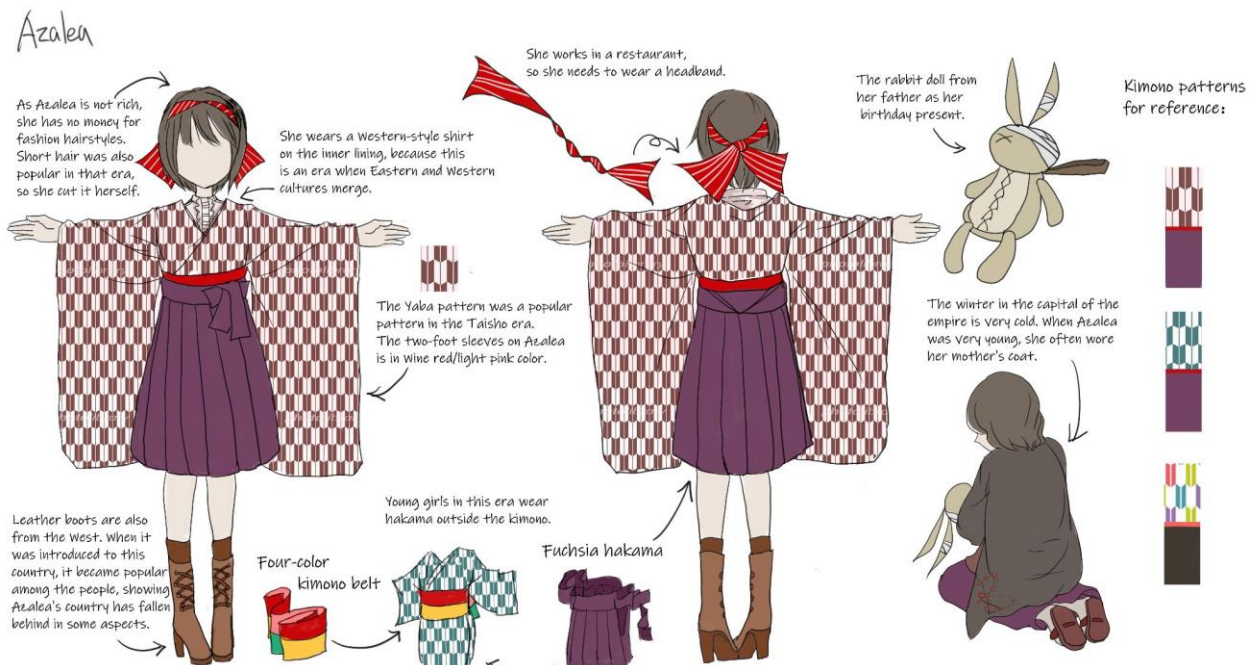


Character design-Azalea (draft)





Character Design- Azalea (1st Version)



Character Design- Azalea (Final Version)



## 4.2 Story frame

### 4.2.1 *Snowy night*

0-10 narration + protagonist running in the snow + looking into the distance with a barbed wire + wind and snow

"But unfortunately, the soldiers' revolution failed.

They were shot by the emperor

Azalea brought the birthday doll for his father, but failed to see him for the last time."

0-2 Telegraph pole (looking up) + gunfire + title

Title: "Azalea"

0-8 The river lamp floats on the water (far to near) + put the doll on the wooden boat + the paper flies out

### 4.2.2 *Snowy Mountains*

9-15 Snow mountain (far) + train speeding across the bridge

16-25 The protagonist sits up from the car, walks around to watch the pictorial on the car + flowers floating by the window

26-37 The flower spins in the air (near), the petals spread out, turning into a boat + a boat floating under the bridge (looking down)

38-46 fighter jets fly over the bridge (follow the fighter's perspective)

47-56 The scenery in the picture next to the dashboard becomes street view (zoomed in)

### 4.2.3 *City street*

57-63 Street view (view from driving) + flags flying

64-67 Rail tram + get off the protagonist

68-73 The protagonist goes up the spiral staircase

74-76 The protagonist turns around with the map + turns into a map scene

77-86 Chess pieces game on the map, the invaders are approaching step by step

The 87-93 fighter takes off, the background is real historical bombing (Shanghai?) + metronome sound

94-105 Incendiary bomb falls into the city + boat floats through the sewer + fire on the doll's face (near)

106-108 The boat sails into darkness (zoom out)

109-111 Black screen, metronome sounds farther and farther

### 4.2.4 *Dragon Cave*

0-2 Wiped a match (very close)

3-5 Use a match to light the light on the bow of the ship  
6-11 The protagonist takes off the light on the bow of the ship and takes pictures around  
12-15 The boat is driving in the cave (far away), the lamp illuminates the mural  
16-29 Taking photos around, looking at murals, talking to oneself (historical events: dynasty decayed, mutiny suppressed)  
30-55 There are flowers floating in the air + petals falling on the lamp, the lamp becomes bright (historical events: foreign aggression and cede land compensation, the failure of the democratic revolution, the second mutiny successfully overthrew the emperor)  
56-64 Blood is poured into the water on the rock wall, the water level becomes higher + the flowers become more (historical event: the military government takes power)  
65-76 Water and blood turn into a Tai Chi picture + the protagonist's boat passes through and muddy the water (looking down)  
77-80 Azalea lantern illuminates the dragon on the top of the rock wall + more and more flowers fly towards the lamp to brighten the lamp  
81-84 The dragon collapses after being illuminated by lights  
85-86 The screen turns white  
87-88 "One day, we will meet in a place where there is no darkness"

Total:  $10+2+111+88=211$ s, about three and a half minutes

## 4.3 Scenes

### 4.3.1 *Snow scene*

The capital of the empire, the prototype is Showa Restoration. In the heavy snow, Azalea (young) bid farewell to her father Shinano who is a navy officer, and her father handed her a doll as a birthday present. Azalea stands in the snow, the troop carrier, and the soldiers pass her one by one. Azalea continued to walk, saw her father and other soldiers shooting at the bureaucrats, leaving the blood in the snow. One foot stepped on the pit, it was Azalea. She was stopped by the imperial soldiers and her father was taken into a car. Azalea ran after the car, gunshots were heard in the distance, and she fell to the ground.

Gunshots were heard in the distance, and Azalea's father was killed. Azalea put her doll on the small wooden boat floating in the creek, and there were countless river lanterns floating around.

### 4.3.2 *The scene that the train pass the bridge*

The style is steampunk, the prototype is Taisho Democracy. A hand stretched out and Azalea was pulled onto the train by an unknown man in the suit. There are some trendy pictorials posted inside the train. Azalea walks in the train and looks out the window.

From the outside view, the train is driving on a bridge in the snow-capped mountains, and the scenery is

very beautiful. A few azaleas fell on the river under the bridge, and at this moment, the small wooden boat carrying the doll was passing under the bridge. At this moment, Azalea looked out the window, but saw a fighter jet flying by.

#### *4.3.3 Dragon-harbor, urban street scene, similar to the 70s in Hong Kong*

The ammunition of the fighter jets turned into azalea flowers and floated through the train windows, the tram dropped off passengers on the flyover, and Azalea (after growing up) got off the city tram. The angle of view follows Azalea moved up the floor, and various posters representing various forces were posted in the corridors of the building (semiotics). Azalea looks at a map on the wall. The map is divided into regions of military separatist territory. The chess pieces on the chessboard next to her are also constantly moving, symbolizing that different forces want to carve up the country.

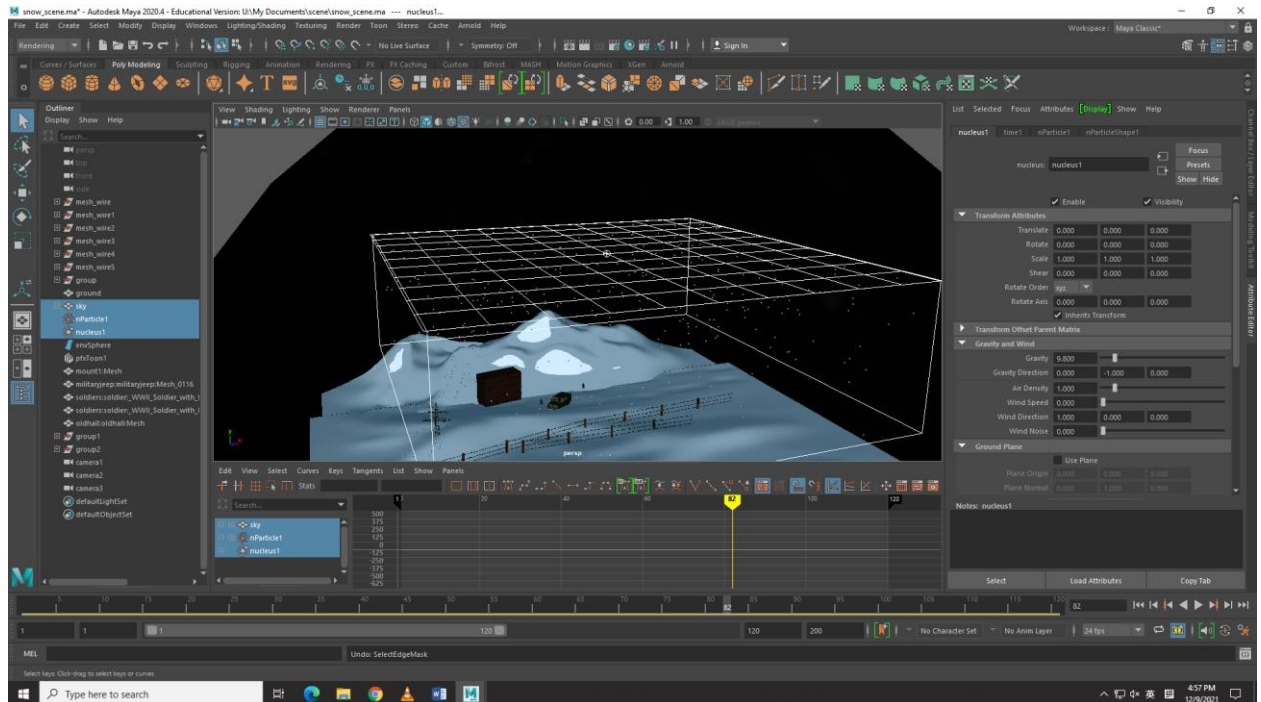
The small wooden boat carrying the doll is also passing through a waterway in the city. One hand moved the arm of the metronome (the air defense alarm of Leningrad in World War II, the speed up of the metronome means an air attack), the sound of the metronome spread all over the streets, and there were no more people in the street, only left the doll lying on the boat in the moat. With the fall of fire and bombs, the city became a ruin.

#### *4.3.4 Dragon Cave*

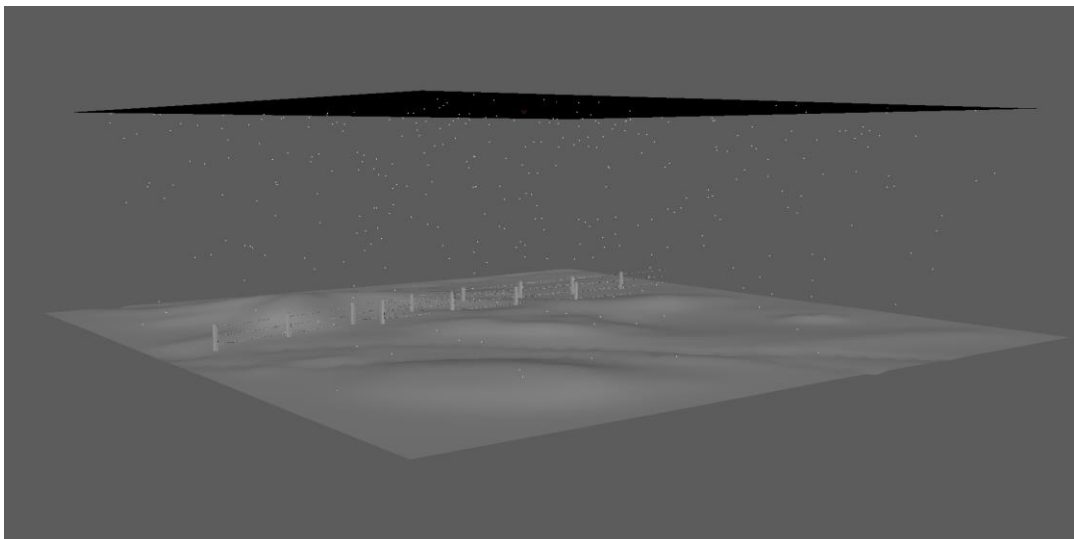
This is a prophetic virtual scene. In this rock cave, Azalea sat in the boat which belonged to her doll. She lit the oil lamp on the bow with the only match. The murals on the rocks allowed her to see clearly (in fact, let the audience know) what happened in this country before, and also what Azalea has experienced as an innocent citizen. And on the wall of the rock cave, there is real blood flowing down from the mural, which symbolizes countless sacrificed lives. Blood drips into the water to form different shapes. For example, when it comes to the military government, the blood is in the shape of Tai Chi (symbolizing the Park Zhengxi government). The inflow of blood lifted Azalea's boat until she could see the dragon standing on top of the rock wall.

## **5 Implementation and evaluation**

## 5.1 Particle emission

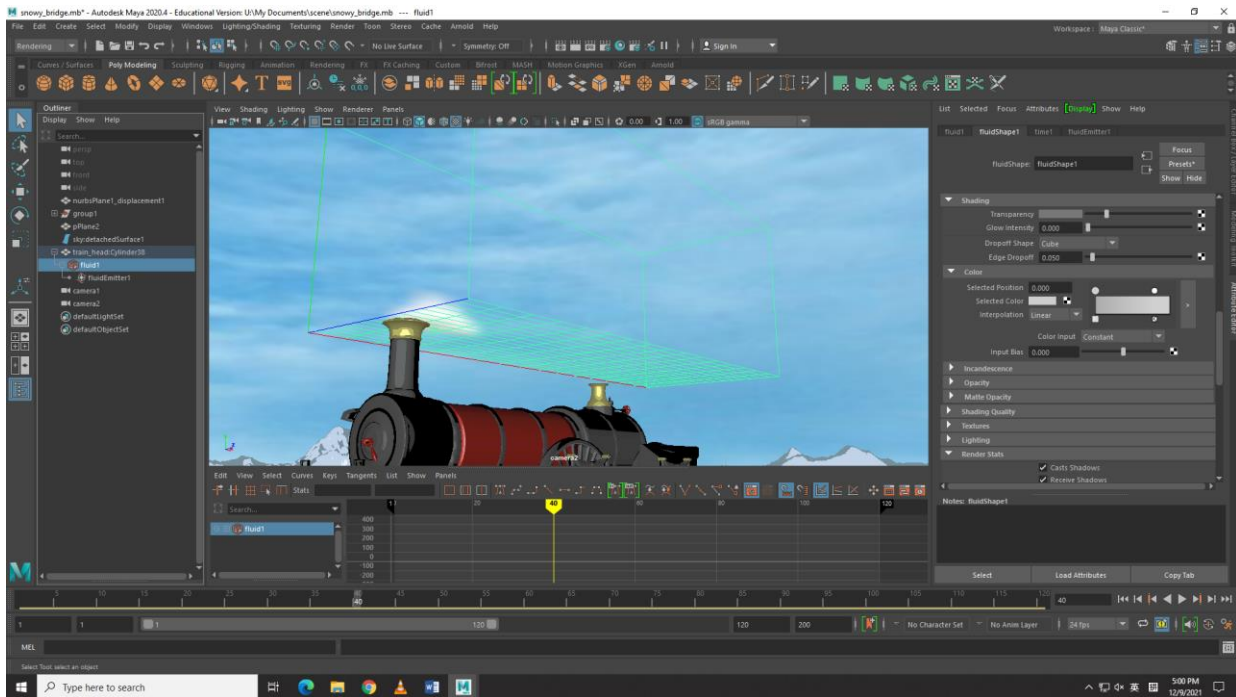


The first scene was snowing, so a particle emitter was used to make falling snowflakes. In addition to using the Particle Tool to place particles to create a particle swarm, another method is to diverge the particles through the emitter. The emitter can be used to determine where the particles were created, and also to determine the direction in which the particles are ejected. Particle emitters cannot be rendered. There are two types of particle emitters in Maya: one exists independently, and the other exists together with the object. One of the biggest advantages of using a particle emitter is that it can accurately control the position, direction, number, and initial velocity of the particles. If you want to use objects to emit particles, you need to use the Add Emitter command to complete. The Add Emitter command allows particles to be emitted on objects and elements of objects. If you add an emitter to a NURBS object, the emitter will be located on the controllable point of the NURBS object. If you add an emitter to a polygonal object, the emitter will be located on the vertex of the polygon.



Here I use a new square plane at the top of the scene to emit particles and execute the Particles → Emit From Object command to create a particle emitter.

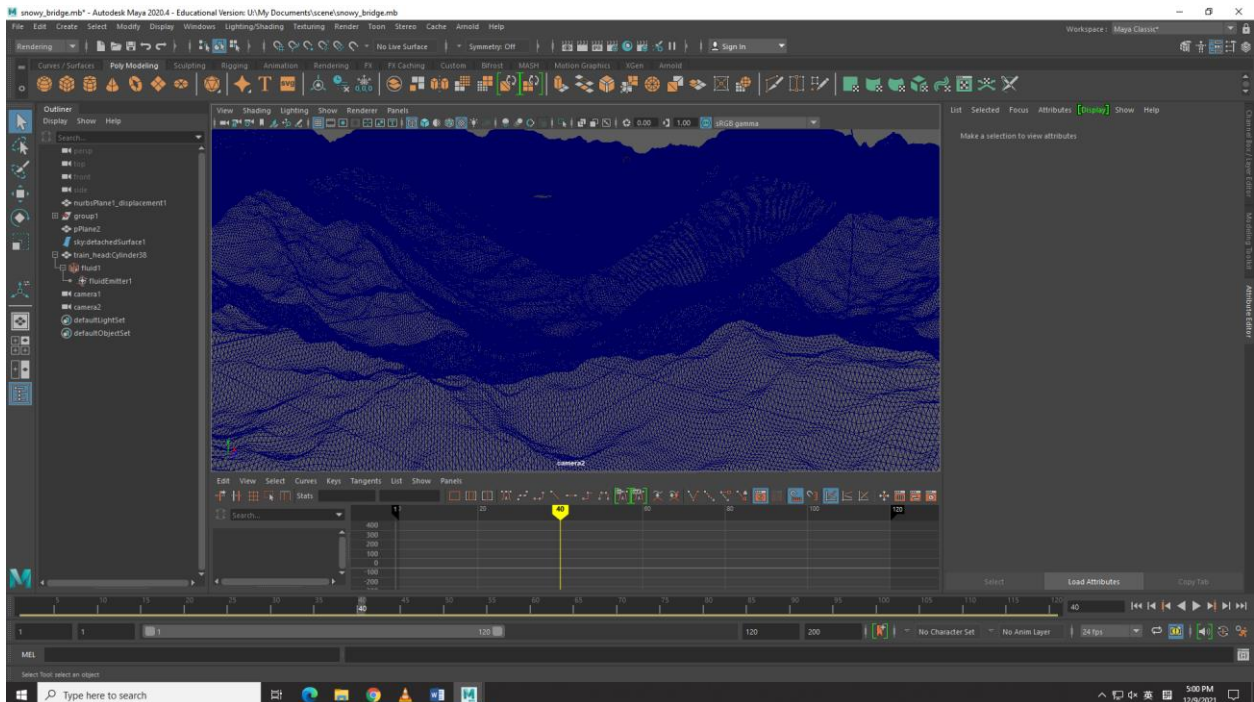
## 5.2 Particle fluid



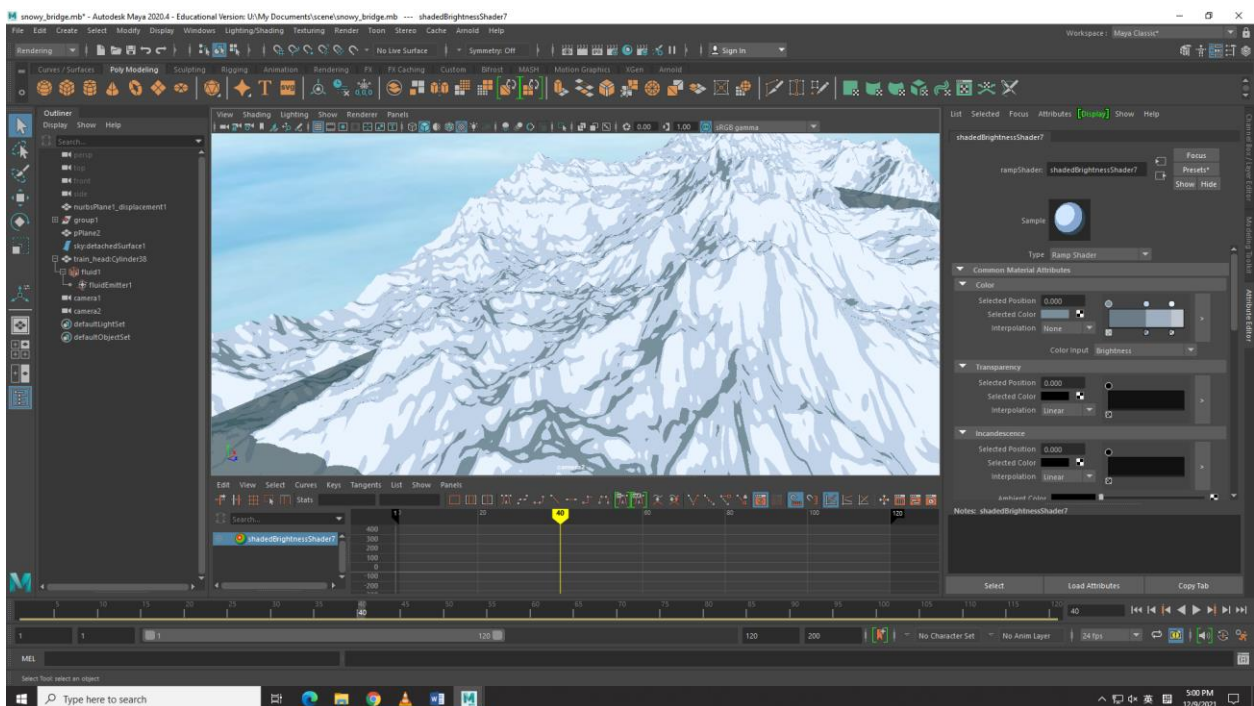
Here, fluid particles are used to make the smoke of the train, and the process is similar to that of making the snow. Since the train smoke is upward, a simulated gravity field is needed. Mao(2009) mentioned that they use nodes to interact with various properties of fluids and particles to enhance rendering quality. It is most commonly used in the simulation of heavy smoke and dust dynamic effects. The method of introducing fluid materials into the particle system absorbs the sampling method of the fluid itself, and the solution of the fluid container. After introducing particles, the fluid container is replaced with a sphere of particle cloud. Usually fluid is only responsible for generating volume and not dynamics, but in the actual production process, dynamics and materials are often related. Therefore, the particle info node of Maya is used to interact with the various properties of the fluid and the particles to get a better simulation effect. This method can be used in the simulation of heavy smoke and dust, such as the smoke from the explosion, the tail smoke from the rocket launch, and the dust from the collapse of the building.



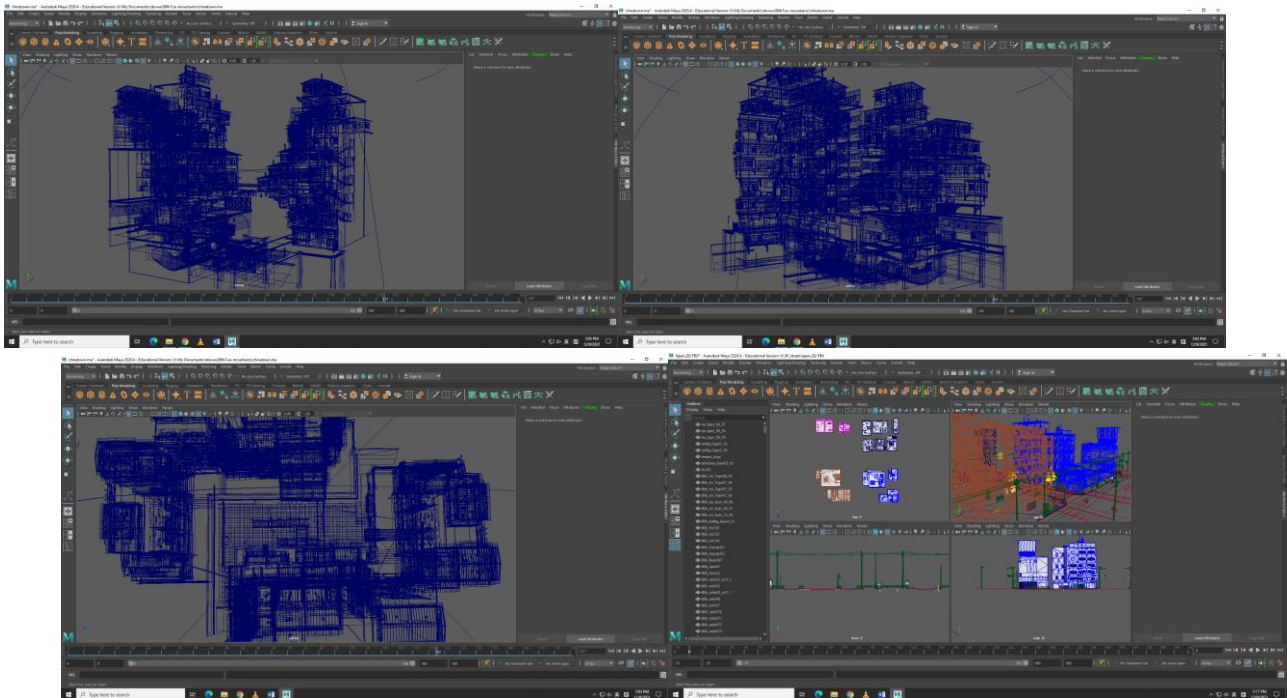
### 5.3 Mountain constructions



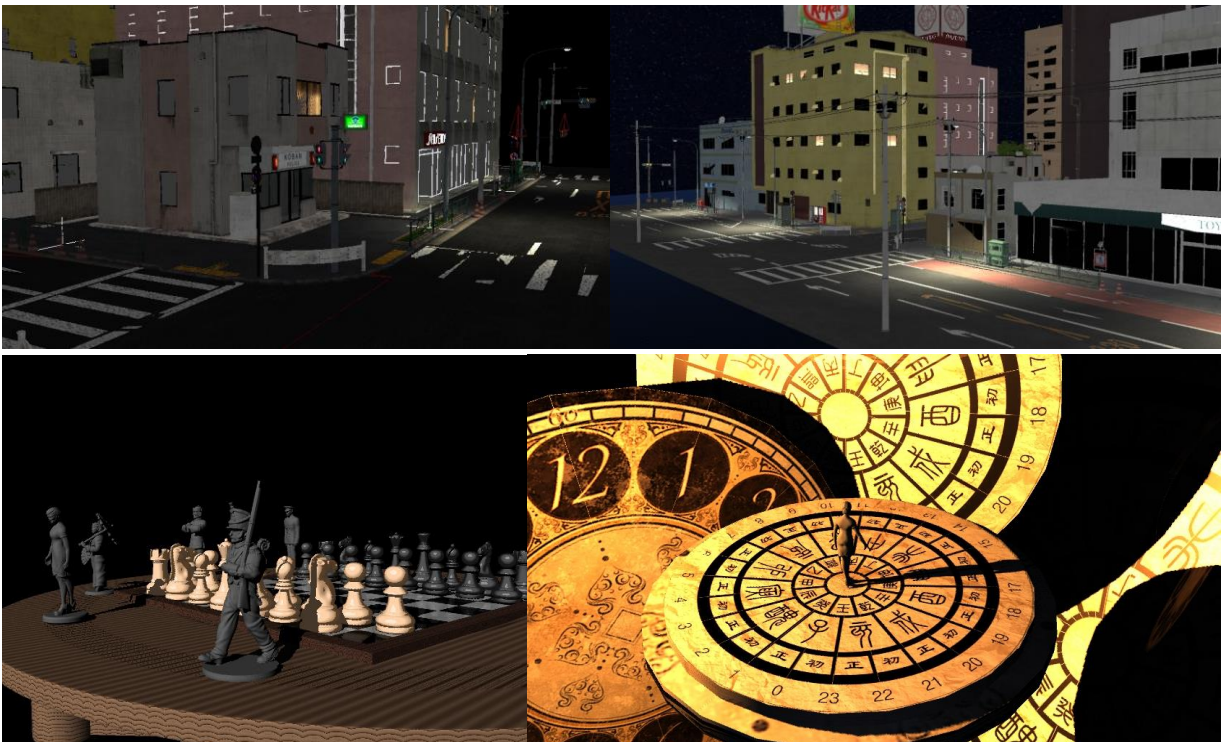
Since the mountains are different from the previous snow ground (the previous snowy ground was made using bump carving), in contrast, the snow mountains are more irregular and have more sharp surfaces. Here, a random function is used to build the mountains. Finally, use **Modify>Convert>Displacement** to Polygons to replace the generated object map with a mesh surface. The advantage of this is that there is no need to adjust each face. The disadvantage is that too many faces are generated, which will lead to a long rendering time.



## 5.4 Other Scene Models



No special technology, it only takes time.

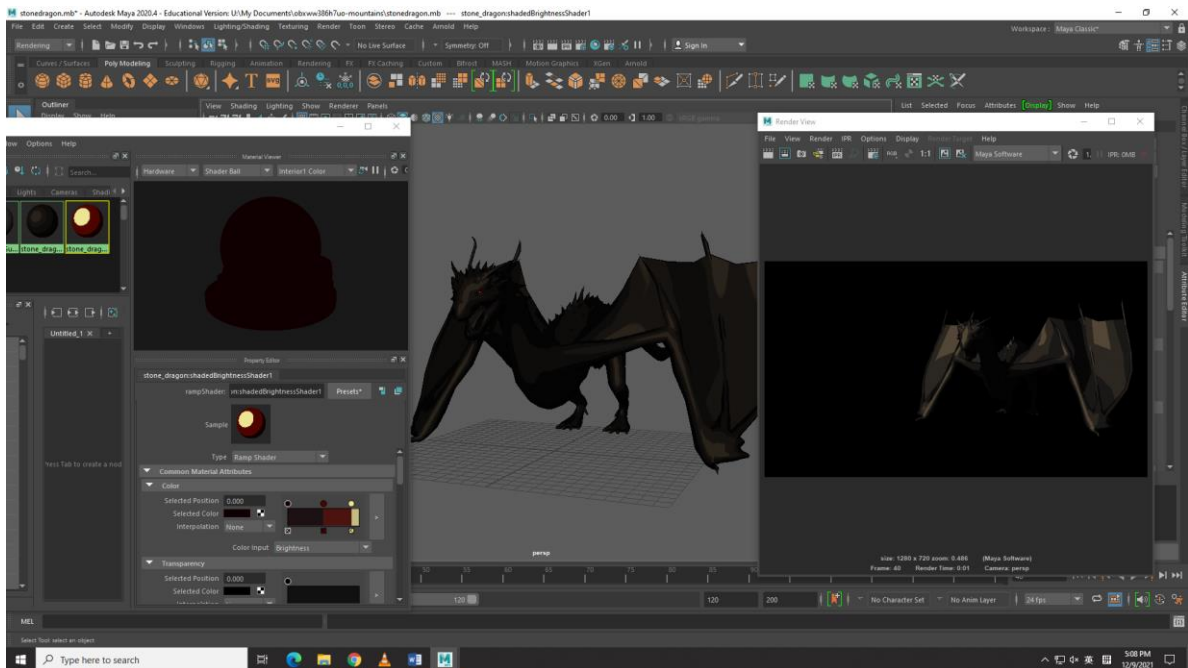


## 5.5 Toon Shader

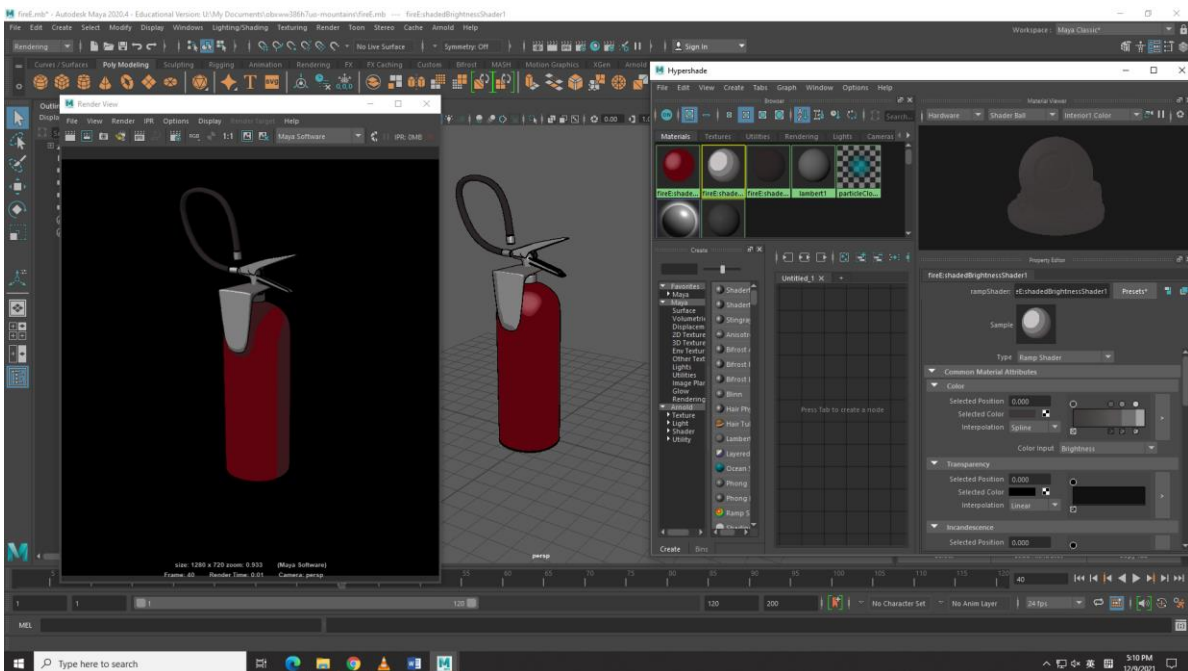
Maya has a built-in toon shader, to be precise, the cartoon rendering mode of the shader, which can easily set the rendering effect to cartoon style. The so-called cartoon style is actually mainly for light:



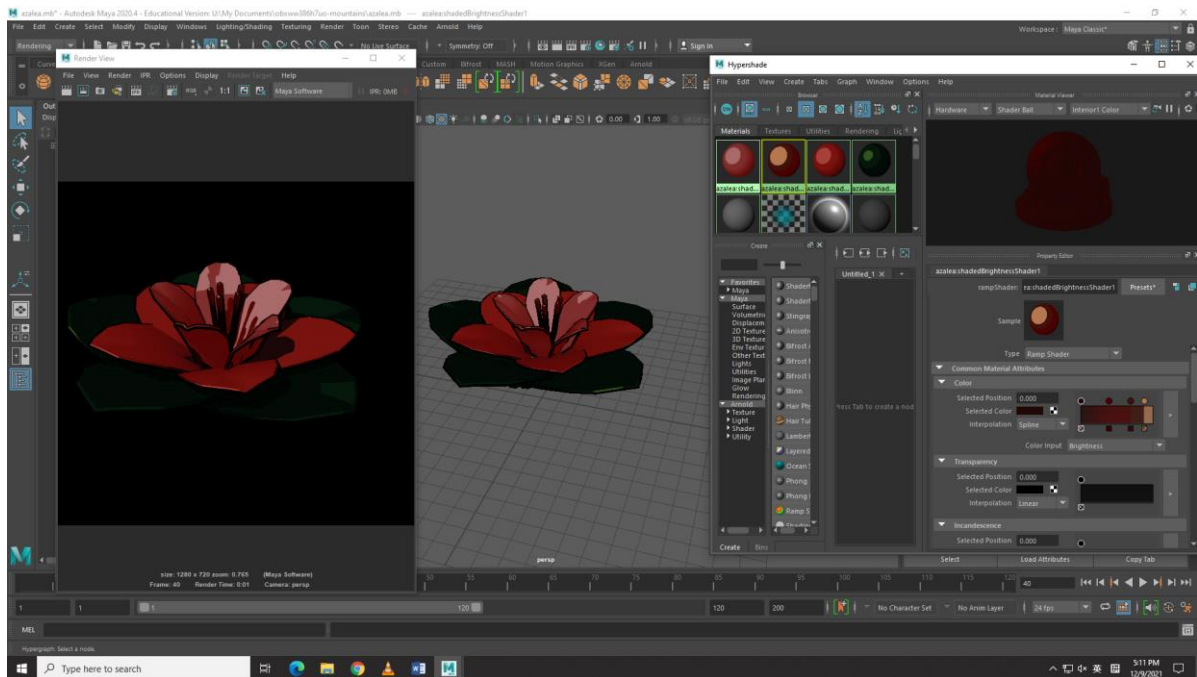
diffuse reflection light, the color is flatter, and the junction of the bright part and the dark part of the specular reflection light is harder.



Dragon: Shader, 3D model, render view



Fire extinguisher: Render view, 3D model, shader



Azalea flower: Render view, 3D model, shader

At the same time, the pfxtoon node is used to establish a wireframe, in which a number of wireframe parameters are adjusted to make the rendering effect look more like animation, as the edges are added to simulate the effect of sideline in manga.

### 5.5.1 More toon rendering objects





## 6 Concluding remarks: A critical appraisal of the project

### 6.1 Future Improvement

The first problem is the material of the scene model, because there are some places where materials and texture maps are used for convenience (such as the text on the store sign), so it may not look coordinated together with the cartoon-like objects using the toon shader. Therefore, I will continue to improve the scene and improve the material in the follow-up. Another problem is that there are too many faces for some objects. For example, in a snow-capped scene, twelve pictures need to be rendered for one and a half hours due to too many faces. Therefore, it is necessary to continuously reduce the number of faces, but this must be done without changing the rendering quality.

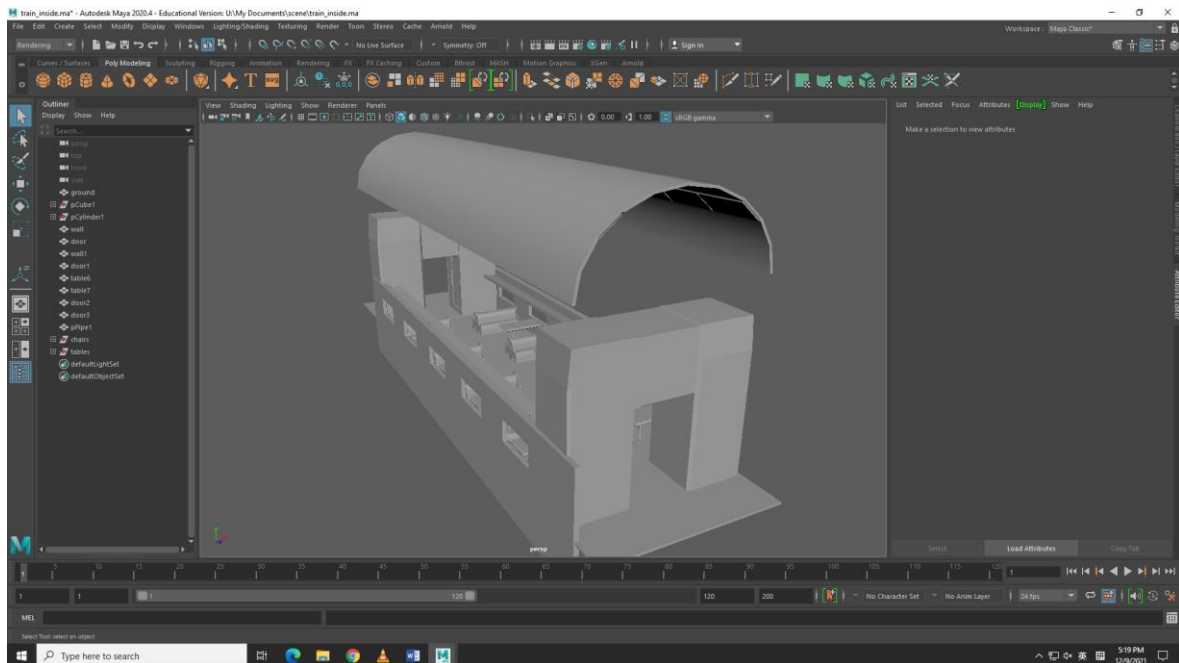
And there are follow-up questions, because I am about to start the animation of the character model, but there is a big problem, because the character is wearing clothes, and the clothes can easily cause the model to be worn. If the clothes model is manually repaired, the animation effect will be unnatural. So this is still a question to be answered. There are also some particle special effects issues, such as how to make the smoke/fire/snow more realistic without increasing the number of particles. Since the hardware conditions of the computer are still limited, using too many particles may cause the computer to crash during rendering.

### 6.2 Problems

Although the goal has been basically completed this semester, there are still many shortcomings. First of all, it takes much more time to build the model than I expected, so I haven't fully completed the model



building yet. Secondly, it is difficult to bind bones. Although some open source human models can be used on the Internet, hair and clothes are still difficult to make.



Uncomplete train inside scene

Another problem is that unlike other shaders and materials, the toon shader is difficult to control the lighting, especially the colored lighting effects. The problem of full white/no change/full black transform often occurs during rendering, and I have not found a solution to this problem so far, so it may be necessary to use post-production special effects to repair the color.

## 7 Summary

In general, the progress of this semester has not fallen behind much. Part of the reason is that this semester is too busy, but there is no need to take that many classes in the next semester, so the progress will be faster, so in general, I still follow the original schedule. And the biggest change is to rewrite the script and replan the scene. When I wrote the proposal during the summer vacation, I presented 11 scenes. Before the semester started, there were seven, but now there are only four. The original animation length is also changed from seven minutes to three minutes. This is a refinement of the story, and for me it is also a reduction in workload.

However, my initial thoughts remain unchanged. My theme is to use symbolism and symbolism to tell a story against aggression and exploitation. The animation style integrates Chinese culture, Japanese culture, Korean culture, etc. The purpose is to prevent people from thinking of it as the historical story of a particular country. The ultimate goal is actually to show that in turbulent times, the fate of ordinary people all over the world is the same. Anyway, as this is a 3D animation, the story can be changed based on the existing scene at any time before the final composite video. Therefore, on the narrative, I can

continue to improve the next semester, and the final composite video will also be adjusted according to the audio track.

## 7.1 Outcome

Short demo of the starting two scenes, the snowy night and the snowy mountains:

(Without the character.)

<https://youtu.be/9UE1uJQqQBc>

Short demo of the city scene:

<https://youtu.be/O065cUmO5Zk>

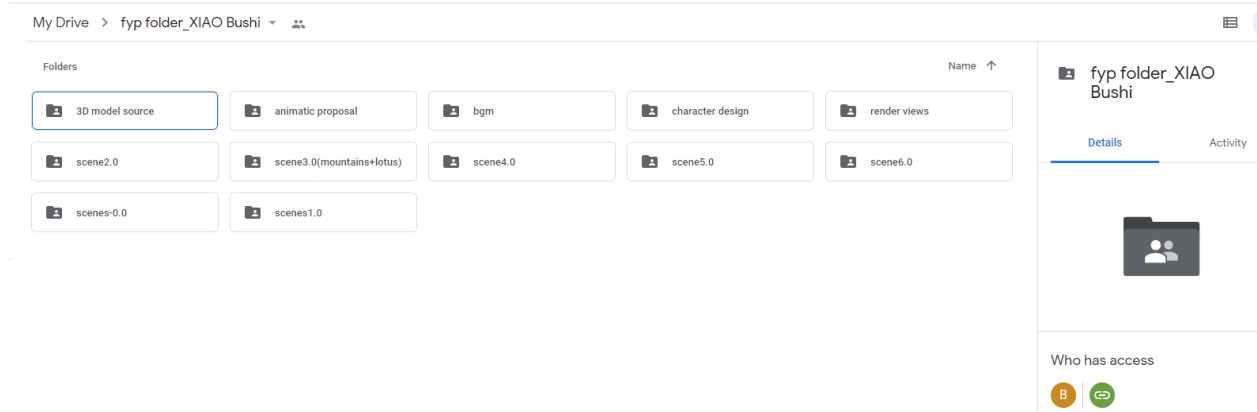
Short demo of the stone cave:

(Without the character, using the doll instead)

<https://youtu.be/b9At9p2XF3g>

## 7.2 The fyp sharing folder

<https://drive.google.com/drive/folders/1UGKfVtyCHD-SWgQ-lgAme1XZ5Sh2NkPS?usp=sharing>



Can be seen as fyp blog

## 8 References List

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