Heroines From An Ancient World

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ARTIFACT - SYNOPSIS

A female warrior wearing different historical armor will fight against each other for territory. Ultimately, it will be presented in Unreal Engine 5 through a fusion of animation, special effects, and armor themes.
I will conduct historical research on armor in its early stages, including its structure and essential components. Then, I will choose a particular armor set from that era for production. I will study the fighting movements of different warriors and make them into animations accompanied by historical background stories.

Create three special effects, namely thunder, fire, and ice, and integrate these elements into the animation to present them in an engine.
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MASTERY PILLAR 1

DESCRIPTION

Research 3 types of armor references to support this 3D modeling, investigate the 3D character modeling pipeline, and all the prop/weapon references contained with the character. This will be fully sculpted and textured. It will look realistic, but the character's skin will mix with a cartoony style.

RESEARCH

1. https://i.pinimg.com/originals/03/c8/3c/03c83c80713e23300fc00503bd63b27b.jpg


I found some historical armor, high-poly references, and vibe references for female samurai.

Method 1- Learn Anatomy Sculpting

I studied some high-profile human body carving and tried to find inspiration for the body structure of female samurai.
Female Anatomy Figure - 1st block-outs (Zbrush Core Part 2) – Learn Female Anatomy Sculpting knowledge.

https://www.youtube.com/watch?v=yWPMKJH5TEg&list=PLCC2xuWisHCikG4WiXxFDk3uRzjBAK55PEx&index=2

https://www.youtube.com/watch?v=FO02ZpgN800
Samurai making (Sculpt only) – Get an idea and inspiration from others who are sculpting.

In this video, I learned the proper workflow for character production from proxy to high-poly. I should follow this standard.

Figure 6 - armor

https://www.christies.com/en/lot/lot-6389188


Nanbokucho-Muromachi period: The Nanbokucho-Muromachi period was a time of political upheaval and frequent warfare in Japanese history. During this period, samurai armor further developed, becoming more intricate and advanced.

Azuchi-Momoyama period: The Azuchi-Momoyama period marked a critical stage in Japan's history as the end of the Warring States period. During this period, samurai armor experienced new changes to adapt to the continuous warfare and evolving battle tactics. Chest armor began utilizing more robust and precise iron plate jointing techniques to provide excellent protection and stability.
Edo period: The Edo period was a relatively stable and peaceful era in Japanese history, and the armor of this period emphasized practicality and everyday use. With reduced scale and frequency of wars, samurai armor gradually simplified and focused on durability and flexibility.
Take research about Song dynasty armor, look at the definition of Song dynasty armor, with all the details and design elements about armor.

Figure 9 – armor
http://dragonsarmory.blogspot.com/2016/10/song-dynasty-armor.html

Figure 10 – armor
https://www.pinterest.co.uk/pin/237072367877221387/
I found some Viking armor references.

Proof Of Concept

Some simple references to the armor structure were made, which will be corrected in the next stage because the character in the middle is not a natural person from history.

Figure 11—Armor From the Period of Warring States

Warring States Samurai Armor 1
Figure 12 – Armor From the Southern Song Dynasty Period in China

Southern Song Dynasty Armor 1

Figure 13 – Armor From the Viking Period

Viking Armor 1

MASTERY PILLAR 2
DESCRIPTION
This mastery requires me to rig characters ready for the game engine and make a fighting combo.

RESEARCH
Method1- Tool reference

![Image](https://www.youtube.com/watch?v=c538zkwxgTQ&t=386s)

Quick Rigging and Skinning a character for beginners – How to use and set up with Quick Rigging tool in Maya.

Method2- Basic principles of animation

Understanding the basic principles of animation will help me in my future animation research and production.
3D Character Animation in 14 minutes! Beginner Maya Tutorial – Break down the animation before making it.

**Figure 16**

https://www.youtube.com/watch?v=GcqD7Q2EVOo

MASTERY PILLAR 3

DESCRIPTION

They are learning the Special Effects Pipeline in UE5. Special effects will be created on the character's weapon, generating impact and combo attack animation. When the characters perform animation, it will trigger an effect when they interact with each other.

RESEARCH

Method1-Make FX in Unreal4 using the Niagara system.

The following video gives me a more detailed understanding of creating dynamic effects.
League of Legends Attack FX in UE5 Niagara Tutorial | Download Files – Learn how to set and use Niagara in UE5.
Sword Trails in UE5 Niagara Tutorial | Download Files – Learn how to do Sword Trails in UE5

https://www.youtube.com/watch?v=LjVdf6B-tmA

Figure 19

Fire in UE5 Niagara Tutorial | Download Files

In this video tutorial, Asif Ali demonstrates how to create a simple fire effect and assemble rocks using UE5 Niagara. The tutorial includes steps for randomizing the size, initial rotation, and distance from the center of the stones to create a more natural look. Ali also provides instructions for making material for the fire effect, including adding a radial exponent, overlapping textures, and distorting the texture coordinates. The tutorial is easy to follow and includes detailed explanations of each step, making it accessible to beginners.

THE ARTIFACT

DESCRIPTION

A Female character in 3 different armors with animation and dynamic FX. The scene will finally be presented in Unreal Engine 5.

RESEARCH

Various parts of the armor
In this section, we will provide a detailed description of the different components of samurai armor during Japan’s Warring States period, including dou (body armor), kusazuri (thigh guards), and sode (shoulder guards).

Dou: The dou is one of the main parts of the armor, covering the upper body torso. It is constructed from iron plates or leather with cords and buckles to provide protection and flexibility. The design of the dou can vary based on the samurai’s requirements but generally presents an encompassing shape for torso protection. The surface of the dou is often decorated with engravings, patterns, and family crests, showcasing the samurai's identity and honor. These decorations also contribute to the durability and sturdiness of the dough. Additionally, the interior of the dou is frequently lined with padding to provide extra comfort and cushioning, enabling the samurai to stay comfortable and agile during prolonged battles.

Kusazuri: The kusazuri is the leg protection of the armor, primarily safeguarding the area below the samurai’s knees. It is usually iron and covers the entire lower leg down to the feet. The design of the kusazuri ensures the samurai’s flexibility and stability during combat. The exterior of the kusazuri may feature inset metal scales or plates to increase its protective capabilities and strength. Different armor parts often employ multiple layers of overlapping iron plates or scales to offer improved defense. The kusazuri has straps and fasteners to secure it to the legs and feet, ensuring proper attachment and stability.
Code: The code protects the armor’s shoulder, covering the samurai’s shoulders and upper arms. It is made of iron and equipped with adjustable straps and buckles to ensure stability and safety for these areas. The code is designed to be relatively large and robust, providing effective defense while coordinating with other armor components. It is often embellished or carved, enhancing its decorative and expressive qualities. It may represent family crests, totemic animals, mythical legends, etc., further enhancing the symbolic significance and sense of honor associated with the code.

The above descriptions outline the different components of samurai armor during Japan’s Warring States period, highlighting their specific functions and purposes. Each component contributes to the overall functionality, aesthetics, and symbolism of the armor, showcasing the rich heritage and craftsmanship of the era.

The Role of Armor in War

During the Warring States period in Japan, samurai armor played a crucial role in warfare. It served as protective equipment against enemy attacks and represented the status and honor of the samurai class.

The role of armor in warfare extended beyond just protection and identification; it also possessed tactical value. Due to the all-around defense provided by armor, warriors could move and attack with greater freedom on the battlefield. The flexibility and comfort of the armor allowed samurai to maintain high mobility, adopt various combat stances and tactics, and react swiftly. Additionally, armor could provide additional protection to block or weaken enemy attacks.

However, armor had its limitations. Although it provided sufficient protection, it couldn't completely prevent all forms of attack, especially against powerful weapons or skilled opponents. The materials and weight of the
armor could cause fatigue and limit the samurai’s ability to maneuver during prolonged combat. Furthermore, armor relied on the physical strength and physique of the individual samurai and may not be suitable for those with weaker bodies.

Figure 22 – Japanese Armor From Different Dynasties 3

Credit:
https://i.pinimg.com/originals/4b/6c/69/4b6c69bb3def435c3d6356bc1ad90cf.jpg
https://www.pinterest.co.uk/pin/281543711308554/
https://i.pinimg.com/originals/5f/c7/f0/5fc7f04d1a42900fe22992056d01b99c.png
Figure 23 – Japanese Armor From Different Dynasties

Figure 24 – Armor From Yokohagido Dynasties


Details of Yokohagido-type armor from the Mid-Edo Period. The samurai who wore this armor belonged to the Clan Ikeda.

Armor during the Southern Song Dynasties in China
**Characteristics of Armor during the Southern Song Dynasty**

The armor of the Southern Song Dynasty in China is very representative. Most armors in games or movies about the Chinese background today are based on the armor of the Song Dynasty and processed and designed.

During the Southern Song Dynasty, due to the weak state of the Southern Song Dynasty's small court after the Southern Expedition, the pacifists vigorously obstructed the anti-Jin struggle, resulting in backward and stagnant military production. In addition, the invention of firearms is also an essential reason for the stagnation of armor production. Although armor was still used during the Southern Song Dynasty, people realized that the power of firearms had increased, gradually reducing the defensive role of armor in warfare and no longer receiving the same attention as before. In the armor of the Southern Song Dynasty, a helmet shaped like a cold hat appeared on the first armor. A copper helmet was unearthed in Zhengcheng, Shandong, similar to the warrior helmet in Yu Gong's tomb mural. From this point, it can be seen that armor production during the Southern Song Dynasty was backward and not valued.

The Song Dynasty still adopted the armor form of the Tang Dynasty and the Five Dynasties. It is said that after the elimination of Emperor Taizu of Song, the founder of the Song Dynasty, a large number of armor was obtained in the Tang Dynasty, which could not be wholly destroyed or sent to the north, so they were sealed in the south and re-opened in the Southern Song Dynasty. Therefore, armor was made in the Song Dynasty's form and the Tang and Five Dynasties in the Southern Song Dynasty army.

*Figure 25 - Song Dynasty golden lacquer iron armor*
1. According to the stone statue of General Yongyuling in Huiguo Town, Gongxian County, Henan Province, the beam armor of the Song Dynasty adopted a horizontal beam method similar to the Five Dynasties period, using belts, ribbons, or silk straps to fix it. According to the shape of the shin armor worn by the samurai statues in the Song Dynasty stone sculptures in Dongqian, Ningbo, and Hunan, the shin armor in the Song Dynasty is similar to that in the Tang Dynasty. Still, the shin armor comprises horizontally woven leather armor pieces, covered with black fabric or black lacquer leather, bound up and down by a belt, and tied vertically with a belt buckle. In addition, the lower edge of the shin armor is also equipped with foot guards, which are used to protect the instep of the foot and are connected to the head of the cloud boots through a belt.

2. Therefore, the main characteristics of armor during the Southern Song Dynasty were as follows: the production of armor stagnated and was not valued; The invention of firearms weakened the defensive role of armor in warfare; The appearance of a hat-shaped head armor in the armor; Simultaneously using the armor forms of the Song, Tang, and Five Dynasties; The bundle armor adopts a horizontal bundle method and is fixed with belts, ribbons, or silk straps; The shin armor is horizontally woven with leather patches, covered with black fabric or black lacquer leather, and equipped with foot guards to protect the instep.

**European Viking Warrior Armor**

**The Historical Background and Origin of Viking Warrior Armor**

Viking armor is also a significant type of research. Viking culture significantly impacts current films, television, and games. Many magical and fantasy backgrounds, such as the God of War and the Assassin's Creed, will add to Viking culture. Inspired by Viking culture.

The European Viking warrior armor, as one of the vital war equipment in medieval Europe, has a unique and eye-catching historical background and origin. This article will delve into the historical background and origin of Viking warrior armor from the perspectives of its scope of activities, historical development background, and the origin of armor. Viking warriors were active sea explorers and warriors in the Nordic region from the 9th to the 11th century. They mainly come from modern Sweden, Norway, and Denmark and are renowned for their fearless spirit and brave combat skills. Viking warriors are known for their maritime plunder and expeditions, and they took longships to prepare for attacks on coastal cities and trade routes, bringing colossal military and economic impacts. This unique activity mode also provided a background for the emergence of Viking warrior armor.

The origin of the Viking warrior armor can be traced back to the early Viking Age, about the beginning of the eighth century. Early Viking warriors did not wear full body armor like medieval knights but relied on light protective equipment to protect themselves. They usually wear leather jackets and helmets and use shields made of wood or metal plates as their primary defense tools. Over time, Viking warriors gradually realized the importance of more robust protective equipment, especially in the face of increasingly complex enemies and war technologies. So, a new generation of Viking warrior armor began to emerge.

According to archaeological research, these armors are usually composed of iron or steel chain armor, which forms a movable network structure through interlocking rings, covering the warrior's entire body. The armor
design aims to provide better defense and flexibility to cope with various attack methods such as stabbing, chopping, and arrow attacks. In addition to chain armor, there have been further developments and improvements in Viking warrior armor.

**Research on Armor Design and Manufacturing Technology**

The armor design is crucial for the warrior's protective ability, so the design of Viking warrior armor has been carefully considered. Firstly, the overall shape and structure of the armor must be able to cover critical parts of the warrior, providing complete body protection. Typically, Viking warrior armor consists of multiple components, including a breastplate, leg armor, arm armor, and helmet. These components need to have a certain degree of flexibility to ensure that soldiers maintain free movement during combat. In terms of design, the Viking warrior armor combines chain and armor, providing good protection and flexibility. Chain armor is composed of metal rings connected by rings, covering the body parts of the warrior. Although chain armor is relatively flexible, its effectiveness in resisting severe impacts and arrow shooting is limited.

The shape of the Viking warrior's armor has been carefully designed to provide the best protection effect and show the mighty image of the Vikings. Helmets are essential to Viking warrior armor and come in various shapes. Standard Viking warrior helmets include pointed helmets, round helmets, and eyelets. These helmets are usually metal and can cover the head and face, providing necessary protection for soldiers. In addition, helmets often have decorations such as horns, wings, and animal images to showcase the warrior's identity and deter enemies. In addition to the helmet, the Viking warrior breastplate has unique styling features. The breastplate is usually connected by a metal plate, covering the crotch and abdomen to provide protection. The standard shapes of Viking warrior breastplates are V-shaped, U-shaped, and circular, providing good protection and adding visual effects. In terms of design, complex decorations often appear on the breastplate, including patterns, animal reliefs, and inscriptions. These decorations can not only distinguish different soldiers and tribes but also express the Vikings' attitude of respecting nature and belief. The chain armor in Viking warrior armor also has a unique shape, consisting of many metal rings connected to form a sturdy protective net. This type of chain armor requires skilled artisans to connect each ring accurately. In terms of shape, chain armor can flexibly fit and adapt to the warrior's body shape, allowing them to maintain high flexibility during movement.

Chain armor protects against piercing swords and intense impacts during battles. In addition, the detailed decoration of Viking warrior armor is unique. Various patterns, grooves, and carvings appear on armor to enhance visual effects and personal style. Vikings often carved mysterious symbols, mythical and legendary biological images, and abstract geometric patterns on their armor. These decorations reflect aesthetics and express the warrior's pursuit of nature, gods, and combat glory.
Regarding shape forging, every armor component needs to be shaped correctly through cold or hot forging treatment. Metal rings must be connected individually to form a sturdy chain network for chain armor. This process requires skilled blacksmiths to ensure a robust and reliable connection between the rings. As to producing armor, forging thicker metal plates requires high temperature and vital force and usually requires using tools such as hammers. The material thickness and curvature of armor must be accurately controlled to adapt to the curves of the warrior's body and provide the best protective effect. In manufacturing Viking warrior armor, minor processing and decoration are also required in addition to forging. This includes surface polishing, shape adjustment, and simple pattern carving and decoration. Adding these decorations adds visual appeal to the armor, highlighting Viking warriors' social status and combat glory. The sophistication of the design and manufacturing technology of the Vikings warriors' armor demonstrates their outstanding skills in metallurgy and forging. It reflects their emphasis on and pursuit of combat equipment. These advancements in design and technology provide soldiers with better protective capabilities and enhance their comfort and flexibility on the battlefield.

**The 3d realistic character pipeline:**
Investigate the complete 3d realistic character pipeline process:
Find a proper concept to use as a reference for sculpting. This is a critical stage, which will be the basis for all further work.

**Sculpting (method A)**
This will use ZBrush to sculpt and create the most detailed model. First, it will finish the basic shape and look at the silhouette. Then, it will move to significant details, add small details, and check anatomy details.
Substance Designer (method B)

1. Using SD to make the texture of clothes inside or the armor. I found a tutorial on YouTube; the video shows the step-by-step process to create a fabric; it starts with setting up the graph, then making a few waves, the first and second weft, then applying mask and winkles to the fabric, then building the maps (Base color, metallic, roughness maps)

https://www.youtube.com/watch?v=YCI0pyLQIA

Figure 27- Shinobi | Game Character | Part 5 | Detailing | Zbrush
1. This tutorial video shows how to create a fabric material in Substance Designer. The tutorial assumes a basic understanding of the Substance node-based workflow and walks the viewer through each step of creating a fabric material. The video starts by creating an empty graph and a basic setup to preview the material in the 3D viewport. The fabric material is divided into a base weft and an ornamented weft. The tutorial shows how to create the base weft using the “weave 2” pattern, scaling it up to 64, duplicating it, rotating it, and blending it to create a crisscross pattern. The tutorial then adds imperfections and fraying using the multi-directional warp grayscale node and a Gaussian noise node. The tutorial shows how to create a mask using the warp grayscale node and a Perlin noise node to create the ornamented weft. The tutorial then shows how to blend the two wefts using the “add” blend mode and applies a mask to control where the ornamented weft appears. Finally, the tutorial demonstrates how to adjust the parameters to achieve the desired look for the fabric material.

2. Retopology
   Because this model will be imported to Unreal Engine, it will create another Low-poly model with fewer polygons to make this one fit the game requirements.

3. UV Sweep and Bake Maps
   For the character UV sweep, I should hide the seams in less visible places, such as the inner side of the arm, armpit, etc. For Bake Maps to transfer the detail from the high poly model to the low poly model. Such as Normal Map, Ambient Occlusion, and others.

Fire in UE5 Niagara Tutorial | Download Files
In this video tutorial, Asif Ali demonstrates how to create a simple fire effect and assemble rocks using UE5 Niagara. The tutorial includes steps for randomizing the size, initial rotation, and distance from the center of the stones to create a more natural look. Ali also provides instructions for making material for the fire effect, including adding a radial exponent, overlapping textures, and distorting the texture coordinates. The tutorial is easy to follow and includes detailed explanations of each step, making it accessible to beginners.

[Image of a tutorial video]

https://www.youtube.com/watch?v=gWVBjzwWsc

*Figure 29 – FX Niagara Tutorial*

Unreal 5.1 - How to paint damaged textures and other effects on skeletal meshes.

The video tutorial explains how to paint a texture on a skeletal mesh, which can help display damage on game characters with pixel precision. The process involves creating two render targets, one for permanent damage and the other for temporary damage, which are used as masks to blend materials and spawn particles. The tutorial also covers creating a dynamic instance of the material on the skeletal mesh actor and assigning a unique render target to each paintable actor to ensure multiple copies of the effect can be created without sharing textures. The tutorial then goes over using ray casting to paint on the mesh before explaining UV mapping and its importance in ensuring texture details are correctly applied to the mesh.

1. Weapon FX

Using the Niagara system in UE will make some weapon FX in Unreal Engine. This Unreal Engine FX tutorial from CGHOW shows the FX pipeline in Niagara. I will follow this as a guide and then make my own FX for my character.
CGHOW first made the weapon swipe material in UE and then imported it to Niagara for adjustments.
In a particle system, parameters are adjusted to produce a good result. It added to the character.
Use the same method to make ground destroy effects.
VFX Test in UE 5
I created a Niagara system in UE 5, then made a Fountain Emitter, adjusted the initialized particle and velocity, added a new emitter called Dynamic Beam, set the beam emitter the start and end point, then added a new scratch pad module, set map local to this scratch pad, so the particle read will get the first Fountain Emitter which I created first, in Beam Emitter Setup I can get this scratch pad module at the end Beam position, then copy this scratch pad to Beam start position. Then, I added a noise to this ribbon effect.
Then, I added a level blueprint and set this effect to spawn when the level is.

Some weapon FX test:
PROOF OF CONCEPT

Made Sword Trail/Ribbon Trail test in UE5 Niagara

First, I downloaded an animation and character model from Mixamo and imported it to UE5 as an FBX file for testing.

Then, I made a sequencer in UE5 and dragged character animation into it. I also attached the sword mesh to LeftHandIndex3 Bone so that the character could hold the sword properly. Then, I added a camera to the sequencer to present this character better.

Secondly, I have created my Niagara effect system and a material for my Ribbon trail. First, I made an effortless flat white color for the Ribbon trail material to test whether it works properly. I also deleted those settings I do not need in the Niagara system for these effects. Set the Spawn Rate to 100 and ribbon width to 50 and apply the Ribbon trail material to Niagara.
Figure-27

Figure-28
Then, drag this Niagara effect to the sequencer and attach it to the sword. I attached these effects to the center of the sword.
Next, create Ribbon Materials for the sword; in the Material Editor, Make a primary fade black effect and color the edge first. Created a TexCoord Node, then added 2 component mask set to R and G channel; in R channel set One Minus and added Power Node, then added multiply with Particle Color, set to Opacity, in
G channel set to Step to 0.05 and added Multiple double times, the second Multiple’s B channel will be linked to Dynamic Parameter, then added Black Body to use control color templates for the color change, link all this to Emissive color.

![Figure-33](image)

Next, add red and blue colors to the ribbon material and create another TexCoord Node, a Noise texture, and a Lerp node. Two colors (red and blue) should be connected to the Lerp node; blend those two colors into the primary effects. Then, add Panner to the texture to make it dynamic.

![Figure-34](image)
Finally, I added a spark emitter to the sword and created a new fountain emitter in Niagara. In Shape Location, set Shape Primitive to Cylinder, adjust Height to 80 and Radius to 0, delete Gravity and Velocity, set Spawn Rate to 20, set particle size to Min to 0.1 and Max to 2, set Mass mode to Unset/(Mass of 1), then add Curl Noise to particle, also adjust color to orange.

**PRODUCTION**

**PROTOTYPE SLICE**

**DESCRIPTION**

*Why is your Prototype what it is?*

First, I will continue to look for armor references, correct my previous pictures, try to split the armor into more parts, help me understand the armor structure, and think about the workload in the production process and how to improve efficiency.

Secondly, I will continue to learn related animation tutorials because I only had a little animation talent before, so I need to know more now.

Regarding special effects, I will find more references at this stage and consider how to combine them with animation. Since I rarely do kinetic effects, this will challenge me.

**SCHEDULING / PLANNING**

*How did you go about planning? Were there changes, and why?*

The following is my plan form. In fact, during the production process, I spent more time on the early armor reference research because I wanted to confirm whether it was from an actual historical source rather than from a film, television, or conceptual design. I spent much time looking for it and will ensure my historical accuracy. Regarding animation, in addition to studying the fighting movements of samurai, I also need to think about how to combine fighting animations because there are fewer resources for fighting between characters from different eras, so it will take extra time.

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| 1    | - Research past classmates’ graduation projects, study excellent and bad proficiencies, and analyze the reasons for them  
- Start developing your themes, studying their processes, and evaluating whether your abilities can be achieved  
- Communicate with the professor to obtain approval, some have already been approved, and some require more proof |
| 2    | - Continue to improve content and obtain approval  
- Continue to evaluate one's abilities and search for a large number of resources to obtain inspiration  
- Communicate with the professor and start conceptualizing potential intentions based on feedback |
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| 3 | - Start to truly identify your three thematic intentions and search for more relevant information  
- Organize past works to provide more evidence based on actual situations  
- Based on feedback, improve the three themes and rough process of thinking, as well as time management |
| 4 | - Start a large-scale search for the entire process and details corresponding to the three themes, and try to conceive different methodologies-7  
- Continue to refine the concept of a journal and schedule 6  
- Preparing a presentation-4 |
| 5 | Prototype - MIDTERM PRESENTATION  
- Continue to communicate with the professor on three topics in the mid-term stage to ensure that one of them can be selected  
- Summarize the good points and areas for improvement of three themes-5  
- Summarize the professor's opinions and feedback, and finally determine a feasible solution based on one's intentions, and obtain the professor's permission-5  
- Finalize the plan and start searching for more information to prove it  
- The final direction is the direction of historical hero armor-1 |
| 6 | - Start searching for a large number of historical themes related to armor, as well as different designs, ages, and more for each armor-5  
- Start combining typical elements of armor to find designs that fit your heart and organize them together  
- Starting to generate more armor with historical themes and following the same process to conceive two other types of armor-3  
- Starting to study the principles of animation and the basic standing and walking postures of historical characters, as well as the changes that occur after they are given armor-7  
- Start researching special effects that interact with the environment and characters, extensively search for information, and combine themes-5 |
| 7 | - Select one of three historical armor types and start splitting them apart. -2  
- Study the details and texture composition of the armor and find the corresponding split structure diagram-4  
- Start collecting texture maps for armor and store them in the map library for future use  
- Start searching for the corresponding character production process video and watch it repeatedly. In terms of carving, you should focus on how to bake and how to present it with light in the engine-3  
- Conceptualize different methodologies to support the character's production process  
- Start searching for a large amount of action information, continue researching action principles and human body movement patterns, watch action-themed videos and videos of real warriors for
- Conduct extensive research on armor structure and select different historical-themed armor. Study the material composition of armor and the material composition of its internal structure, and find various methods to achieve its effectiveness.

- Communicate with the professor to ensure the feasibility of the entire process implementation. Regarding character skins, the professor does not recommend using mari. As an alternative solution, I will use up or SD to create character skin textures.

- Search for an entire process animation production method.

- Regarding animation, start researching one of them, samurai combat animation, and imagine how to combine samurai combat animation with the other two different types of warriors.

- Watching live combat videos and start searching for inspiration and corresponding materials for several different combat effects.

- Start importing the model into the engine to ensure a smooth animation presentation.

- Continue to search for special effects information and classify weapon effects and character effects.

- Watch the special effects video production process and create simple, special effects based on the tutorial, such as character weapon effects, which are just a small prototype for import into the engine for testing.

- Watching the special effects video production process and creating large-scale scene special effects according to the tutorial is only for learning the impact of the entire process, not for testing in the engine in the project.

- Finalize the methodology for the entire process, reserve several alternative solutions, and begin the formal production process.

**METHODOLOGIES**

First, I corrected the previous pictures so that the armor came from real photographs and made a more detailed version, including how to form, wear, color, material, etc. This will help me make better realistic armor.

**Characters with Armor for Spec Sheets**

samurai
Figure 35— Armor From the Period of Warring States 9

Warring States Samurai Armor 2
I studied the essential components of Japanese armor during the Warring States period and showcased them through continuous refinement of the spec sheet. It includes upper and lower body armor, Haidate. The candidate was tied around the waist by a rope. It also has the Shoulder armor, Kote, Kougake, and Samurai Sword. Regarding the inner wearing of armor, there is a rope under the shoulder pads to connect the main armor to various parts of the samurai body. The most distinctive feature is its Zane Dou, which is neatly arranged. In the armor of the upper body, the upper layer of armor is narrower. In comparison, the lower layer of armor almost wraps around the upper layer of armor, making it appear more expansive. For the lower body, they are similar to the elements of the breastplate, consisting of several layers of armor, and multiple layers of armor are spliced together. Among them are essential components of armor, which are interconnected and influence each other, forming a complete armor. I will calculate their quantity and start modeling.

**Characters with Armor for Spec Sheets**

General of the Southern Song Dynasty in China
When making the spec sheet for Japanese samurai and Southern Song armor, I found that the clothes inside could be reused. The inner garments of the two armors are very similar, and there is a gap between the Japanese samurai and Viking armor. The standard element chain mail can also be reused because the red armor in the movie The Last Samurai incorporates some elements of Western culture, and the chain mail is also applied to the arm and leg armor. But in reality, this won't happen in real life, so based on historical research, I won't use it.
The armor of the Southern Song Dynasty in China has many similarities with the armor of Japan. Chinese-style armor will have a large decoration area and appear thicker and heavier. It includes a Chestguard, Arrangement of the Crudifix with the armor, Tiger head state at the waist, inner and outer, front and back structure, and the carapace and breastplate connected by a rope. Their way of wearing it is almost identical to Japanese armor. The scales of Chinese armor are different from Japanese armor. They are made of metal material, with a shape similar to the triangular and orderly arrangement of the Crudifix, called Shanwen Jia Tablets. The swords of the Tang Dynasty in China have many complex patterns.

**Characters with Armor for Spec Sheets**

**Viking**
Figure 39– Armor From the Viking Period

Viking Armor 2

Figure 40– Armor From the Viking Period

Viking Armor 3
Many styles of Viking armor are on the market, but they come from something other than the real era. Many Viking styles in movies and games have undergone secondary design, and the way real Vikings wear them is relatively light. I will break down some of the main elements of Viking armor, including the base leather breastplate and the belt wraps around the breastplate; there is also a protective layer of lather material on the left and right sides of the waist, and cotton overshoes are wrapped repeatedly with belts. It includes shoulder armor, inner cotton base clothing, and famous chain mail. The hand guards are similar to the leg guards but are made of leather and reinforced with bear fur on contoured edges. There was more than one type of weapon during the Viking period, but Viking axe weapons had their characteristics, so I chose them.

I made a mistake here. In my research and spec sheet, I should not look for game concept design drawings as a reference for historical accuracy because game concept design is based on history, people's imagination, and artistic processing. I should reference actual armor that existed in history.

Characters' basic models

First version 1

In the testing section, I will export the model from Daz for human body carving, which will help me better understand the composition of human muscles and carving methods and practice before I officially make it.

Figure 41– List of human height

Average human height by country - Wikipedia
This refers to the average height of Asian and Western women in different years. My protagonist is an Asian warrior woman with a more robust and taller physique. I will use a higher average value to create a woman's human body.

Bare female model scale references:

![Female Body Scale References](https://www.pinterest.com/pin/51836238358133642/)

![Female Body Scale References](https://www.pinterest.com/pin/854417360531123095/)

The primary female model from Daz 3d (G8) was exported for testing and practice, and the G8 model from Daz 3d was only experimental.
I exported the model and measured the height of the character in Maya.
I adjusted the approximate proportions and muscles of the characters in Zbrush with the Move Topological tool.

Figure 45 – female body test

Figure 46– female body test
1. Import the model into Zbrush, click on zModeler, select Polygroup, a single poly, and leave the following content as default. Hold down alt to the group in white face mode, hold down the left mouse button while releasing alt to assign colors, and then press alt to switch the group's colors.

2. Click on the colors of different groups, hold down the left mouse button while holding down the shift to pick the colors of the faces, and then click on other faces to unify the groups' colors.

Refer to the facial bones of some women.

![Figure 47 – female body test](Image)
Before drawing skin detail textures, there are two solutions to avoid the problem of object subdivision and shrinkage:

1. Click on the Morph Target, click on the store MT, hold down ctrl+D to increase one level, shift+D to decrease to the original level, click on the switch, and press d to increase one level to observe the changes in both. Although the model may shrink, it is significantly better than before.

2. If the requirements are strict, you can repeat the operation before upgrading to ctrl+D, such as clicking DelMT and then clicking store MT to cycle through the above operations. The situation will be fixed more.

3. To save time, record the tedious process in Macro, where two loop operations are performed, storing the recorded process in a fixed folder, and then repeatedly clicking ZbrushMacro_001 is used to increase subdivision, which is very convenient while ensuring that the model does not deform or shrink.
Attempting to increase head segmentation and apply surface noise to adjust skin texture is an exploration.
Another method to repair model shrinkage:

1. If the subdivision levels of two sets of models are different when merging the human body, Zbrush will merge according to the parts with lower subdivision levels, so the models with higher subdivision levels will lose some details. Therefore, different groups should maintain and merge the same subdivision level in the final stage.

2. Select Zmodeler for the skinny part between the models, then select Bridge in Line mode, select Two Holes, and continue to select Merge and Loop in Line mode to fix the problem of merging the two sets of models without gaps.

Select a shader with light to observe the depth of the model.
The model's perspective is most suitable for high-poly convenience between 20 and 30.

The corners of the eyes are too thin; increasing the thickness of the corners makes the front look more three-dimensional.
Start sculpting some high-poly details on the face.
I tried using the noise method in Zbrush to increase the texture of skin detail. It is just an attempt, but I may use something else. At the same time, the character’s facial features are detailed and sculpted.
The human body sculpture is just for testing, and the display of three views is completed. Because it is a warrior woman, the outline of the muscles will be emphasized more.

**Method research**

There are currently two mainstream skin methods: ZBrush, which imports alpha through skin texture and drags it out through displacement brushes, and Mari mapping. Both methods have their advantages and disadvantages:

1. The drag-and-drop method does not require pre-preparing UVs. Mari must prepare wiring (automatic topology, etc.), UVs, and a complete low mode. It does not require a final perfect UVs; it must be spread out.
2. If the character has characteristics, Mari mapping must prepare the texture in advance, as the corresponding texture must match the character's face. Spending time on preparation is even more necessary if it is a monster or a face with characteristics. The advantage of the ZBrush drag-and-drop method is that there is no need to prepare the texture in advance. The implementation effect will be faster.
3. The apparent disadvantage of the ZBrush drag method is that it needs to be more accurate than the Mari mapping method in terms of facial position and requires manual modification of the position.
4. The Zbrush drag-and-drop method needs to be updated. Even if many layers are established, returning to the initial state for modification is still tricky. Mari is a texture, so its modification is more flexible.
5. The Zbrush drag-and-drop method needs to be updated. Even if many layers are established, returning to the initial state for modification is still tricky. Mari is a texture, so its modification is more flexible.

6. Mari can perform mixed channels to extract the details of three layers of skin, from large to small, and then import Zbrush for layered modification. This can create rich textures. However, considering that the texture used is truly facial, I must respect that the asset comes from the artist, and the skin texture needs to be made by myself in the preliminary preparation work. If the skin is 2048x2048 or 4096x4096, extracting such rich details is difficult, so this method is often used for film and television character production.

I also found some 3d artists, such as Pankaj Kholiya, who use Marvelous Designer for making clothes, a software for creating fabrics. He uses this to create fabric patterns, simulate fabric, sew fabric pieces together, create sleeves, use the M&M free sewing tool, refine garment designs, add sewing details, use the steam tool, merge fabric pieces, and change fabric properties. Also, bonus tools like the UV editor and sculpt tool suggest checking out their premium products for more advanced fabric designs. Using MD can significantly improve my efficiency in making clothes.

He is a 3D Character Artist who shares his process of creating animation-ready clothes simulations using Marvelous Designer. This includes blocking out the outfit, detailing, animation in Mixamo, transitioning from A-pose to T-pose, animation in Marvelous Designer, detailing, texturing, and rendering. He has worked on notable games like Ghost of Tsushima Director's Cut and Final Fantasy VII Remake.

I found an article explaining creating an animation-ready clothes simulation in MD. The author shows each step’s function and why he does it.

- Blocking out the outfit is crucial; time spent on proportions, silhouette, fitting, and seams ensures a solid foundation.
- Patterns were created and adjusted based on the avatar, using particle distance for primary shapes and simulation efficiency.
- Fabric and textures were added, refining the fitting and silhouette of the clothing.
- Detailing followed, incorporating elements like buttons, seams, and folds to enhance realism.
- Particle distance and warp values were adjusted to achieve accurate folds in the cloth.
- Animation was handled in Mixamo, with the character rigged and animated before transitioning to Marvelous Designer.
- Transition from A-pose to T-pose was executed by importing the T-pose mesh and morphing the outfit accordingly.
- Animation was imported into Marvelous Designer for cloth simulation, resulting in realistic clothing movement.
- Detailing during animation involved decreasing particle distance, altering fabric properties, and adjusting outfit thickness.
- Texturing in Substance 3D Painter included matching colors and adding dirt, noise, and sweat for believability.
- Rendered results in Marmoset showcased the final outfit using previously set-up lighting. This method is suitable for simulating the clothes animation during the animation stage, and I want to try it.
Figure 57 – *method with character*

Creating Animation-Ready Clothes Simulation in Marvelous Designer BY Pankaj Kholiya


Figure 59 – *method with armor*
I have checked an artist called Sebastien Heroux-Lefebvre, a character modeler at Ubisoft Montreal; he created some characters for the For Honor project. I looked at his artwork and saw that he created armor in ZBrush, focusing on the metal and cloth parts. He uses ZBrush to create the high poly, Maya to make the low poly, and Marmoset for the baits and renders. Substance Painter is also used for texturing. The model is aimed at a basic understanding of ZBrush, Maya, and texturing. The first step is to get a base mesh for the body by opening Lightbox and selecting the Project and Mill CBR. He then shows how to hide the grid, lower the subdivisions, and delete the higher subdivisions. Next, he uses custom menus to work faster and more efficiently, including creating a new menu and adding tools such as Delete Hidden, Mirror and Weld, and Weld Points. He also covers using Delete by Symmetry and changing the order of tools.

The process of texturing a 3D model using different colors to designate different materials. The first step is to create a new save and add colors to other elements that need to be selected in texturing. For example, all cloth will be given a red color, all metal will be given a green color, and all bolts will be given a yellow color. He then decimates the mesh to reduce the polygon count necessary for baking. The decimated mesh is further reduced to use in Maya, but he cautions against going too low to avoid losing shape. The final step is to merge the pieces that need to be re-tropologized in one mesh. He provides detailed instructions for each step, including using plugins and shortcuts to speed up the process.
Figure 61 – method with armor

Artwork by Sebastien Heroux-Lefebvre

https://www.artstation.com/artwork/rAvxGe
I also checked other artists' workflows for making armored characters. I found an artist called Cosimo Bonechi. He is a 3D and VFX Artist who discusses his journey as a 3D Generalist, sharing insights into his creative process, workflow, and techniques while creating the Tomb Guardian character.

Workflow: Modeling

- Cosimo uses tools like Blender and Maya for modeling.
- He employs hard-surface modeling techniques and the Crease Maya tool for efficient results.
- A custom script helps convert hard edges to Creases for a smoother workflow.
- Details are added with Maya bonus tools and custom scripts, creating clean and detailed meshes.
- He transitions to ZBrush for sculpting, using standard brushes and noise for micro-detailing.

![Figure 62 – method with armor](https://80.lv/articles/creating-mortal-shell-inspired-tomb-guardian-in-maya-unreal-engine/)

He created another decal to extract a mesh for the weapon holes, which he subtracted from the dynamized one.

Workflow: Texturing

- Cosimo creates innovative materials for texturing, adjusting layers for dirt, wear, and rust.
- He uses Marvelous Designer for clothes and adds folds and details in ZBrush.
- Substance 3D Painter is used to create materials and add detail while maintaining focus on Unreal results.

Workflow: Lighting & Rendering

- Unreal Engine is used for rendering with ray tracing and GI disabled.
- Lighting setup includes warm fill and cold rim lights for balance and depth.
- High-poly and low-poly renders are compared, and optimizations are made for portfolio pieces.
• The final render settings include spatial and temporal sample counts for reduced noise.

Figure 63 – method with armor

Creating Mortal Shell-Inspired Tomb Guardian in Maya & Unreal Engine


I will try some of the methods I have checked above. These artists' workflows and production ideas will help me improve production efficiency.

Making model Process
I manually modeled Max by hand, but due to the small number of faces, I imported the turbo mesh model into Zbrush to adjust the body's proportion and smoothness. Then, I created the semester in ZBrush and exported it to Max for production.
Figure 65 – female proxy model

Figure 66 – female proxy model
I have referred to many female body structure diagrams, and based on my spec sheet, I will gradually make the equipment on my body. I will take out the face from the human body to make clothes and equipment, and I need to name the critical equipment. According to previous research, they have a total of 11 main parts, and at the same time, I lack a helmet. I will conduct research in the next stage. Among the ten main parts, I made separate pieces and reused them. The armor connection is related to ropes; this model is just an incomplete proxy. I will refine them in the next stage.

I copied the models and named them into three types for the next stage.
Figure 68

Figure 69
Making Character Animation

1. Rigging and Skinning a Character in Maya.

https://www.youtube.com/watch?v=mhJlLe9URI0

https://www.youtube.com/watch?v=6G0T8z4xl

*Figure-70*

*Maya Tutorial - Rigging and Skinning a Character | Part 1/2: Skeleton creation and binding.*

*Maya Tutorial - Rigging and Skinning a Character | Part 2/2: IK Controls and Weight Painting*
This tutorial teaches viewers how to create a custom skeleton rig for their 3D models using joints and bones. The process is split into two parts, with the first involving creating and naming the skeleton and binding it to the model's geometry. The second part consists of painting the skin weights for more specific influence and setting up eye controls for realistic movement. The tutorial instructs users to ensure their model is symmetrical and centered on the grid before creating joints and bones using the "create joints" tool. The bones are positioned as they would be in real life, and the process is repeated until the entire skeleton is complete. The tutorial also covers mirroring joints and specifying the plane of mirroring. The tutorial emphasizes the importance of naming each bone and joint for easy organization and provides tips for parenting and editing joints. The tutorial offers a comprehensive guide to creating a custom skeleton rig for 3D models.

The part 2 video tutorial covers creating IK controls for arms and legs and weight painting to tell the skeleton how to influence the skin mesh. The process involves selecting the rigging skeleton, creating IK handles, and using them to create a chain of bones that can move naturally by only moving one entity. Once the IK handles are in place, the video shows how to create visual controls using circles around the wrist or ankle, which can be moved around to influence the IK. This process helps animate or pose and can be done for both arms and legs. The tutorial also covers weight painting, which tells the skeleton how to influence the skin mesh. This involves selecting the mesh, going to the Paint Skin Weights tool, and painting different mesh areas with weights to control how it moves with the skeleton. Overall, the video provides a helpful guide to creating IK controls and weight painting for 3D character animation.

2. Making Animation
The pipeline for making a fight scene in Maya

https://www.youtube.com/watch?v=U2QezujmTvg&list=PLfZWySGjB5zvOx5zkM5r0f888jeiTUQj1&index=5
How To Animate a Fight Scene | Autodesk Maya 3D Character Animation Tutorial Part 1 | HOW 2 ANIMATE
In this video, the creator showcases the process of animating a fight scene between two characters. The heavier character has a shield and an axe, while the other is smaller and stealthier with saber-like weapons. The creator starts roughing in the animation, animating straight ahead with no blocking. The heavier character smells and turns towards the camera while the more minor character peeks behind a tree. The smaller character rushes in for a big attack, and the fight begins. The creator emphasizes the importance of animating the camera and always having a viewable camera. They also demonstrate how to add weight to the characters by adding translations to their shoulders and delays to their movements. The creator emphasizes the importance of subtle movements and being in complete control of the animation. They also discuss using a more enormous rotation tool for finer movements. The video ends with the creator setting up critical poses for the next part of the scene.

The video continues with a cutscene animation where the creator has added a camera cut and a small figure sneaking around the tree to start a fight. The creator updates the viewers about YouTube's new policy that requires a minimum of 10,000 total views to qualify for monetization. The small figure sneaks forward to a certain point and then takes a big step to make a jumping attack to kill the big guy, who hears him and blocks him with his shield, thereby starting the fight. The creator provides tips on animating a walk, reminding viewers to follow the pattern of poses for a walk. The creator demonstrates how to create the passing position, the walk's highest point, and the down position. The creator also emphasizes the importance of checking the weight left and right and the center of mass while animating a walk. The creator then demonstrates how to sneak around and stop, preparing for the fight.
In this video tutorial, the creator continues working on an anime cutscene, showcasing his progress and techniques. He demonstrates how he quickly creates a first pass of animation, which is rough and dirty, to get the initial poses and timing in place. He emphasizes the importance of developing methods to animate quickly, as is expected in the industry, especially in games with a fast turnaround. He also advises beginners to take their time and enjoy the process before attempting to work fast. The creator shows how he changes the camera angle for a dramatic effect, adds a back step for one character, and creates an attack blocked by another character's shield. He notes that the attack is desperate and weak, which will not cause any damage. The plan is for the character to do a shield barge, stepping back and barging the other character off-screen. The video ends with the creator posing the attack and adjusting the animation.

I also found a plug-in called Advanced Skeleton in Maya.
The author introduces Advanced Skeleton, a free character rigging tool for Maya that is fully functional and easy to use. The author, who is not a rigger, has used the tool to rig various characters and creatures for studio productions. The tool can be downloaded from the Animation Studios website and installed using a simple process that involves creating a new shelf and dragging and dropping the install file. The author provides a step-by-step guide on using the tool, including preparing the model to work with Advanced Skeleton and using the Model Check to ensure the model is symmetrical. The author also demonstrates how to use the setup cleanup tool, which can find vertices that are not symmetrical and cause problems with the rig later. The tool is essential for rigging a character's face, and the author stresses the importance of getting the model's symmetry right from the beginning. The author provides five videos to guide users through the rigging process and encourages viewers to subscribe to receive notifications of new tutorials.

Check other animators' workflows to get inspiration.

In this video, animator Joe Daniels explains his animation workflow and the importance of finding a workflow that fits your style. He shares his process for animating a simple two-hit combo attack in less than eight hours and further details his workflow. While he was taught to use a stepped pose-to-pose approach to animation, Daniels prefers to focus on the animation itself first and then go back to tweak the poses. He always starts with a video reference, which he sometimes shoots himself, to feel the action and
understand what the body is going through. He then jumps into Maya to start animating without extensive planning or thumbnail sketches to play around with timing, spacing, and different movement ideas. He creates a cube pass by animating a cube roughly the same size and shape as the character's torso to test out the animation before adding in the actual character. Daniels emphasizes the importance of experimenting with different workflows to find what works best for you.

3. Find some animations attack combo references:

![Figure-76](image_url)

Animation Kata form

I found some reference pictures of martial arts combos, and there are some dismantling of fighting scenes, where I can disassemble the fighting movements frame by frame.

I will disassemble and animate based on these actual fighting references, which can save much time, and I don't need to design the actions myself.
I found some references in the movie, such as The Last Samurai. In The Last Samurai, many scenes are grand battle scenes, resulting in many heads-up scenes between warriors who are unclear in expressing their actions.

However, it still needs to be revised because the action is not continuous due to the many cuts in the movie. I still found some real martial arts performance videos as a reference; the actress showed smooth fighting movements with weapons. I decided to make paint weights in Maya, rigging, and animations in 3D Max. I will also use some plug-ins to assist, but for now, with Advanced Skeleton, I know I must find more plugins to animate.

**Animation making process**
First, I check the model and units, create bip bones, and match the size.
I matched various parts of my body, stretching the bones of my waist and shoulders slightly longer while mirroring the matched bones, provided that the model is kept at the coordinate origin and symmetrical to the left and right; otherwise, errors will occur.

Figure -80

Import the FBX file into Maya, allocate the weights initially, and refine the weights.
I encountered some problems while brushing weights, especially in the shoulder area. I used the Maya-adapted mstool plugin to relax the shoulder area, which needs to be adjusted repeatedly.
I will back up the model and import it into Max. After naming and saving all the separated components separately, I will load them sequentially.
Figure -86
Figure-87

Figure-88
Finally, import the model name into the engine for animation testing.

Dynamic FX test
The primary inspiration for this hack-and-slash special effect comes from ancient generals using cold weapons to compete in combat, such as For Honor, Ninja Gaiden, and Devil May Cry. The impact of these games is excellent, so I watched many of them. Related game content videos serve as inspiration. At the same time, my mastery is also about ancient generals using cold weapons to fight each other, so the slashing effects of my swords, the movement trajectory effects of weapons, the character's hit feedback, and the blood-splashing effect were all taken into consideration, so I created a set from the trajectory of the gun being swung, to the feedback of hitting the character, and then the blood splattering on the ground.
I first made some blood spray special effects, but I have yet to find a suitable blood Niagara special effect, so I made one using the particle system of Unreal Engine 4 and then migrated it to Unreal Engine 5.

I used the marketplace assets in this test demo, like the main character animation and enemy.

I followed CGHow's YouTube video to make blood material. I adjusted a bit and then created my blood material; his video explains how to spawn blood particles where an enemy is hit and create decals where the
particles hit the ground. It describes how to add collision to the particles, bind an event to the particle collision, and spawn a decal where the particle collides.

![Figure 77: Unreal engine | Blood Material and Particle Tutorial](https://www.youtube.com/watch?v=hhcUDejc-E4)

Here is my blood material:
Figure 78 – Blood material process
Then, I imported this blood material into the particle system, but UE5 shows the legacy version. I first made the first layer of the blood effect, but to make it look better, I copied three layers after completing the first layer and then adjusted them one by one based on the first layer, adding some effects such as reflective highlights.

Later, I created the effect of blood splashing out because the knife would cut into the character. The idea is the same as blood production. The parameters, such as the direction of blood generation, lifespan, etc., are adjusted in the particle special effects system.

I created the first layer of special effects for the blood example and added reflections, highlights, and shadows as needed. Based on the first blood layer, I copied and pasted the following two layers and then edited them layer by layer.
Hit feedback

I planned to make hit feedback and a highlight display to create the hit effect and make the character's hit feedback obvious. I made a Fresnel parameter based on the material of the monster material to control the color parameters. Conveniently adjust the parameters of hit feedback.
Figure 82 – Fresnel material

Figure 83 – Fresnel control system
Sequencer

I decided to use a sequencer to make a demonstration so I could import the animation, hit feedback, enemy, and character and do a post-processing together.

![Figure 84 - Sequencer](image)

I used the ribbon effect that I made during my first FX test.

![Figure 85 - Ribbon Trail for sword](image)

At the same time, I want to do some light effects while being hit to achieve the effect of delayed damage. In some games, movies, or animations that show strong attack power, the explosion will be delayed after hitting someone.
I found CGHow’s YouTube video to teach how to make FX hit effects in UE5,

https://www.youtube.com/watch?v=PwDNNvXsLUI

*Figure 86 - Hit FX in UE5 Niagara Tutorial*

In his video tutorial, Asif Ali demonstrates creating a hit effect in v5 Niagara. He starts by creating a good map for artifacts and adding a character to the scene. Next, he creates an FX class and takes the first diameter that will be dark. He uses a transplant material to make it darker and adds a bust particle. He shows how to make it scale up initially and then fade away. He adds a flash behind it and uses a flash material to create a bright color. He shows how to make it scale quickly and increase the size. He then adds another flash that should be above the previous two layers. He uses a delay to make it appear later and brighten. Then, he adds particle bursts and some glow effects to the scene. He shows how to copy the dark core and make it purplish.

I followed his tutorial and made the hit FX.
Figure 87 – Hit FX process

Figure 88 - Hit FX in UE5 Niagara
Finally, I added all the elements together in Sequencer. I also adjusted the post-processing to make it look better and added a camera to the scene with a camera shake, which can better highlight the attack's impact.

![Figure 89 - Post Process in sequencer](image)

Here is the final look for the FX test.
Blood Splash Decal

Since blood splattering has a unique effect when attacking, blood will splash on the ground.

I followed UnrealCG’s YouTube tutorial to create a blood splash effect. The video tutorial demonstrates how to make a realistic blood spill effect in Unreal Engine 5. The effect includes blood spilling out of a sphere, fading out after time, and creating a secondary spill when hitting the floor. The blood is also randomized based on location and aligns to flat surfaces. The tutorial covers two materials: one that cuts off at inclined planes and one that doesn’t. The first material is more customizable, while the second is easier to add and aligns to surfaces without cutting off. The tutorial includes step-by-step instructions for creating the blood decal, bringing in textures, and adjusting parameters for each material. It also explains adding the blood spill effect to a mesh and character blueprint.
After watching his tutorial, I made the blood material and decal based on his ideas. Still, later, I found that the animation I played in the form of a sequencer could not be applied to the blueprint like the method in his video, so I said I just used the blood decal and added it to the sequencer to adjust the generation position of the decal material so that the position where the decal material is generated is consistent with the timing of the monster being hit.
Figure 93 – Blood decal process

Figure 94 - Blood Decal Material
I also added a Magical Trails effect around the character, making it more powerful. I found a tutorial from CGHOW, who made an Aura effect around the character. The tutorial video demonstrates creating a magical lower effect in UE5 Niagara. The effect involves two rotating particle trails, rings, and a glow.
After watching his tutorial, I created my magical trail effect based on his ideas. The tutorial starts by creating the particle trails using the source fix and vortex velocity to create the effect. Then, it moves on to creating the rings and the glow. The glow is created by adding particles of a size of 200 and 150 and using a material with radial exponent, unlimited additive, and a density of 0.5. The rings are created using a round shape rather than an oval one and are given a material with a texture. The tutorial also shows how to animate the particles and use the curve in the drag. Finally, the effect is balanced by reducing the size of the particles and placing the effect around the character.

https://www.youtube.com/watch?v=ruEvaZUC7sA&t=903s
Figure 97 - Magical Trails Effect

Figure 98 - Magical Trails Effect in Unreal 5
Visual Effect update

I found a bug in the last magical trail effect. It will be superimposed layer by layer in the engine, and only the played ones will remain, so I plan to replace it with a spawn special effect.

I found CGHow’s YouTube video, and he explained how to create spawn effects in Unreal Engine 5.

He said the effect involves two rings at the bottom, a cylindrical shape with streaks going upwards, two circles on one side, and a character dissolving.

He creates a Niagara label and a material flow before dragging and dropping the assets into the Niagara system. He then adds a scale value of 100 to the effect. Finally, he demonstrates how to adjust the effect by changing the values in the Niagara system and the materials.

I made materials and textures in Photoshop based on his ideas and then made some changes based on his ideas. I imported the textures into the engine to make materials and created a Niagara special effect. I created a ring using the selection tool and stroke and scaled it down. I also created a pattern by merging layers and making a selection tool. I also created a cylindrical shape in 3ds Max and used a radial ramp to create sparks.
Figure 100 – Spawn FX process

Figure 101 – Spawn FX Niagara
DESCRIPTION
I will refine the high model at this stage and use some techniques in ZBrush to assist production and make clothes simultaneously. The remaining details will be made in texture software, allowing me to get a higher precision model. I'm going to look for more animation references to get some more distinctive movements and understand the differences between them. This will make it easier for me to create better animations that fit the characteristics of each character. I am going to start working on the special effects, and I'm going to test them to integrate them better with the animation.

SCHEDULING / PLANNING

<table>
<thead>
<tr>
<th>WEEK</th>
<th>TASKS / HOURS</th>
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<tbody>
<tr>
<td>8</td>
<td>Make high poly of the samurai armor seven h Use MD to make clothes h</td>
</tr>
<tr>
<td>9</td>
<td>High poly bust-8h</td>
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<tr>
<td>10</td>
<td>Make alpha texture five h Find more animation information h</td>
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<tr>
<td>11</td>
<td>State of the Vertical Slice Find more special effects reference-6h Do some vfx-7h</td>
</tr>
<tr>
<td>12</td>
<td>Refined high-model-5h Rig-character-8h Get more texture references to ensure historical accuracy-3h</td>
</tr>
<tr>
<td>13</td>
<td>Critical Reviews Create fire special effects and find more special effects inspiration-5h</td>
</tr>
<tr>
<td>14</td>
<td>character animation -8 Find the right action effect. Fix incorrect references-6h</td>
</tr>
<tr>
<td>15</td>
<td>Continue to create blood flowers and fire unique effects h Texture and low-poly refine-10h</td>
</tr>
<tr>
<td>16</td>
<td>Vertical Slice - FINAL – PRESENTATION Continue to create armor texture nine h Animation with fx-7h</td>
</tr>
</tbody>
</table>
METHODOLOGIES

I used some high-model techniques, improving efficiency and the model's accuracy. The animation references classic actions while incorporating animation styles from Japanese games so that it doesn't look too dull. The special effects will try to make the fire effect more obvious and realistic so it can be combined with the animation better.

Figure 105 – Clothes in MD

Sew along the sleeves and the garment's outline to sew the entire upper body together.
The collar of clothes needs to calculate an approximate interval value. To get this, multiply the length of the left and right halves of the front by two and add the collar's curvature.
Since the collar is divided into two parts, the suitable collar must freeze the right side of the garment when sewing; otherwise, the model will twitch during simulation.

![Figure 108 – Clothes in MD](image)

When making a belt, use the Show arrangement points function to make the pulled-outside adsorb at the desired location.

Sleeve

Use the pattern-making tool to edit a rough layout and sew it together, simulating to ensure that the sleeves will not slip, and pay attention to the width control.
Make templates based on the shape of the hand, and use point, line, and surface editing.
Editing to match the hand

After you're done, do the mirroring operation and copy the arm on the other side.

Figure 113 – Sleeve making in MD

Lower – Body

The idea is the same as that of the upper body clothes. Use the edit pattern tool to create the pattern, open Show Arrangement Points for adsorption, and then mirror and copy the other half.
After freezing the upper body, sew the pants and create a new section to make trouser cuffs. Ancient people used a locking trouser cuff design. At the same time, pull the pants up to create a pleated effect. The trouser cuff locks the calf.
Make four divided pleats in the middle of the pants, add four dividing points, and connect them, then divide the pleats evenly in the middle of the line and pull out the pleat layering.

Figure 116 – Lower – Body making in MD

Figure 117 – Lower – Body making in MD
1. The line has been adjusted

2. The slope is modified here to facilitate everyday baking.

3. low-poly display
Remade the armor based on the reference
High-poly modeling – Pattern

Shadow layer settings in Photoshop

![Layer Style](image)

Figure 123 –Pattern in Photoshop

The curve can be reversed to achieve different effects.
The level can be controlling contrast.
Adjust the gray value to represent the inward concavity.

*Figure 125 – Pattern in Photoshop*
The gray nail undulation effect of the underwear is adjusted in Photoshop. This image is from Pinterest and was only used for preliminary testing purposes and did not appear in my work. This is just an example.
Adjust some brush settings.

Soft and hard-edge test: This method's advantage is that the model can be generated regardless of the image's pixel size.
Figure 129 – Alpha in Photoshop

Credit: https://www.pinterest.com/pin/221309769180702541/

Test the softness and hardness of the brush. This image is from Pinterest and was only used for preliminary testing purposes and did not appear in my work. This is just an example.
Create nail pattern models and arrange them in Zbrush. Make them into black and white images and drag them onto the UV. But it was found that the accuracy was relatively low, and then manually arrange them.
There are two layers of mapping textures: one for hard leather armor and the other for minor damage.

![Figure 130 – Sculpting detail in ZBrush](image)

I used these three sets of brushes to sculpt the uneven texture of the armor and superimposed very shallow noise.
In some details, I used the move tool to adjust the position of the ropes and twisted them together.

Use the spline tool to make the rope by adjusting the points.
Figure 133 – line adjusting in 3ds MAX

This is the previous version; I need to modify the print above; the belt is a placeholder.
This is the hemming of the clothes corners. I will take them apart separately.

*Figure 134 – Sculpting detail in ZBrush*

Select the surface and use the lightbox. Many textures will appear; you can control its size, direction offset, and angle.

*Figure 135 – Sculpting detail in ZBrush*
Figure 136 – Sculpting detail in ZBrush

Fix stretching issues by adjusting x and y coordinates while hiding imperfections out of sight.
Adjust the intensity and attenuation to superimpose the texture. Use smooth to smooth the connecting parts. Turn the attenuation to 56% to get it right. The edges are blurred so that they can be aligned.

Draw on the model

There are bumps on the side, sharpening, and blur, something different.

When protruding, the edges will be softer. Deformation, polishing

Twisted, IMM inserts the brush, M displays all,Duplicates them, and chains the chain mail together.
Duplicate them and chain the chain mail together. Find the IMM brush library. Press and hold the m key to see all the brush libraries.
Select the modeler brush, and select insertNanoMesh and all poly.
Some material tests are needed for scale effects. And some damaged texture effects are added.

Figure 144 – Pattern Sculpting detail in ZBrush

Figure 147 – Export from MD in 3ds Max
Welding points on clothes

**Figure 148 – Detail clothes in ZBrush**

**Figure 149 – Detail setting in ZBrush**
Figure 150– Thickness of sleeves in ZBrush

Group display
Figure 151 – Group display in ZBrush
High-poly model showcase

Figure 152– Group display in ZBrush
Figure 153: High poly showcases in ZBrush.
Figure 154—High poly showcases in ZBrush
Figure 155– High poly showcases in ZBrush.

Figure 156– High poly showcases in ZBrush.
Figure 162— Skin texture in ZBrush

Use different alphas to make acne pits on the skin.
Use morph memory to modify acne marks.

Use this standard brush.
Make corresponding wound marks made by the knife.

*Figure 165 – Brush in ZBrush*

*Figure 166 – Skin texture in ZBrush*
Select the skin brush in Substance Painter.

Figure 167 – Skin texture in SP
Figure 168 – Skin texture in Photoshop

The effect of creating crow’s feet lines at the corners of the eyes

Figure 169 – Skin texture in SP
Similarly, it increases the dark parts of the skin.

![Image of skin texture in SP](image)

*Figure 170 – Skin texture in SP*

Create the effect of backlighting, adjust the values of Scatter and Depth, and have this transparent feeling, which proves that every face of this character will have the effect of sss skin no matter how it is lit.
This value can increase the skin's oil production.

Hair simulation

Hair modeling process

Place the third layer in a sparser place to be more layered.
Figure 174 – Hair modeling in 3ds Max

I put the black and white image alpha and bitmap for comparison.

Because I added new hair and modified the previous version, much of the hair was re-developed with UV and overlapped. The black ones are the outermost hairs.
The outermost hair is the thinnest.

Layer wrapped hair

Place the inner hair in the densest alpha for occlusion.
You will see if I delete the hair inside this.
It would be exposed, have gaps, and become weird, so I adjusted some hair to make it seamless.

When modifying, I will copy the patch and check for any gaps.

Adjust the large hairbrush.
It is equivalent to the move brush, which adjusts hair size.
Figure 186 – Hair texture

Draw hair strands using ctrl+J, ctrl+T, horizontal flip, and other tools for the hair curve test.
Generate regular selections in PS, fill the colors with brushes, and create the required textures.
Use a soft eraser brush to blur the ends of the hair.

3 Methods for Making Hair Gradient Color
Figure 190 – 3 methods for making hair gradient color

Figure 192 – Hair render in Marmoset Toolbag 4
Figure 194 – Low-poly refine with armor

Figure 195 – Low-poly refine with armor
**Figure 196 – Low-poly refine with armor**

Baked armor using Eight Monkeys, reused UV as much as possible, and repaired some seam lines.

---

**Figure 197 – High-poly refine**
Figure 198 – High-poly refine

Figure 199 – High-poly refine
**Skin painting in zbrush**

Draw skin textures in zbrush and compare colors with a large number of reference images.

*Figure 200 – Skin painting in ZBrush*

---

**Clothes sculpting in zbrush**

1. Distinguish the clothes inside from the armor outside and carve them.
2. The carving of underwear is used to bake low pattern undulating textures.
3. The high mold is carved under advanced subdivision, and after completion, it returns to the first level subdivision to export the low mold.

*Figure 201 – Clothes sculpting in ZBrush*
Clothes and armor detail

1. Different brushes were used to create a damaged effect
2. Pay attention to the edges for convenient baking of normals
3. Use noise and alpha to create some surfaces

Figure 202– Clothes sculpting in ZBrush

Armor texture in substance painter

The display of three different sizes of armor materials
Figure 203 – Armor texture in substance painter

Armor texture detail in substance painter

Figure 204 – Armor texture in substance painter
Figure 205 – Armor Render

Figure 206 – Armor Render
The animations shown below will not be included in this milestone; the interactive animation scene and the other two characters are still basic models; they will be made in the next milestone.

I have found some real-life and anime, game-like combo references; the regular real-life combo might be boring, so I want to combine those.
Figure 208 – Real–life combo reference
Figure 209 – Real-life combo reference
Figure 210 – Real-life combo reference

Figure 211 – Anime and Game combo reference

Figure 212 – Anime and Game combo reference
Character Animation

The first one of the hair bones is drawn in the frame, and the rest is solved using a plug-in.
Enter the plug-in, k the first bone, loops select 1 to enter the loop; there is a difference between soft and complicated in the spring value of 0.2 and 0.8
Figure 215 – Hair animation rigging setting

Streamers float up
Turn on the arc curve to represent buffering; turning on the straight line means no buffering.

Go into it. This is the animation curve.
Figure 218–Hair animation simulation setting

Drawing the knife requires attaching it to the waist and then to the hand. This converter is needed in the middle.
Click the add link to attach the knife to another parent object.
Figure 220 – Hair animation setting

Sequencer of Combat animation
Figure 221 – Sequencer of Combat animation

Combat move showcase
**Figure 222 — Sequencer of Combat animation**

**Figure 223 — Character Animation**

1. Preserved the original bones and matched the characters
2. Re brushed weights in Maya
3. Changed the bone position on the square box to make the special effects more convenient
Niagara Ribbon Effect update

I updated the visual effects of ribbon effects, created a new texture in Photoshop based on the idea from CGHow’s video on YouTube, imported those textures to UE 5, and made a new Ribbon Niagara system.

I created a new Ribbon Niagara. First, I made a primary slash ribbon material in UE using the texture I created in Photoshop, and then I created a new empty Niagara.
Figure 225 – Trail material

Figure 226 – Trail tail material
For my trial effect, I created a semicircle model in 3D Max. The ribbon effect was consistent with the main trail, trail tail, and ink particle.

The main update for this ribbon is Niagara Control by Blueprints. I made some color parameters in the Niagara system, so I wanted to change those colors from the blueprints.

Figure 227 – Ribbon Niagara
1. First click Add in the upper left corner, create a "Niagara" object, and name it FX_DaoGuang.

Then, drag the object onto the main page and create a link Set Niagara System Asset to assign the Niagara emitter to the object FX_DaoGuang.

Drag out the In Asset of Set Niagara System Asset and select to create it as a variable "Niagara." Select the variable Niagara in the lower left corner and then expose it to the cutscene in the upper right corner. Then, you can select the blueprint in the scene and replace the Niagara system in the lower right corner.

2. The Niagara particle system has a parameter display page in the lower left corner. Create a "linear color" variable in the user public and name it "Dao_Color."

3. Then select the particles whose color needs to be modified and drag the linear color variable to the parameter whose color needs to be modified. This can be adjusted later.

4. Then, in the blueprint, drag the FX_DaoGuang object out of the link Set Niagara Variable (Linear Color) node to modify the linear color, and enter Dao_Color in the object name of the Set Niagara Variable (Linear Color) node to make sure it is the modified Dao_Color variable of Niagara.

5. Then do the same thing as above: Drag out the In Asset of Set Niagara Variable (Linear Color) and select to create it as a variable "Dao_Color." Select the variable Niagara in the lower left corner, and then in the upper right corner, expose it to the cutscene. Then, you can select the blueprint in the scene to modify the color.

Now, the ribbon can change color at any time.
Figure 229 – Changing Ribbon Niagara in engine.

Created a new level and then imported this Niagara to the sequencer. It is not used for the game, so it does not need to attach to the character model; it needs to add the key to the sequencer by hand and move this effect to the sword hit point. You need to add spawn critical points to each ribbon blueprint for changing color so that each hit the character makes will change for different colors.

Figure 230 – Niagara Key point in sequencer
Smoke FX

I decided to make smoke FX, also controlled by blueprints; when the character waves her sword, it causes smoke during combat.

Use sub-UV animation in particle updates. Play the material. At the same time, the sprite renderer has the same number (8) of sub-UV, sub-image inputs, and sequence frames. Because of the y sub UV texture, it has eight frames horizontally and vertically.
Then, create the parameters in the user parameters in the picture below.

Figure 232 – Smoke Niagara Sub UV animation

Figure 233 – User Parameters in Smoke Niagara
Smoke FX – Blueprints

Figure 234 – Smoke Blueprints
Blood Decal Update

I made this new blood decal, which can be adjusted in material instants.
Blood FX Update

Figure 237 – New Blood Decal Material

Figure 238 – New Blood splash material
I updated UE 5 to 5.3 and tried a new feature of UE 5.3 called the Fluids system. I decided to use this function to make the weapon fire FX.
Then I also made a fire trail FX, which can be attached to weapon play with a tail, so when the character waves her sword, it will come with some fire FX.

Figure 241 – Fire trail material

Figure 242 – Fire trail Niagara
Dynamic FX update

So, to make fire interact with the environment dynamic, I made a fire FX that can be attached to the box. The box is a placeholder, so I tried to attach this fire FX. Then, in the level sequencer, I can control when the fire will appear or not.

Figure 243 – Fire Material with Box
I tried the mesh ribbon with blueprints before, but it did not work that well, so I tried another ribbon, which is a trailing ribbon. This ribbon can be attached to a weapon and moved with a sword, making it look more natural.

Figure 244 – Fire Niagara with Box

Figure 245 – 3 trial ribbon particles material
Made those 3 particle system to combine together and make another ribbon trail for fire combo attack.

The particles generate alpha, and then they are connected together to form a trail. Two points are bound in the animation, and a alpha of particles is generated between the two points, and then the alpha is generated according to the movement of the animation.

**Figure 246 – 3 trial ribbon particles combine.**

Fire ember FX

Because of fire FX, I wanted some fire ember particles around the environment.

**Figure 247 – Fire ember FX in Niagara**
I put all the FX I needed to level the sequencer and made them together in UE 5.

The final render looks like this:
DESCRIPTION

All assets should be complete and ready to polish

All three characters must include corresponding animations

At least 3 FX

To better integrate each mastery, the quality requirements are higher.

SCHEDULING / PLANNING

At this stage, I still spent too much time in the high-model stage. After that, most of my things started to be made in texture software. Although some accuracy will be lost, it can be used in the game.

<table>
<thead>
<tr>
<th>WEEK</th>
<th>TASKS / HOURS</th>
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</table>
| 1    | Song dynasty proxy and high poly -9h  
Rig song dynasty and for animation test.-8h |
| 2    | Song Dynasty high poly -8h  
Song Dynasty low poly-6h  
Polish samurai armor texture-5h  
Ice VFX-6h |
| 3    | Make low poly for the song dynasty-10h  
Rig and Animation for song dynasty-10h  
Ice VFX-6h |
| 4    | Make proxy and high poly for Viking armor -6h  
Animation for song dynasty-9h  
Song dynasty texture-10h |
<p>| 5    | high poly for Viking armor-5h |</p>
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<thead>
<tr>
<th></th>
<th>thunder vfx-7h</th>
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<tr>
<td></td>
<td>rig and animation for Viking-6h</td>
</tr>
<tr>
<td>6</td>
<td>Low poly for Viking armor -7h</td>
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<tr>
<td></td>
<td>Animation-8h</td>
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<td></td>
<td>Texturing -6h</td>
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<td>Polish vfx-7h</td>
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<tr>
<td>7</td>
<td>Texturing finished-8h</td>
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<td></td>
<td>Animation polish-6h</td>
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<tr>
<td></td>
<td>Vfx finished-20h</td>
</tr>
<tr>
<td>8</td>
<td>ALPHA - MIDTERM PRESENTATION – TBD</td>
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<tr>
<td></td>
<td>All finished</td>
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<tr>
<td>9</td>
<td>Refine</td>
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<td>10</td>
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<td>Refine</td>
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<td>13</td>
<td>Evaluation for Defense</td>
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<td></td>
<td>Refine</td>
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<td>14</td>
<td>*RTM – PRESENTATION</td>
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<td></td>
<td>Refine</td>
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<tr>
<td>15</td>
<td>DEFENSES CAN BEGIN</td>
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<td>Refine</td>
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<td>16</td>
<td>Refine</td>
</tr>
</tbody>
</table>

**METHODOLOGIES**

Start to make proxy and sculpt the high poly for the Song Dynasty armor.
Use this brush to start creating edge wear.
Figure 252 – Song armor High Poly Modeling

Figure 253 – Song armor High Poly Modeling

Try using a brush to create curves to achieve the effect of a high model.
Figure 254 – Song armor High Poly Modeling

Figure 255 – Song Armor High Poly Modeling
Use alpha to create basic textures in Zbrush.

Figure 256 – Song Armor High Poly Modeling

Use the parameters in the lightbox to adjust the wrinkle effect.
Try the alpha reuse method to make some small armor pieces. First, you need to create basic shapes and stack them.

Figure 257 – Song armor High Poly Modeling

Figure 258 – Song armor High Poly Modeling
After making the nail plate, grab the document and generate the texture.

Figure 259 – Song armor High Poly Modeling

Figure 260 – Song armor High Poly Modeling
Split the UV of the shoulder armor, import the generated texture into the black-and-white texture, and turn it into alpha in ZB. To achieve better results with the high model, I added an extra layer of film to the large mountain armor on the chest, posing out high-poly details.
At the same time, small stickers will be made to facilitate the generation of ID texture.
The armor material of the Southern Song Dynasty had many problems, including roughness in the middle. I found a good tutorial on adjusting the roughness, metallic, and transparency map.
It was the final display of the Song Dynasty armor.

Figure 267 – Song armor texture
Using the same approach, I re-optimized the Japanese armor textures.
Learn how to control color maps and normals and roughness.

I am painting some skin textures in sp.

*Figure 271 – Skin texture*
My texture size is 4096x4096, but it does not affect the number of FPS in the final executable file.
Each set of armor, plus character, eyes, hair, skin, and weapons, has 11 material slots. There are 44 material slots because 2 Viking armor corresponds to the Song Dynasty and Japanese armor in the fighting animation.

| Element 0 | M_Hair1Inst2 | 
| Element 1 | M_ArmorLowSword | 
| Element 2 | M_Armor_Van | 
| Element 3 | M_Armor_Jian | 
| Element 4 | M_Armor_Xiong | 
| Element 5 | M_Armor_Cloth | 
| Element 6 | M_Skin_New2 | 
| Element 7 | M_Iaculum Inst | 
| Element 8 | M_Eyedrow Inst | 
| Element 9 | M_Eyenst | 
| Element 10 | M_Armor_Xiashen | 
| Element 11 | M_Armor_Tou |
Figure 273 – Japanese armor render

Engine rendering of Japanese samurai01

Figure 274 – Japanese armor render

Engine rendering of Japanese samurai02
Figure 275 – Song armor render

Engine rendering of the Southern Song Dynasty in China01

Figure 276 – Song armor render

Engine rendering of the Southern Song Dynasty in China02
This is the final rendering of Japanese armor.

![Figure 277 – Viking armor modeling](image)

Start making high-model Vikings.

Use the same method to create a Viking high model.
Figure 278 – Viking armor modeling

Figure 279 – Viking armor modeling
Figure 280 – Viking armor modeling

Figure 281 – Viking armor modeling
Figure 282 – Viking armor texture

The effect of Vikings in sp.

Figure 283 – Viking armor render

The rendering effect of Vikings in Marmoset.
Figure 284 – Viking armor render

Figure 285 – Viking armor render

The final rendering of Viking armor effect03
Regarding the animation part, I spent a lot of time adjusting the movements. I searched for many action references because finding pairs of people wearing armor from different eras was difficult. I tried to integrate them as much as possible.

![Image](image_url)  
*Figure 286 – Animation test*

Firstly, I am looking for a battle reference for the Vikings. I will spend much time adjusting keyframes during the animation production process.
My movements could have been smoother. The character jumped too high, and there was no exceptionally smooth connection in the air. I referred to some motion curves and made adjustments to this area. However, I will continue to repair this area in the beta stage. I also need help fixing situations where people and objects fall too far to the ground.
Figure 288 – Animation test

Figure 289 – Animation test
Figure 290 – Animation test

Presentation of some repaired keyframes.
Figure 291 – Animation test

Figure 292 – Animation test
Figure 293 – Animation test

Figure 294 – Animation test
There are many perforations in the weight of the clothes, which will be repaired in the next stage.
I tried to create a simple hit animation, but many issues with keyframes will be fixed in the next stage.

Figure 297 – Animation test
Figure 298 – Animation test

Figure 299 – Animation test
Dynamic FX – Ice and Lighting Thunder

Ice FX

The critical point is to use Initial Mesh Orientation to control the initial orientation position and then use Update Mesh Orientation to control the end of turning underground.

Then copy several ice picks again, let the multiple ice picks play randomly, and integrate them into the whole to form ice spikes.
Figure 301 – Ice Niagara FX

Figure 302 – Ice Niagara FX
I created two material functions. One of the two MFs controls Cristal "Crystal Style" and Frost "Fresnel Luminous." The modification method uses the node Get Material Attributes to retrieve the attributes that need to be manipulated and then Set Material Attributes to input the modified attributes. To use the material, check the "Use Material Properties".

![Figure 303 – Ice Material Function](image)

**MF_Ice_Cristal**

Get the UV, use the two noise maps to perform depth calculations based on the camera (Ice Depth Control part); the above is the camera vector to tangent space, then RG is the UV, B is the depth, perform calculations, and obtain ice-like cracks depth.
Ice Color part, depth-based color assignment.

Normal Blend Part: The regular part is strength-controlled and blended.

The Subsurface Scattering part, based on Fresnel, gives the ice layer a base color.

Based on depth noise, the roughness part creates different roughnesses for the ice and depth layers.
MF_Ice_Frost

It is just a map based on Fresnel's glow, with bright edges and a dark middle. The roughness varies according to the brightness.
Lighting Thunder FX

For light particles, set the volume scattering parameter to 0, then control the radius and adjust it according to their color and life.
I use the "Sub UVAnimation" node for the two-particle emitter to play the material's sequence. In the bottom particle material, the "Sub UV" node sets the horizontal and vertical amounts of the playback sequence.

Figure 309 – Lighting Thunder Niagara

Figure 310 – Lighting Thunder Niagara
These two particle emitters are like the one above, but the "SpriteAlignment" parameter is set to make the thunder particles vertical. Then, the power saving of the playback sequence is placed in the particle generation because there is no need to change. Then, I used the "Camera Offset" node to control the distance from the camera.

![Image of Niagara particle system]

*Figure 311 – Lighting Thunder Niagara*

The following three-point particles are used to create the impact effect, cylinder emission, and acceleration, and then cut noise force is added. The downward wind force is gravity, noise, random vortex force, and center point force.
Figure 312 – Lighting Thunder Niagara

FX Show Render

Figure 313 – FX Show Render
Figure 314 – Fire FX Render

Figure 315 – Ice and Lighting Thunder FX Render
I updated and optimized materials for some armor parts.

Figure 316—Japan armor texture
They decimated the polycount of character.

![Figure 317– song armor texture](image)

**Figure 317– song armor texture**

- Before
- After

Decimated the polycount of character
Tris from: 61,760 to 21,851

**Figure 318– decimated poly**

They decimated the polycount of 3 armors.
Decimated the polycount of Japanese armors.
Tris from: 212,316 to 48,532

Figure 319– decimated poly

Decimated the polycount of Song Dynasty armors.
Tris from: 114,318 to 49,209

Figure 319– decimated poly
Figure 320– decimated poly

Figure 321– update texture
I have optimized the format and size of some textures, but I still need to complete the compression. I will complete the optimization in the next stage.

*Figure 322 – update texture*
Figure 323– rendering01

Figure 324– rendering02
I made some exploded views of the common parts of the model.
Character Animation

I tried to make some keyframe changes to the animation

Figure 329– Viking animation adjust
I have readjusted the curve regarding the Viking's falling motion.
Repaired the bones and turned the non-animated parts into a single one.
Figure 335 – Japanese animation adjusts

Figure 336 – Japanese animation adjusts
Figure 337 – Japanese animation adjusts

Figure 338 – Japanese animation adjusts
Figure 339 – Japanese animation adjusts

Dynamic FX

I optimized the sky sphere in UES in the beta phase for the final render.
I made these three textures to blend sky material in Photoshop, then created this blueprint sky sphere for and applied sky material.
These three textures will replace the sky sphere material in turn into the Sky material instance so that the sky will be mixed between these three materials.
Before rendering from UE5, I made some settings in the level sequence queue: Add Anti-Aliasing, set spatial and temporal sample counts for both 16, and then tick override anti-aliasing.

![Image of settings in level sequence queue](image)

_Figure 344 – Anti-aliasing setting_

I added export as a PNG sequence, which is also high resolution.
After exporting from UE5, I imported the video to After Effects for final editing. I added a rain effect and adjusted the video by changing the color contrast and filter.
Conclusions

OPTIMIZATIONS
How performance was improved and why.

CONCLUSION

RTM

DESCRIPTION
I mainly focused on implementing feedback and polishing a few things in RTM. I list all I need to do below:

- Change the cylinder in the scene.
- Adjust VFX to get better performance.
- Add a quit button.

METHODOLOGIES

- Chamfer the top of the cylinder.
- Adjust the Spawn Rate in Niagara for Fire, Ice, Smoke, and Thunder.
- Use Level Blueprint

FINAL OPTIMIZATIONS

- Float Ember effect: I have adjusted the inactive response to complete; this will let particles finish and then kill the emitter, so the ember will not exist anymore.
Also, scale down loop duration to 0.5; this reduces the time for float ember last.
- I have reduced the Spawn Rate for Fire, Ice, and Smoke FX, like fire FX, from 50 to 10, so the detail of FX will be fewer, but performance is good; FPS is 50 – 60.
I enabled particle cutout on the sprite renderer. This can drastically reduce the overdraw by creating a tighter fit to the visible part. Even using more verts, eight instead of 4, is usually better for performance if it cuts off more of the transparent parts of the spirit.

Shade Complexity Compare (Before)
- Quad Overdraw Compare (Before)
- Quad Overdraw Compare (After)
● Shade Complexity Compare (After)
- Executable file FX correction compare (Before)
• Executable file FX correction compare (After)

• Level blueprint’s function – Quit game
One mistake I made was not pre-rendering the sequence frame content from Unreal Engine and importing it into After Effects for rendering. Because this is game art, it should be rendered in real-time and played in the game, so Rendering in After Effects is a wrong choice.
CONCLUSION

HISTORICAL ACCURACY - RETROSPECTIVE

What Went Well:

- I did much research, and it helped me better understand the armor I made.
- Successfully learned shade knowledge in UE5.
- Finished complete process of making character. The final render quality was of a good standard.

What Went Wrong:

- Spend much time researching because of the lack of historical knowledge.
- The first character spends a lot of time. Because I was trying a different method.
- Lighting and rendering in UE5 found many tutorials to learn.

What Was Learned/Even Better If:

- Learned three historical armor backgrounds.
- Learned how to use Marvelous Designer
- If I could find better UE5 lighting and rendering tutorials, the outcome would be better.

CHARACTER ANIMATION - RETROSPECTIVE

What Went Well:

- Found some good reference videos to help me make animations.
• Learned an animation pipeline, which helps a lot.

**What Went Wrong:**

• I spent much time polishing the process of learning animation, but the progress was slow.
• I Lack experience in animation production; animation movements are still very stiff.

**What Was Learned/Even Better If:**

• If I had learned and understood the 12 animation principles before, the result would have been better.
• Learned some animation plug-ins.

**DYNAMIC FX - RETROSPECTIVE**

**What Went Well:**

• Be able to make VFX by using the Niagara system.
• Ribbon trail works smoothly; Fire, Ice, and Thunder VFX looks nice.

**What Went Wrong:**

• I made some VFX but did not use it in the final because it was cost-effective.
• I need to watch tutorials so many times because I am not good at them.

**What Was Learned/Even Better If:**

• Learned the Niagara system and how to adjust parameters.
• Learned how to use the level sequence to present animation and VFX.

**ARTIFACT - RETROSPECTIVE**

**What Went Well:**

• Time management, how to plan a large-scale personal project, and how to output content in stages. Continuously conduct self-feedback to improve skills and demand yourself with a professional perspective.

**What Went Wrong:**

• Sometimes, I lose my direction and should spend more time making armor.
• Spend more time on the first character and armor.

**What Was Learned/Even Better If:**

• Make extra time before the deadline and complete the task in advance.
• If I can stop overthinking and doing unnecessary work. The artifact would be better.

**WHY IS THIS MASTERY**
- The female heroine’s character and realistic style have been prevalent recently in the game industry. At the same time, I can master the production process of human body structure and armor props, which will further consolidate my character production skills.

- Making a rigging and animation character will help me cooperate with animators more efficiently in the industry. Learning some animation knowledge can help me better understand and create characters.

- As a 3d character artist, Dynamic FX will make the character vivid and interesting when present in any game engine.

PERSONAL GROWTH

- Become more proficient in the character-creation process.
- Develop a deeper understanding of real-life reference and game character production.
- When making a character, perform some basic animation, character rig, and basic VFX binding to make the character more vivid.
- Learn more about shaders and the knowledge inside the engine.

ADDITIONAL DOCUMENTS

*ADP. This can additionally be shown in context.
*Schedule. This can additionally be shown in context.
*Hour Logs. These can additionally be shown in context.

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