CHARACTER PREPARATION (MODELING, RIGGING, ANIMATION, TEXTURING) FOR CLOTH SIMULATION WITH COMPLETE RENDERING AND POST- PRODUCTION

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Multimedia and Creative Technology

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DAFFODIL INTERNATIONAL UNIVERSITY DHAKA, BANGLADESH

13th February, 2022

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APPROVAL

This Project titled **"CHARACTER PREPARATION (MODELING, RIGGING, ANIMATION, TEXTURING) FOR CLOTH SIMULATION WITH COMPLETE RENDERING AND POST- PRODUCTION"**, submitted by **MUYEED HOSSAIN (ID-173-40-441)** to the Department of Multimedia and Creative Technology, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Multimedia and Creative Technology and approved as to its style and contents. The presentation has been held on 13th February, 2022.

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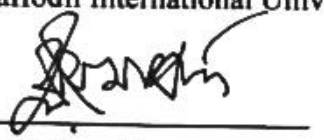

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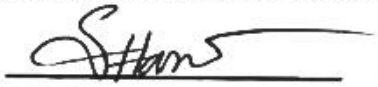

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DECLARATION

I hereby declare that, this project has been done by me under the supervision of **Arif Ahmed, Associate Professor, Department of MCT** Daffodil International University. I also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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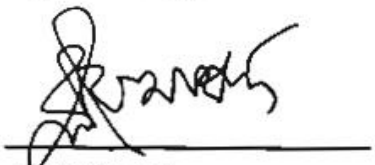

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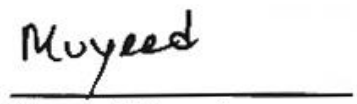

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First I express my heartiest thanks and gratefulness to almighty God for His divine blessing makes us possible to complete the final year project/internship successfully.

I really grateful and wish our profound our indebtedness to **Arif Ahmed**, **Associate Professor**, Department of MCT Daffodil International University, Dhaka. Deep Knowledge & keen interest of our supervisor in the field of "*3D ANIMATION & VFX*" to carry out this project. His endless patience ,scholarly guidance ,continual encouragement , constant and energetic supervision, constructive criticism , valuable advice ,reading many inferior draft and correcting them at all stage have made it possible to complete this project.

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Finally, I must acknowledge with due respect the constant support and patients of my parents.

ABSTRACT

Cloth simulation is very important in 3d Animation and Vfx. If the simulation can be improved to the point that the fabric acts as it would in the actual world, it can be employed in a variety of scenarios. The process of simulating thin-shell materials such as fabric entails rendering intricate textile structures, rendering complex cloth structures more quickly, emulating actual textile behavior. In this project, we discussed how to overcome technological difficulties, problems and experimented with models and simulations methodologies, and examining the flaws and making any necessary modifications, which are subsequently combined to construct a new **Easy, Effective & Efficient workflow**. So that, anyone with very little knowledge about simulation can use this workflow.

In computer graphics, cloth simulation and animation has proven a difficult problem. Simulation is a step farther in the cloth animation process, and it consists of the assembly of various idea from textile. With the rapid advancement of simulation technology in recent years, there has been an increase in demand for cloth simulation in both the digital entertainment and fashion industries. Virtual clothing animation created from simulation boosts the visual realism of the 3D virtual scene and virtual actor in the scene in the digital entertainment area, giving the spectator a more detailed, realistic visual experience. 3D garment design and virtual dressing, as new technology and business models in the apparel sector, are rapidly transforming people's traditional ways of life. But simulated 3D clothing design process is not carried out on a 3D animation and Vfx industries in Asian subcontinent such as Bangladesh, India.

The fabric simulation focuses on the variables that influence the way the cloth behaves finally, an evaluation is completed, demonstrating that the new technique is effective. It has the potential to produce lifelike behavior and can be used in 3d animation and Vfx workflow. The main objective of this research project was to provide an improved workflow methodology for people to use and inspire 3d Animation and Vfx industries to include simulation in their workflow.

TABLE OF CONTENTS

CONTENTS	PAGE NO
Certificate of Approval	i
Letter of Declaration	ii
Acknowledgement	iii
Abstract	iv
Table of contents	v-xii
CHAPTERS:	
CHAPTER 1: INTRODUCTION	1-3
1.1. Definition of internship	1
1.2. Importance of internship	1-2
1.3. Introduction of my internship organization AAVA 3D	2
1.4. Why I choose AAVA 3D	2-3
1.5. Duration of my internship	3
CHAPTER 2: EXPLANATION OF SOME WORKS IN SAME AREA	4-10
2.1. Introduction of previous similar work	4
2.2. 3d Animated Movies	4-5
2.3. Vfx Movies	6-8
2.4. History of Traditional Costume uses in 3D Animation and VFX	9-10

CHAPTER 3: DETAILS OF USED SOFTWARE 11-23

3.1. Autodesk Maya 11
3.2. Autodesk 3ds Max 12-13
3.3. Marvelous Designer 13-14
3.4. V-Ray 15-16
3.5. Adobe Photoshop 17-18
3.6. Adobe Illustrator 18-19
3.7. Adobe After Effects 20-21
3.8. Adobe Media Encoder 21-22
3.9. Adobe Substance 3D Painter 23-24

CHAPTER 4:DETAILS OF MY INTERNSHIP/ RESEARCH PROJECT 25-28

4.1. Description of client work/research project during internship 25
4.2. Client Work 25-27
4.3. Research Project 27-28
4.3.1. Definition of cloth simulation 28
4.3.2. Importance of cloth simulation 28

CHAPTER 5:MY PART IN INTERNSHIP/ RESEARCH PROJECT 29-80

5.1. Client Work : PS5 Product Visualization 29

5.1.1. Opening 3ds Max 2020 & Start a new project 29-30
5.1.2. Selecting Reference Image 30
5.1.3. Starting with one side panel 31
5.1.4. Using Symmetry Modifier to make other side 32

5.1.5. Making front panel using plane 33
5.1.6. Making front blades & RGB light strips 34-35
5.1.7. Making front USB ports 35
5.1.8. Making front lights and base holder 36
5.1.9. Making back blades & ports 36-37
5.1.10. Setting studio lighting setup and texturing 38-39
5.1.12. Setting camera and animating camera 40
5.1.13. Rendering using V ray 41
5.1.14. Using After Effect to compose frame into animation 41
5.1.15. Using Media Encoder to render mp4 42
5.1.16. Final output of product visualization 42

5.2. Character Preparation (Modeling, Rigging, Animation, Texturing) For Cloth Simulation With Complete Rendering And Post- Production 42

5.2.1. Opening Maya and Set project folder 43
5.2.2. Importing female turnaround sketch photo 44
5.2.3. Modeling female mannequin torso 45-46
5.2.4. Modeling female mannequin hands 47-48
5.2.5. Modeling female mannequin head 49-50
5.2.6. Modeling mannequin female legs 51
5.2.7. Finishing complete female mannequin body modeling 52-53
5.2.8. Rigging mannequin character 54
5.2.9. Making rigging controller 55
5.2.10. Animating rigged mannequin character 56-61
5.2.11. Exporting animated character for Marvelous Designer 62-63
5.2.12. Importing character to Substance Painter for Texturing 64
5.2.13. Baking Mesh Map in Substance Painter 65
5.2.14. Changing HDRI environment in Substance Painter 66
5.2.15. Making fill layer and applying base color 67

5.2.16. Making pattern in Adobe Illustrator and using Alpha Map 68-69
5.2.17. Finishing Texture in Substance Painter 70
5.2.18. Exporting texture from Substance Painter 71
5.2.19. Importing and applying texture in 3ds Max 72
5.2.20. Using V Ray Light for studio light setup 73
5.2.21. Using V Ray Light Lister to control light in scene 74
5.2.22. Using V Ray Renderer 75
5.2.23. Rendering animation in EXR format for post-production 76
5.2.24. Opening After Effect making New project 77
5.2.25. Importing multiple EXR file 77
5.2.26. Using adjustment layer for color correction 78
5.2.27. Sending File in Media Encoder render queue 79
5.2.28. Final Output 80

CHAPTER 6: LIMITATIONS AND CHALLENGES 81-82

6.1. Limitations 81
6.2. Challenges: 81-82

CHAPTER 7: CONCLUSION 83

REFERENCES 84-85

LIST OF FIGURES

FIGURES

Figure 2.2.1. : White Snake (2019) Complex cloth Wrinkles 5
Figure 2.2.2. : White Snake (2019) Real-world Cloth Fitting and Physics 5
Figure 2.3.1. : Doctor Strange (2016) Simulated cloak of levitation 6

Figure 2.3.2.: Doctor Strange (2016) Simulated cloak of levitation -2 7
Figure 2.3.3.: Man of Steel (2013) Simulated cape 8
Figure 2.4.1. : White Snake 2019 9
Figure 2.4.2. : Traditional Chinese Cloth used in White Snake 2019 9
Figure 2.4.3. : Traditional Chinese Cloth used in White Snake 2019 10
Figure 2.4.4. : Traditional Chinese Cloth used in White Snake 2019 10
Figure 3.1.1. : Autodesk Maya 11
Figure 3.1.2. : Using Autodesk Maya for character Modeling, Rigging, Animation 11
Figure 3.2.1.: Autodesk 3ds Max 12
Figure 3.2.2.: Using Autodesk 3ds Max for lighting 13
Figure 3.3.1.: Marvelous Designer 13
Figure 3.3.2.: Using Marvelous Designer for cloth simulation 14
Figure 3.4.1.: V-Ray 15
Figure 3.4.2.: Using V-Ray Render Animation 16
Figure 3.5.1. : Adobe Photoshop 17
Figure 3.5.2. : Using Adobe Photoshop to make/edit textures 18
Figure 3.6.1.: Adobe Illustrator 18
Figure 3.6.2.: Using Adobe Illustrator to make texture pattern 19
Figure 3.6.3.: Using Adobe Illustrator to make texture patter - 2 19
Figure 3.7.1.: Adobe After Effect 20
Figure 3.7.2.: Using Adobe After Effect to composite frames into animation 21
Figure 3.8.1.: Adobe Media Encoder 21
Figure 3.8.2.: Using Adobe Media Encoder to render composite file into mp4 video 22
Figure 3.9.1.: Adobe Substance 3D Painter 23
Figure 3.9.2.: Using Adobe Substance 3D Painter for Texturing 24
Figure 3.9.3.: Using Adobe Substance 3D Painter for Texturing - 2 24
Figure 4.1.1.: Keyboard Product Visualization - 1 25

Figure 4.1.2.: Keyboard Product Visualization – 2 26
Figure 4.1.3.: PS5 Product Animation – 1 26
Figure 4.1.4.: PS5 Product Animation – 2 27
Figure 1.5.3.: Local Costume Simulation Sari
Figure 5.1.1.1. : Opening 3ds Max 2020 & Start a new project 29
Figure 5.1.2.1.: Selecting Reference Image 30
Figure 5.1.3.1.: Starting with one side panel 31
Figure 5.1.4.1.: Using Symmetry Modifier to make other side 32
Figure 5.1.5.1.: Making front panel using plane 33
Figure 5.1.6.1. Making front blades & RGB light strips 34
Figure 5.1.7.1.: Making front USB ports 35
Figure 5.1.8.1. Making front lights and base holder 36
Figure 5.1.9.1.: Making back blades & ports 36
Figure 5.1.9.2.: Making back blades & ports 2 37
Figure 5.1.10.1.: Setting studio lighting setup and texturing 38
Figure 5.1.10.1.: Setting studio lighting setup and texturing - 2 39
Figure 5.1.12.1.: Setting camera and animating camera 40
Figure 5.1.13.1.: Rendering using V ray 41
Figure 5.1.15.1.: Media Encoder rendered mp4 42
Figure 5.1.16.1.: Product Visualization Final Animation 42
Figure 5.2.1.1.: Opening Maya and Set project folder 43
Figure 5.2.2.1.: Importing female turnaround sketch photo 44
Figure 5.2.3.1.: Modeling female mannequin torso 45
Figure 5.2.3.2.: Modeling female mannequin torso 2 46
Figure 5.2.4.1. Modeling female mannequin hands 47
Figure 5.2.4.2.: Modeling female mannequin hands both side 48
Figure 5.2.5.1.: Modeling female mannequin head 49
Figure 5.2.5.2.: Modeling female mannequin head -2 50
Figure 5.2.6.1.: Modeling mannequin female legs 51

Figure 5.2.7.1.: Finishing complete female mannequin body modeling 52
Figure 5.2.7.2.: Finishing complete female mannequin body modeling - 2 53
Figure 5.2.7.3.: Finishing complete female mannequin body modeling – 3 53
Figure 5.2.8.1.: Rigging mannequin character 54
Figure 5.2.8.2.: Rigged mannequin character with controls 55
Figure 5.2.10.1.: Animating rigged mannequin character 56
Figure 5.2.10.2.: Animating rigged mannequin character 2 56
Figure 5.2.10.3.: Animating rigged mannequin character 3 57
Figure 5.2.10.4.: Animating rigged mannequin character 4 57
Figure 5.2.10.5.: Animating rigged mannequin character 5 58
Figure 5.2.10.6.: Animating rigged mannequin character 6 58
Figure 5.2.10.7.: Animating rigged mannequin character 7 59
Figure 5.2.10.8.: Animating rigged mannequin character 8 59
Figure 5.2.10.9.: Animating rigged mannequin character 9 60
Figure 5.2.10.10.: Animating rigged mannequin character 10 60
Figure 5.2.10.11.: Animating rigged mannequin character 11 61
Figure 5.2.10.12.: Animating rigged mannequin character 12 61
Figure 5.2.11.1.: Exporting animated character for Marvelous Designer 62
Figure 5.2.11.2.: Exporting animated character for Marvelous Designer 2 63
Figure 5.2.12.1.: Importing character to Substance Painter for Texturing 64
Figure 5.2.13.1.: Baking Mesh Map in Substance Painter 65
Figure 5.2.14.1.: Changing HDRI environment in Substance Painter 66
Figure 5.2.15.1.: Making fill layer and applying base colors 67
Figure 5.2.16.1.: Making pattern in Adobe Illustrator and using Alpha Map 68
Figure 5.2.16.2.: Making pattern in Adobe Illustrator and using Alpha Map 2 68
Figure 5.2.16.3.: Making pattern in Adobe Illustrator and using Alpha Map 3 69

Figure 5.2.17.1.: Finishing Texture in Substance Painter 1 70
Figure 5.2.17.2.: Finishing Texture in Substance Painter 2 70
Figure 5.2.18.1.: Exporting texture from Substance Painter 71
Figure 5.2.19. Importing and applying texture in 3ds Max 72
Figure 5.2.20.1.: Using V Ray Light for studio light setup 73
Figure 5.2.20.2.: Using V Ray Light for studio light setup 2 73
Figure 5.2.21. Using V Ray Light Lister to control light in scene 74
Figure 5.2.22.1.: Using V Ray Renderer 75
Figure 5.2.22.2.: Using V Ray Renderer 2 75
Figure 5.2.23.1.: Rendering animation in EXR format for post-production 76
Figure 5.2.24.1.: Opening After Effect making new project 77
Figure 5.2.24.2.: Opening After Effect making new project 2 77
Figure 5.2.26.1.: Using adjustment layer for color correction 78
Figure 5.2.26.2.: Using adjustment layer for color correction 2 78
Figure 5.2.27.1.: Sending File in Media Encoder render que 79
Figure 5.2.28.1.: Final Output 80
Figure 5.2.28.2.: Final Output 2 80

CHAPTER 1
INTRODUCTION

1.1. Definition of internship

An internship is a term of work experience provided by the employer in order to present students and graduates to the professional world, frequently within a specific industry, that is related to their topic of study. Internships can range in length from a week to a year. They can be paid or unpaid; nonetheless, it's crucial to understand your rights when it comes to getting paid before you start an internship. Internships are available in a variety of fields, including sales, marketing, engineering, graphic design, management, information technology, and a variety of others. One will gain a variety of soft skills during internship, including communication, personal effectiveness, presentation, and creative problem solving, and influencing skills. On-the-job training is just as important as classroom learning. After all, No one can truly appreciate what a job entails unless they've done it. Internships are a fantastic way to learn more about a certain field.[1]

During their internship program, a student can gain practical experience and be ready to accept the stress of workplace stress. During that time, I was supervised by a field professional. An internship also allows a student to bring new ideas and energy into the workplace, as well as to develop this capability, talent, and possibly construct a pipeline for future projects. Learn about the current state of your career, work patterns, recognizing issues, and more.[2]

1.2. Importance of internship

Academic knowledge is insufficient for professional aptitude, and while it may require us to engage in discussions, peer interaction, debate, and sharing of our learning experiences, it is also critical to apply and develop academic concepts in a professional situation. Internships not only help us develop our career, but they also help us grow as people, establish understanding, form relationships, get experience, and maintain our network. Internships are essential in preparing students for the workforce, and they are

the simplest method to gain first-hand experience in a desired professional sector without committing to a long-term commitment.[3]

Studying and working as a professional are two very different things. It is impossible to gain a true understanding of a certain industry without performing an internship, and it also prevents a student from becoming skilled at work. Today's industry necessitates competent labor and a well-equipped workforce.[4]

1.3. Introduction of my internship organization AAVA 3D

In Bangladesh, AAVA 3D was the first to offer 3D animation training. Arif Ahmed, the creator and director of AAVA 3D, has been involved in the realm of 3D animation since 1995. He gained a lot of expertise in the 3D animation and visual effects production sector during this time. AAVA 3D is a 3D Animation Research and Development Center. Bangladesh's First 3D Animation and Visual Effects Learning Institute. Since 1995, AAVA 3D has been involved in the realm of 3D animation.

It is a non-profit organization that brings together professionals from both the technical and artistic disciplines with the goal of delivering acceptable solutions. To produce professional and knowledgeable workforce in the multimedia industry. AAVA3D wishes to contribute to the development of a wealthy Bangladesh and a knowledge-based society.

Our mission is to provide 100% customer satisfaction by providing high-quality products, services, and training at a reasonable price. Our long-term goal is to establish ourselves as a leader in technology-based corporate solutions capable of eliciting an unequivocal response from the target market.[5]

1.4. Why I choose AAVA 3D

The first and foremost reason I choose AAVA 3D among other 3d animation and Vfx organization is because Arif Ahmed sir, the creator and director of AAVA 3D. Not only is that he also Associate professor in the department of Multimedia and Creative

Technology at Daffodil International University. Moreover, He is my class teacher and my supervisor for my final project.

AAVA 3D is the first to offer student 3d animation training which we need to progress in my research project. AAVA 3D also provide skilled mentor to guide internship student in every steps. AAVA 3D is also being a 3D animation Research and Development Center gave us a heads up in my research project. AAVA 3D always aware about modern technology. They are also providing 100% scholarship for the students. They also arrange regular seminars & workshops.[6]

1.8. Duration of my internship

We started our internship on 1st May, 2021 and finished our internship on 31st August, 2021.

CHAPTER 2
EXPLANATION OF SOME WORKS IN SAME AREA

2.1. Introduction of previous similar work

There are so many 3d animation and Vfx movies the implemented cloth simulation for the character and their local costume. Such as

3D Animation Movies [9]**:**

1. White Snake (2019)
2. Ne Zha (2019)
3. Nezha Reborn (2021)
4. Dragon Nest: Warriors' Dawn (2014)

VFX Movies [10]:

1. Batman v Superman: Dawn of Justice (2016)
2. Doctor Strange (2016)
3. Warcraft (2016)
4. Spider-Man: No Way Home (2021)

2.2. 3d Animated Movies

White Snake (2019) is American – Chinese movie where they really focused on the cloth simulation and simulated every cloth type object in this movie with real world physics. Inside this movie all the character are from china. So, all the cloth costume in this movie are from Chinese cutler. Example are given in the Figure 2.2.1. In this figure, we can see some really **Complex Cloth Wrinkles.** This type of result can't be achieve only from handmade cloth animation. The reason is quite simple. No one can guess the movement of cloth. Not only that in real world cloth don't follow any pattern for their movement and it's always completely random. So, if someone were to make cloth animation manually, they will have to manually animate every frame of animation which is just impossible. So, that's why simulating the cloth make it way easier.

Figure 2.2.1. : White Snake (2019) Complex cloth Wrinkles

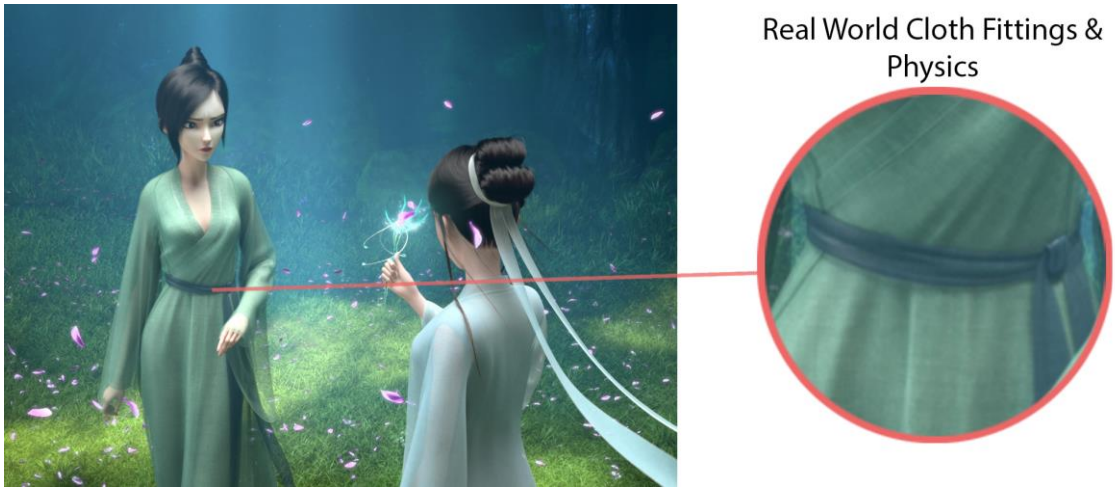

Figure 2.2.2. : White Snake (2019) Real-world Cloth Fitting and Physics

In the above figures2.2.2, we can see some example where we see some complex Real-world Cloth Fitting and Physics used in traditional costumes from local chines people tradition. This kind of cloth movement is just not possible through animating manually that's why simulation is must have.

2.3. VFX Movies

Doctor Strange (2016) and Man of Steel (2013) are some major example where we can see some major implementation of cloth simulation.

Figure 2.3.1. : Doctor Strange (2016) Simulated cloak of levitation

In the Figure 2.3.1. We can see cloak of levitation which is 100% simulated cloak. This type of result is only possible through simulation.

Figure 2.3.2.: Doctor Strange (2016) Simulated cloak of levitation -2

In the figure 2.3.2, we can see a cloth made cloak put in a glass cabinet. If we look carefully, we can see that nothing is holding the cloak but the cloak is behaving like someone is wearing the cloak. It's not possible in real world because the human that wear this cloak have to be invisible in order to make that happen. That's where cloth simulation comes in. With cloth simulation, we can make the cloak behave like a human wearing it without any human visible in the scene.

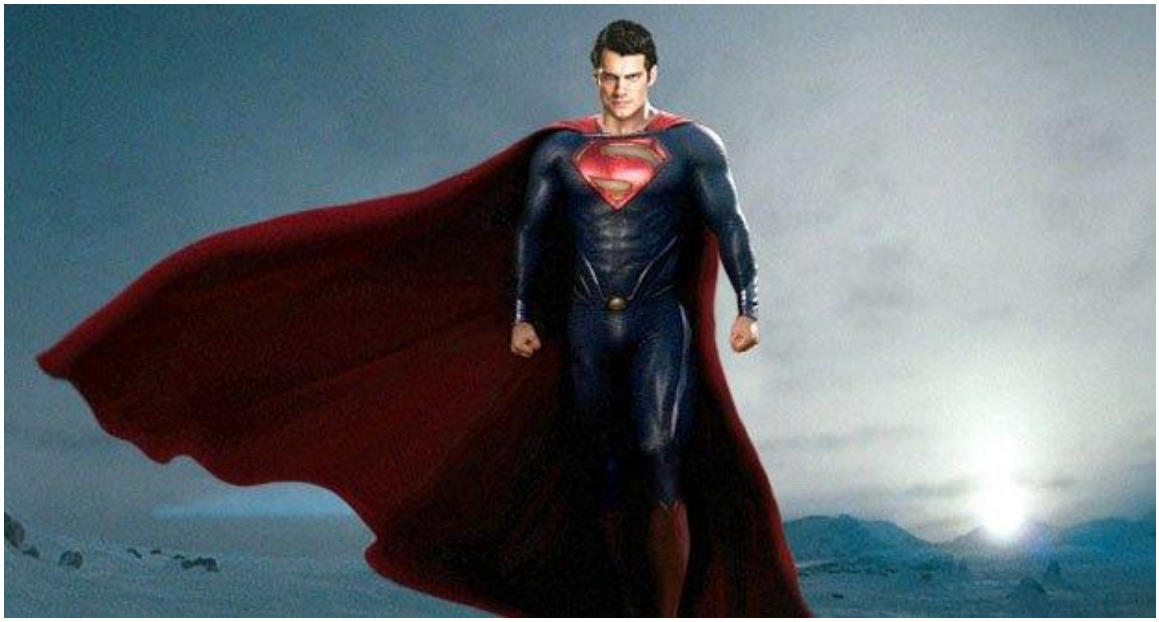

Figure 2.3.3.: Man of Steel (2013) Simulated cape

In figure 2.3.3, we can see a picture from the movie called Man of Steel. In this picture superman is wearing a red cape. When superman fly around, this cape behave like it has no gravity around it. So, in real-world where gravity is always presence how can this cape have no gravity around it? The answer is cloth simulation. With cloth simulation we can achieve Zero gravity cape.

2.4. History of Traditional Costume uses in 3D Animation and VFX

Figure 2.4.1. : White Snake 2019

Have anyone watched this movie? If not I would recommend you to check this movie out. It's a Chinese movie based on Chinese culture. So, the costume of all the character in this movie is inspired by Chinese cloth tradition.

Figure 2.4.2. : Traditional Chinese Cloth used in White Snake 2019

Figure 2.4.3. : Traditional Chinese Cloth used in White Snake 2019

Figure 2.4.4. : Traditional Chinese Cloth used in White Snake 2019

CHAPTER 3

DETAILS OF USED SOFTWARE

3.1. Autodesk Maya

Figure 3.1.1. : Autodesk Maya

Autodesk Maya is a 3D computer graphics tool that works on Windows, Mac OS X, and Linux. It was initially developed by Alias and is now owned and developed by Autodesk. It's used to make assets for interactive 3D applications (such video games), animated films, television shows, and visual effects.

Users create a virtual workplace (scene) in which they can create and edit media. In the picture down below we can take a look at Autodesk Maya user interface and our work is being done in this software.

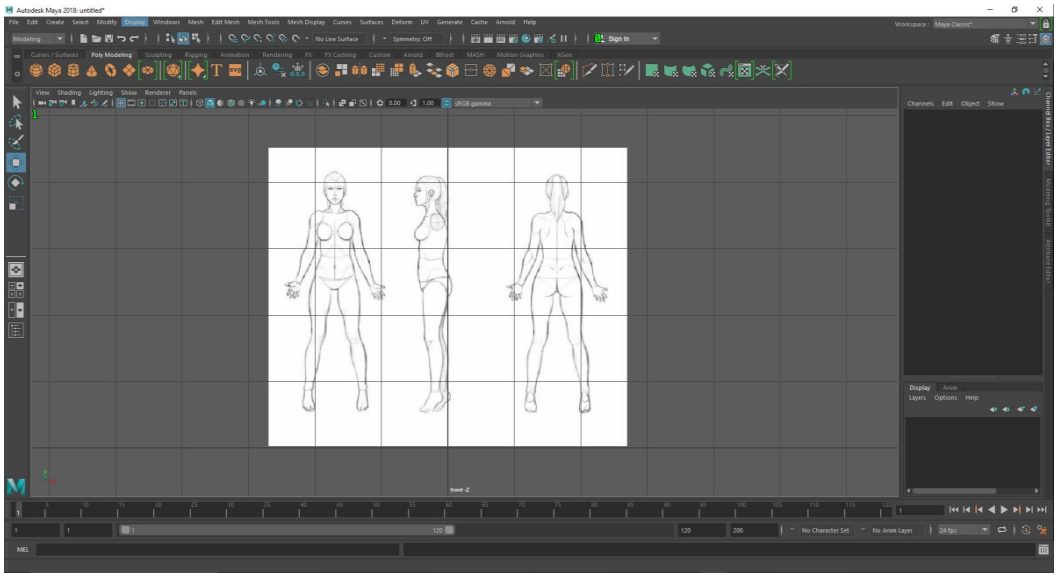

Figure 3.1.2. : Using Autodesk Maya for character Modeling, Rigging, Animation

3.2. Autodesk 3ds Max

Figure 3.2.1.: Autodesk 3ds Max

Autodesk 3ds Max is a professional 3D computer graphics tool for creating 3D animations, models, games, and photographs. It was previously known as 3D Studio and 3D Studio Max. Autodesk Media and Entertainment created and produced it. It requires the Microsoft Windows platform and provides modeling capabilities as well as a customizable plugin architecture. Video game makers, various TV commercial studios, and architectural visualization studios all use it. It's also utilized for pre-visualization and movie effects. Shaders (such as ambient occlusion and subsurface scattering), dynamic simulation, particle systems, radiosity, normal map creation and rendering, global illumination, a customizable user interface, new icons, and its own scripting language are all included in the latest version of 3ds Max's modeling and animation tools.
Many films, including Avatar and 2012, have used 3ds Max (or previous versions of the program under different names) in CGI animation. Mudbox, which is closely connected to 3ds Max, was also used in the final texturing of the set and characters in Avatar.
In the development of 3D computer graphics for a number of video games, 3ds Max has been employed. Concept art and previsualization are created in 3ds Max by architectural and engineering design organizations.[12]

Figure 3.2.2.: Using Autodesk 3ds Max for lighting & Rendering

3.3. Marvelous Designer

Figure 3.3.1.: Marvelous Designer

Bringing fashion design efficiency to computer graphics. With our cutting-edge design software, Marvelous Designer, you can create amazing 3D virtual apparel. Finally, give your designs new life with tools that improve quality while saving you time.

Marvelous Designer can digitally duplicate fabric textures and physical features down to the last button, fold, and accessory on everything from basic shirts to delicately pleated skirts and tough uniforms. You can instantly alter and drape clothing onto 3D shapes with high-fidelity simulation thanks to the wide compatibility with various 3D software and interactive design interface.

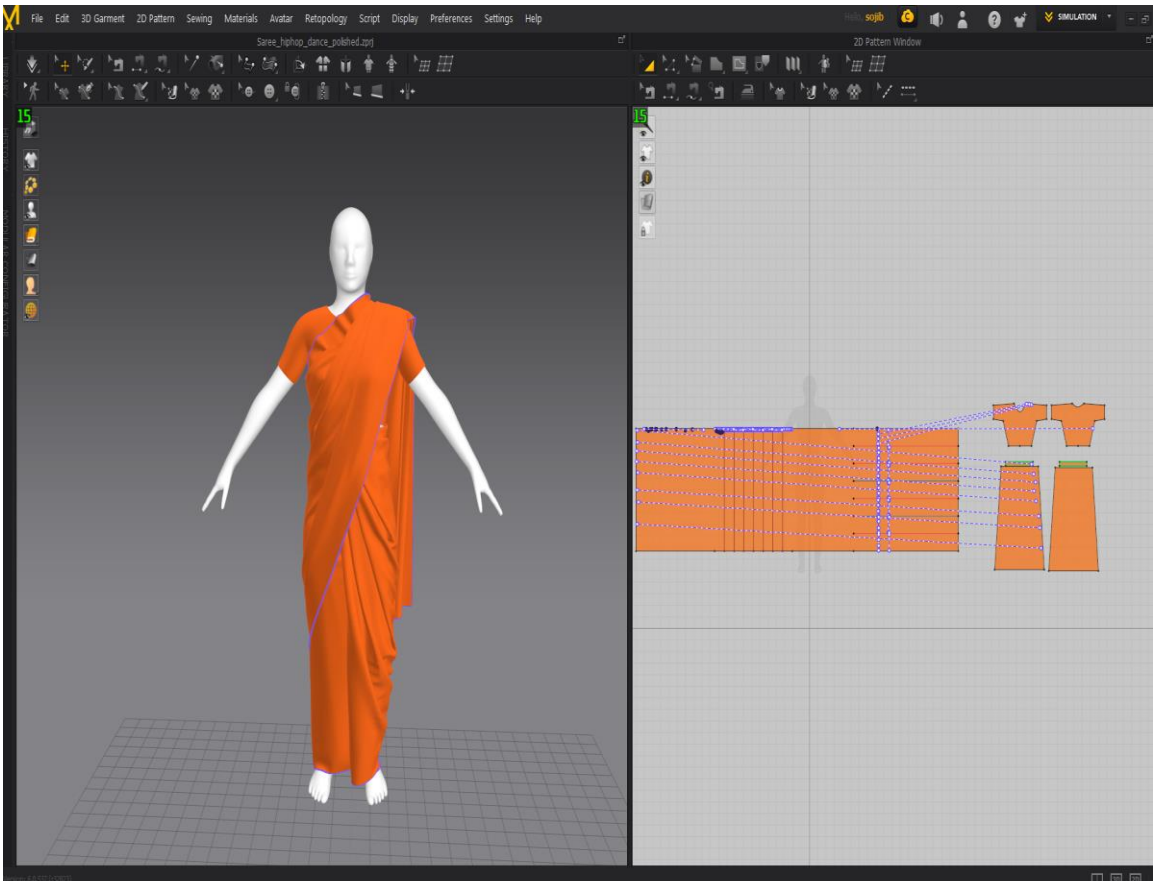

Figure 3.3.2.: Using Marvelous Designer for cloth simulation

Top game firms like EA Konami have already adopted Marvelous Designer's groundbreaking pattern-based technique, which can be seen on the big screen in animated blockbusters like The Hobbit and The Adventures of Tintin.[13]

3.4. V-Ray

Figure 3.4.1.: V-Ray

Bulgarian Chaos Group, which was founded in Sofia in 1997, produced V-Ray, a biased computer-generated imagery rendering software tool. V-Ray is a commercial plug-in for third-party 3D computer graphics software packages that is used in industries such as media, entertainment, film and video game production, industrial design, product design, and architecture for visualizations and computer graphics. Peter Mitev and Vladimir Koylazov are the company's primary architects.

In architectural visualization, Vray is most likely the market leader for still images. It is noted for its quickness and generates excellent quality utilizing either biased or unbiased rendering methods. The main distinction between biased and unbiased rendering is speed. Unbiased render algorithms analyze illuminance at each pixel in a picture, making them more precise but slower than biased render algorithms.

Biased algorithms, in general, divide a scene into 'cells' with equal (or nearly equal) illuminance and interpolate between them. This is a major improvement. To reduce blotchiness, some extremely sophisticated sampling approaches allocate more samples to locations with stronger contrast. Although biased renders are more accurate than unbiased renderings, with a decent engine configured properly, you may not notice a difference in quality, but the speed difference could be significant. You could be looking at a five-fold difference in speed. You'd have to wait 3 hours or more for an unbiased version of a 20-minute biased render.

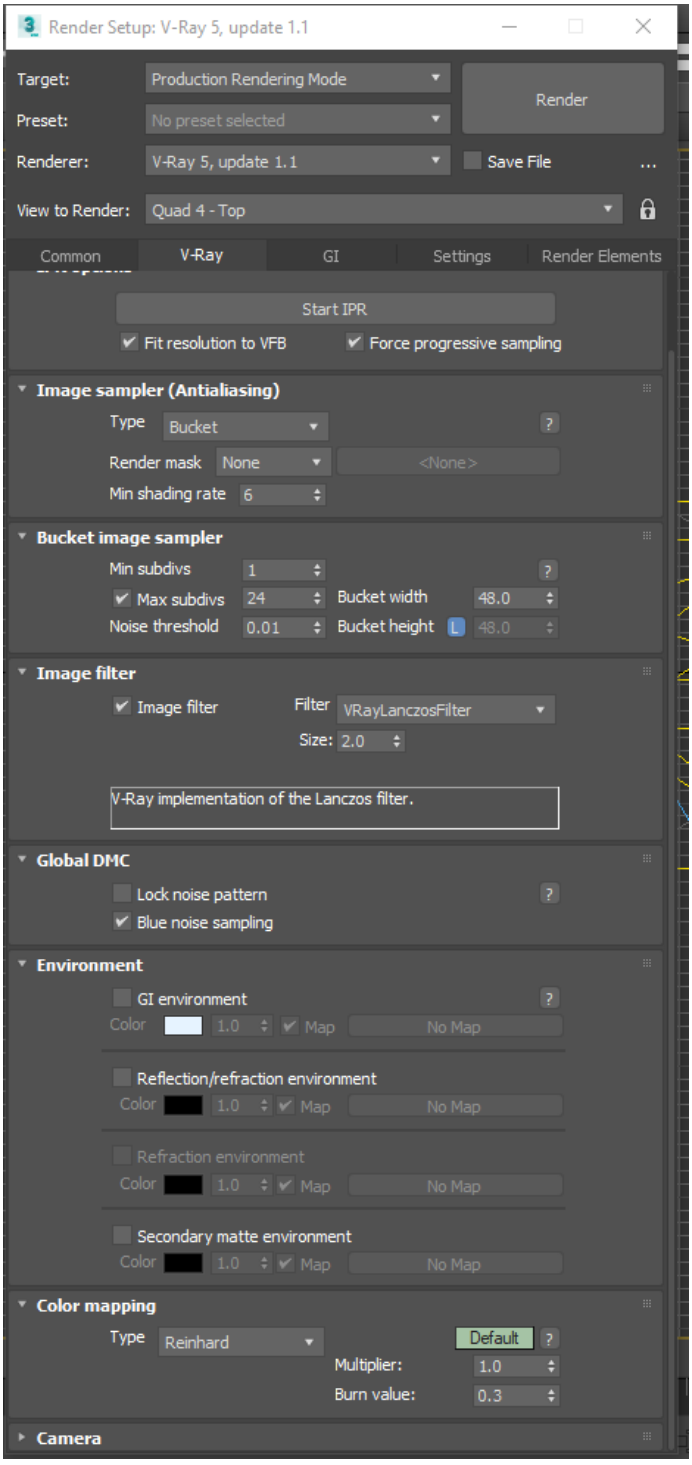

Figure 3.4.2.: Using V-Ray Render Animation

VRay, on the other hand, is a complicated program. It has a steep learning curve because it is extremely powerful and flexible. [14]

3.5. Adobe Photoshop

Figure 3.5.1. : Adobe Photoshop

Photoshop is Adobe's photo editing, image creation and graphic design software. The software provides many image editing features for raster (pixel-based) images as well as vector graphics. It uses a layer-based editing system that enables image creation and altering with multiple overlays that support transparency. Layers can also act as masks or filters, altering underlying colors. Shadows and other effects can be added to the layers. Photoshop actions include automation features to reduce the need for repetitive tasks. An option known as Photoshop CC (Creative Cloud) allows users to work on content from any computer.

Photoshop been the industry standard image manipulation program for so long that its name has become a verb: It is common parlance to say that an image has been “photo shopped” or even just “shopped." Shopped, in this context, is synonymous with edited, manipulated, often regardless of the software actually used. [15]

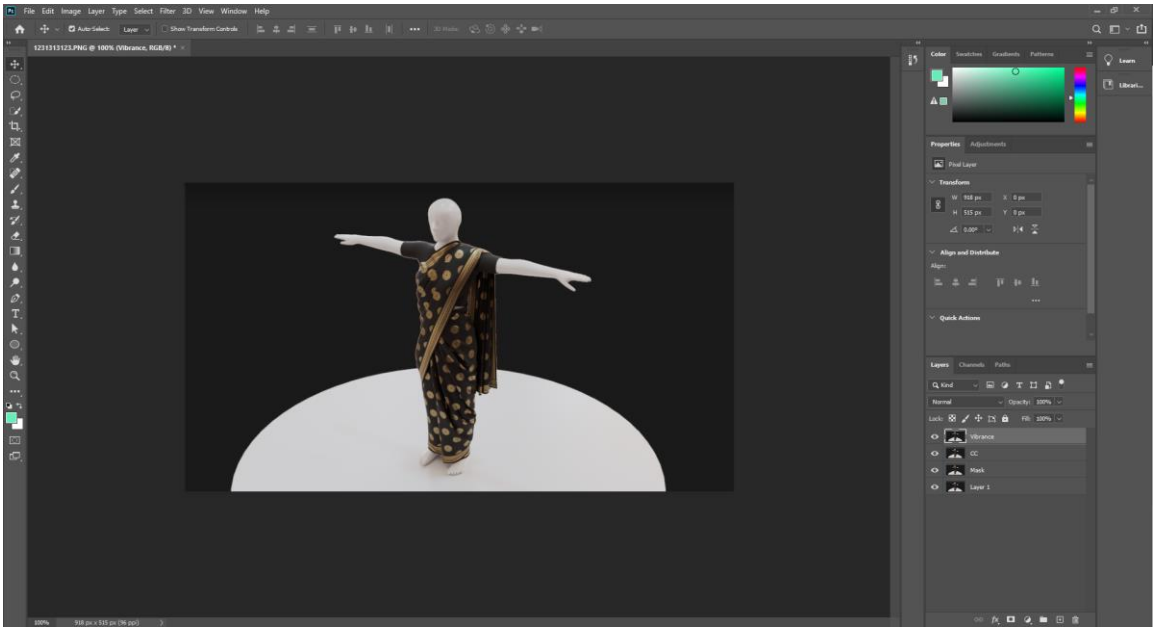

Figure 3.5.2. : Using Adobe Photoshop to make/edit textures

3.6. Adobe Illustrator

Figure 3.6.1.: Adobe Illustrator

Adobe Illustrator is a vector graphics editor and design tool created by Adobe Inc. and distributed worldwide. Adobe Illustrator was first developed in 1985 for the Apple Macintosh computer. Illustrator CC was released alongside Creative Cloud (Adobe's transition to a monthly or annual subscription service supplied over the Internet).

Illustrator 2022, the most recent version, was released on October 26, 2021, and is the product's 25th iteration. PC Magazine named Adobe Illustrator the finest vector graphics editing application in 2018.[16]

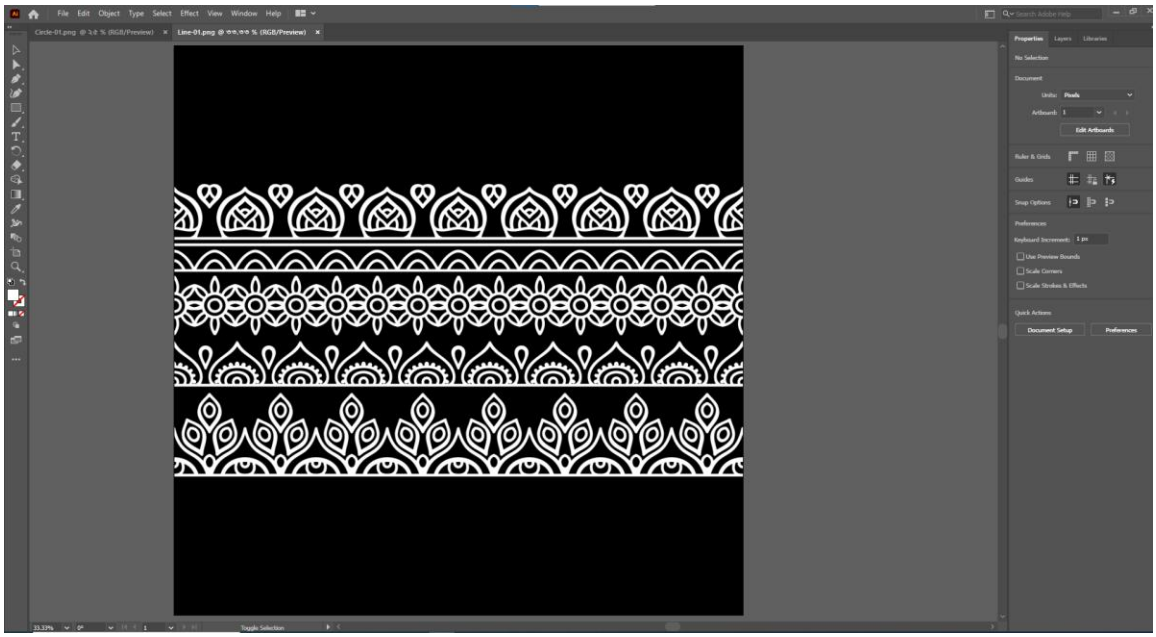

Figure 3.6.2.: Using Adobe Illustrator to make texture patter

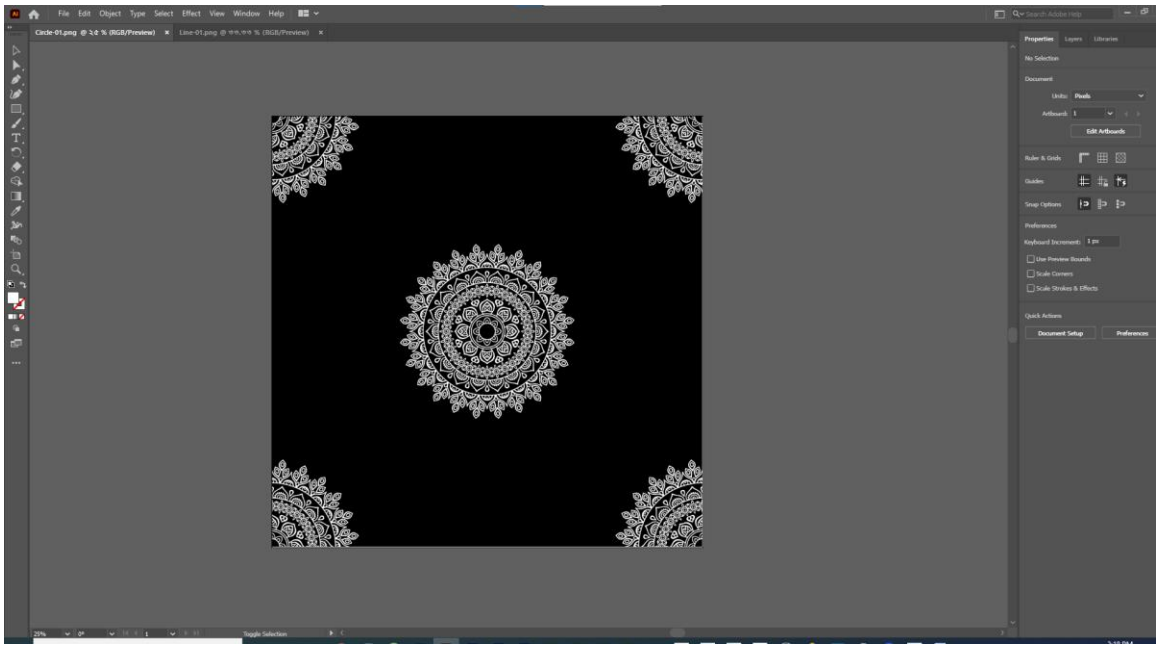

Figure 3.6.3.: Using Adobe Illustrator to make texture patter - 2

3.7. Adobe After Effects

Figure 3.7.1.: Adobe After Effect

Adobe After Effects is a virtual visual effect, motion graphics, and compositing software evolved by Adobe Systems and used in the post-manufacturing technique of moviemaking, video games, and tv manufacturing. Among different things, After Effects may be used for keying, tracking, compositing, and animation. It additionally capabilities as a totally fundamental non-linear editor, audio editor, and media transcoder. After finishing all the work in pre-production then we shift to the post production work though after effect were we also added sound to the work and doing some color correction, masking etc.[17]

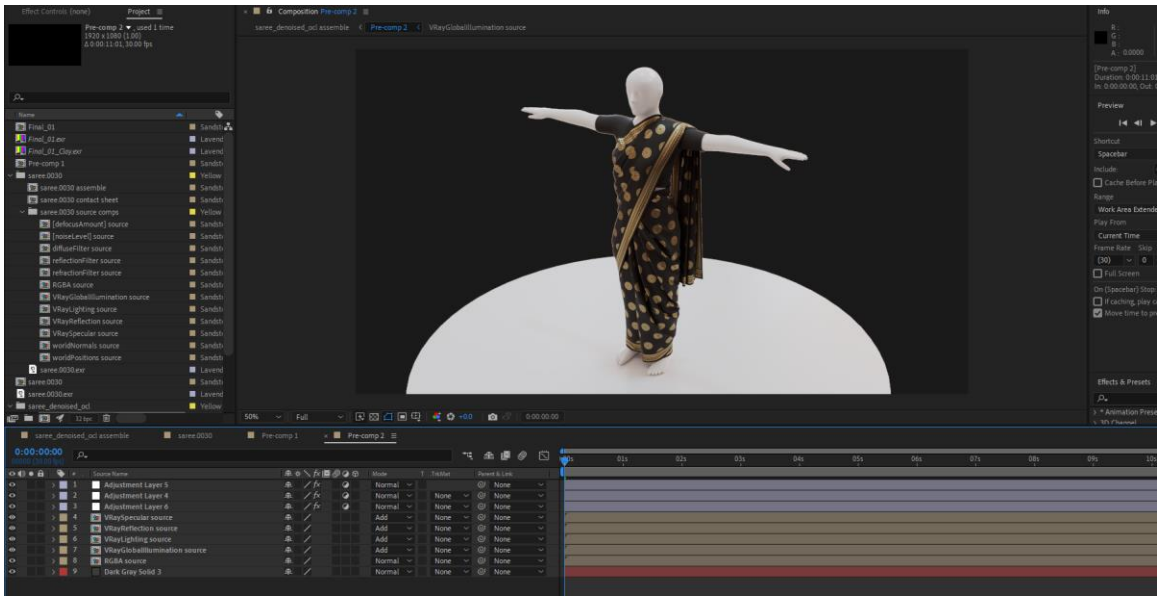

Figure 3.7.2.: Using Adobe After Effect to composite frames into animation

3.8. Adobe Media Encoder

Figure 3.8.1.: Adobe Media Encoder

Adobe's Media Encoder is a piece of software that allows you to create multimedia content for the web and other platforms. It gives you the ability to transform material in a variety of ways, including changing the format. Media Encoder shrinks the size of media files by compressing them.

Here's an example of how Encoder works to help you understand it better. Assume you have a project from which you want to export files. You'd open this project in Encoder, then edit the export parameters to get the file format you want (MP4, PNG, MPEG2, etc.).

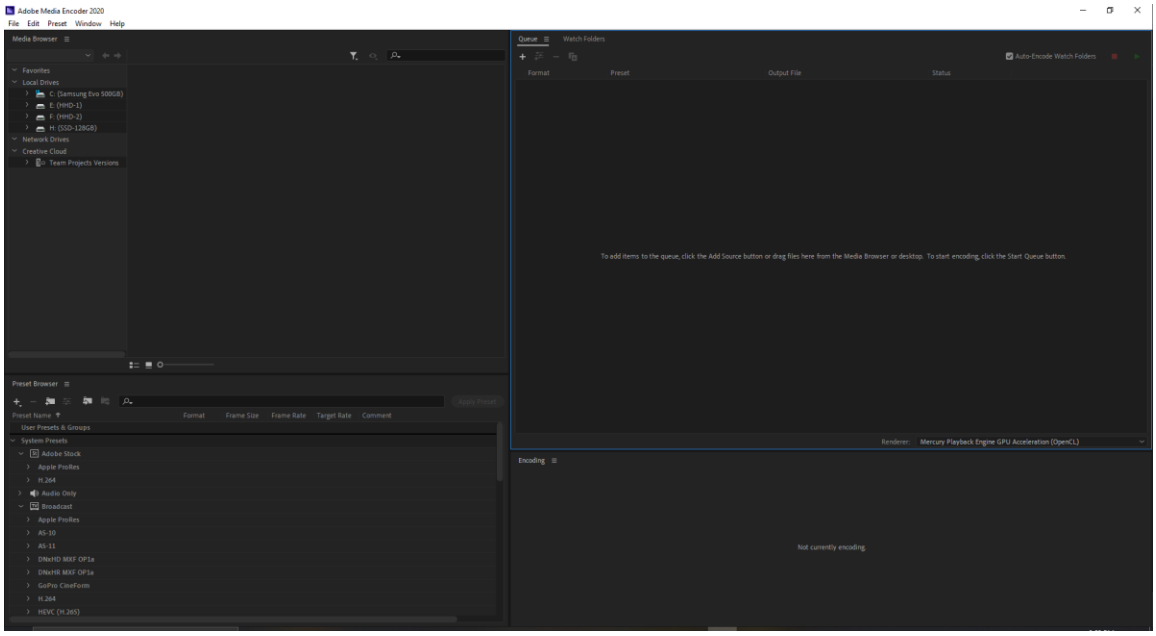

Figure 3.8.2.: Using Adobe Media Encoder to render composite file into mp4 video

3.9. Adobe Substance 3D Painter

Figure 3.9.1.: Adobe Substance 3D Painter

For 3D experts and hobbyists, Adobe Substance 3D Painter is the go-to texturing software. Painter is used by the industry to bring their works to life, from AAA game developers to indies, from Feature Animation to Visual Effects teams, because to its unequaled speed, versatility, and visual quality. Use Smart materials to have textures wrap around your objects automatically, use the integrated physics engine to effortlessly apply weathering effects, or paint exact micro-details across complex assets spanning thousands of texture sets or UDIMs. Unity, Unreal, Amazon Lumberyard, VRay, Arnold, Renderman, and Substance 3D Painter are all compatible with Substance 3D Painter. Painter can convert your textures into the correct format and offer you results that are as near to what you want as possible, no matter what your end platform is.

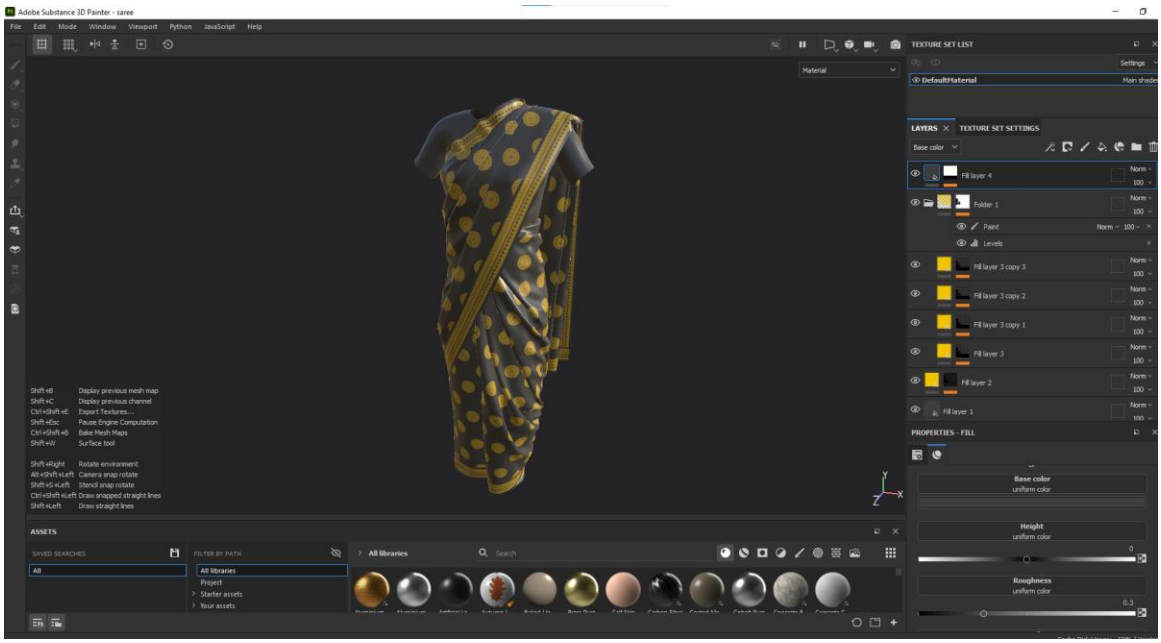

Figure 3.9.2.: Using Adobe Substance 3D Painter for Texturing

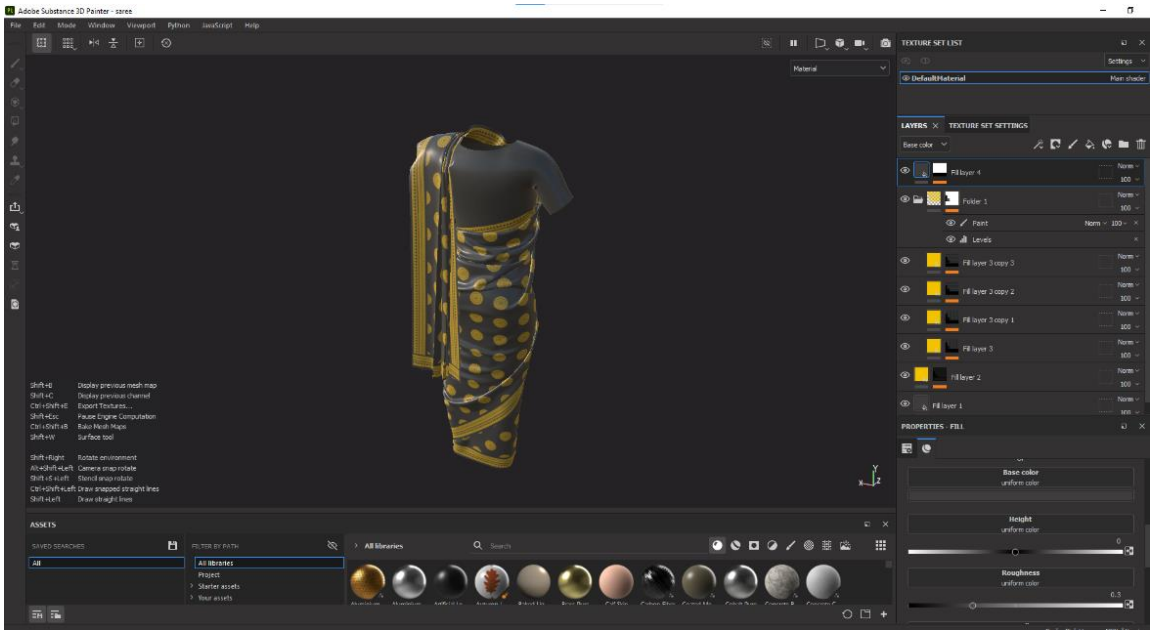

Figure 3.9.3.: Using Adobe Substance 3D Painter for Texturing - 2

CHAPTER 4

DETAILS OF MY INTERNSHIP/RESEARCH PROJECT

4.1. Description of client work/research project during internship

During my internship period, I have done mainly two type of works.

1. Client work
2. Research Project

4.2. Client Work

During my internship period, I was assigned in a team of two member. At first, I was given some test work to understand my skill level. After that I was assigned with real client work under a supervision of skilled professional mentor from AAVA 3D. I was assigned in very few small part of some client work like modeling simple object. But only one client complete work was assigned to me. This was my best and well-reviewed client work. It was under the category of "Product Visualization". Where I had to do everything from start to finish. Starting from modeling to rendered output and post production.

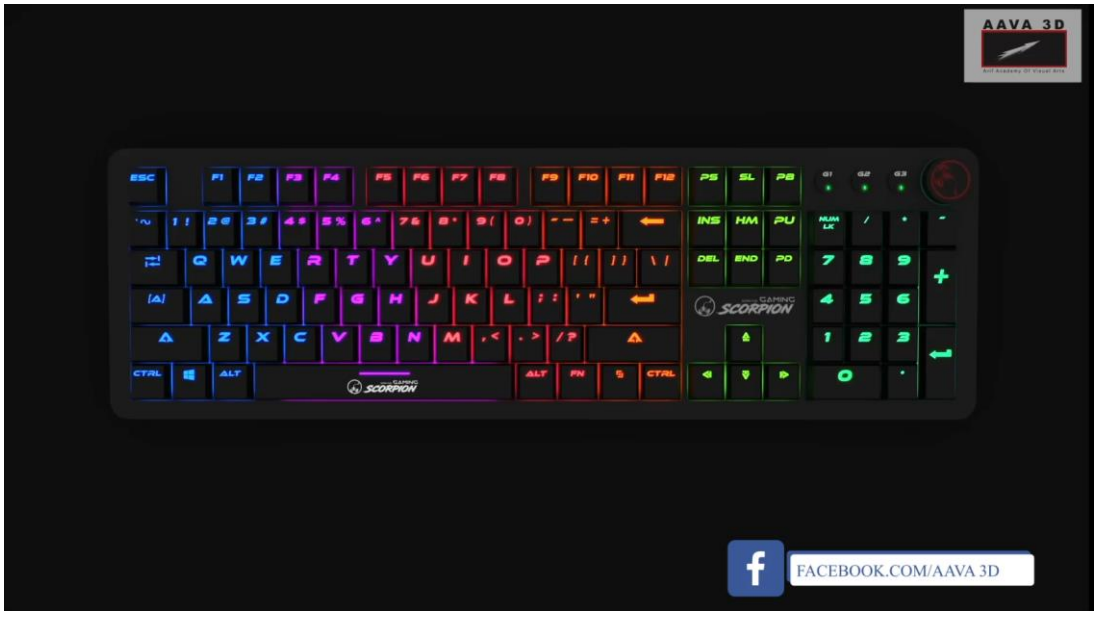

Figure 4.1.1.: Keyboard Product Visualization - 1

Figure 4.1.2.: Keyboard Product Visualization – 2

Figure 4.1.3.: PS5 Product Animation – 1

Figure 4.1.4.: PS5 Product Animation – 2

4.3. Research Project

During my internship half of my work was product modeling and other half was my research project which is also my main project. This research project is called “SIMULATING LOCAL (ASIAN SUBCONTINENT) COSTUMES FOR 3D ANIMATION AND VFX”. This research work was assigned by AAVA 3D under the supervision of Arif Ahmed.

Figure 1.5.3.: Local Costume Simulation Sari

4.3.1. Definition of cloth simulation

Cloth simulation is a process of creating and animating realistic looking fabrics according to the laws of physics such as collision, gravity, friction and much more.[7]

4.3.2. Importance of cloth simulation

Most animation programs and dedicated tools, such as Marvelous Designer, include cloth simulations (MD). Marvelous Designer Version 8 is definitely one of the greatest standalone apps for CG artists to produce gorgeous 3D apparel quickly and efficiently. Users can simply develop and simulate excellent clothing that are compatible with most applications using a pattern-based approach to modelling. The application, like others like CLO3D and Optitex, is used in the entertainment sector as well as in real-world clothing design.[8]

CHAPTER 5

MY PART IN INTERNSHIP/RESEARCH PROJECT

5.1. Client Work: PS5 Product Visualization

5.1.1. Opening 3ds Max 2020 & Start a new project

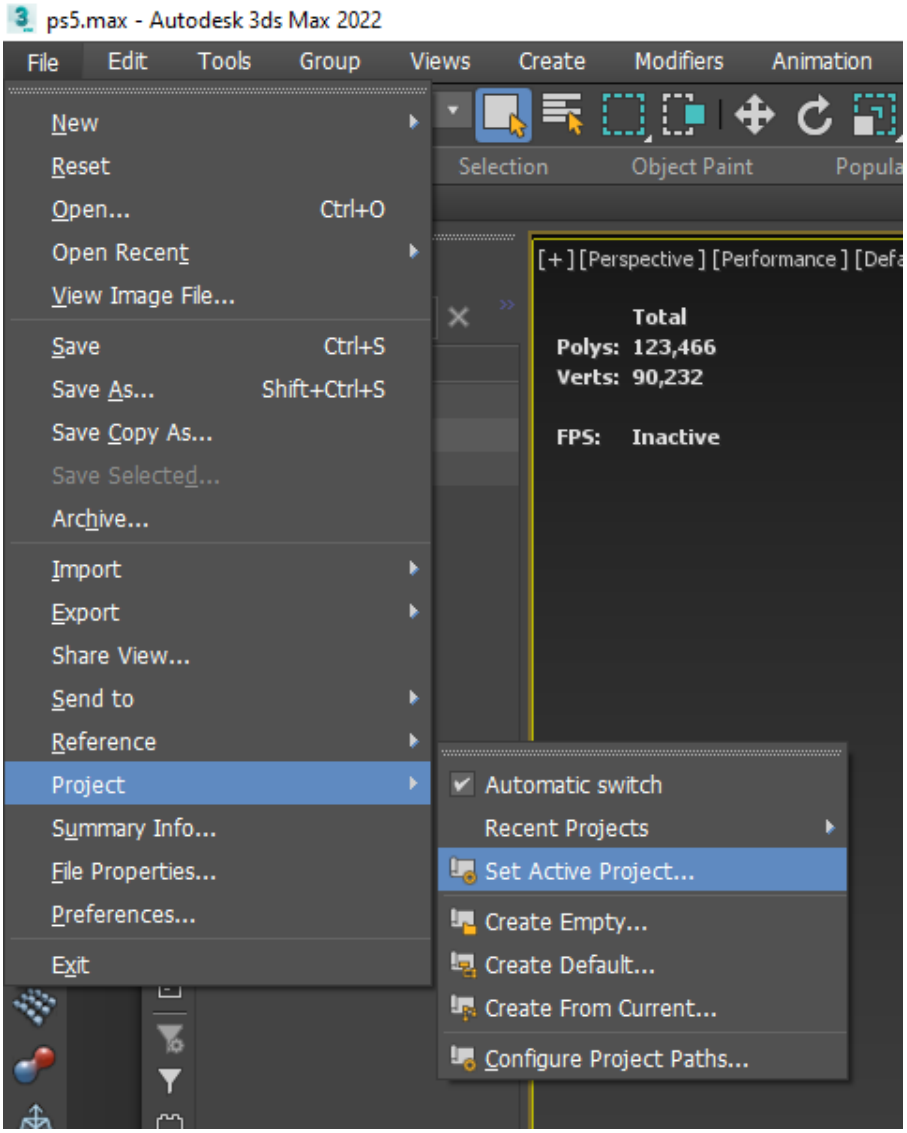

Figure 5.1.1.1. : Opening 3ds Max 2020 & Start a new project

In Figure 5.1.1.1, I am opening 3ds Max 2020. Then go to file located on the top left corner and click on it. In file option select “Project” and select “Create Empty” option. After that chose the preferred location you want to save your files.

5.1.2. Selecting Reference Image

Figure 5.1.2.1.: Selecting Reference Image

In Figure 5.1.2.1. , This is the reference image that we got from our client and after selecting this image, we start modeling process in 3ds Max 2020.

5.1.3. Starting with one side panel

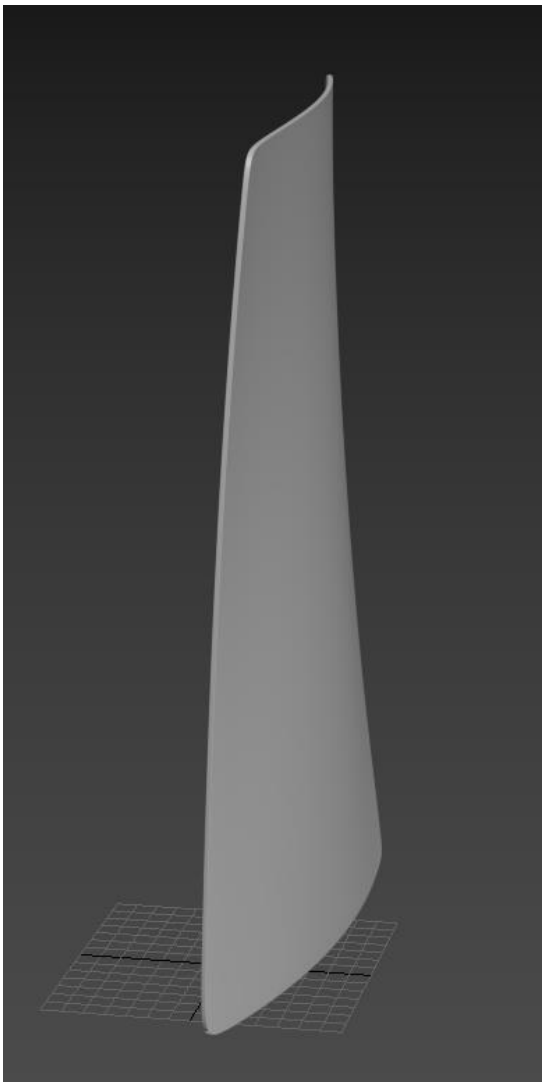

Figure 5.1.3.1.: Starting with one side panel

In Figure 5.1.3.1. We model one side panel. It is very important to remember before we start modeling we have to observe our reference image and think how to do it. Then divide the model into small part. Then we start modeling. Take a plane and use FFD 4x4 And edit it. When done editing, add a shell modifier to give thickness to plane. Use chamfer or use edit poly modifier and give some edge loop then add turbo smooth modifier to smooth edges.

5.1.4. Using Symmetry Modifier to make other side

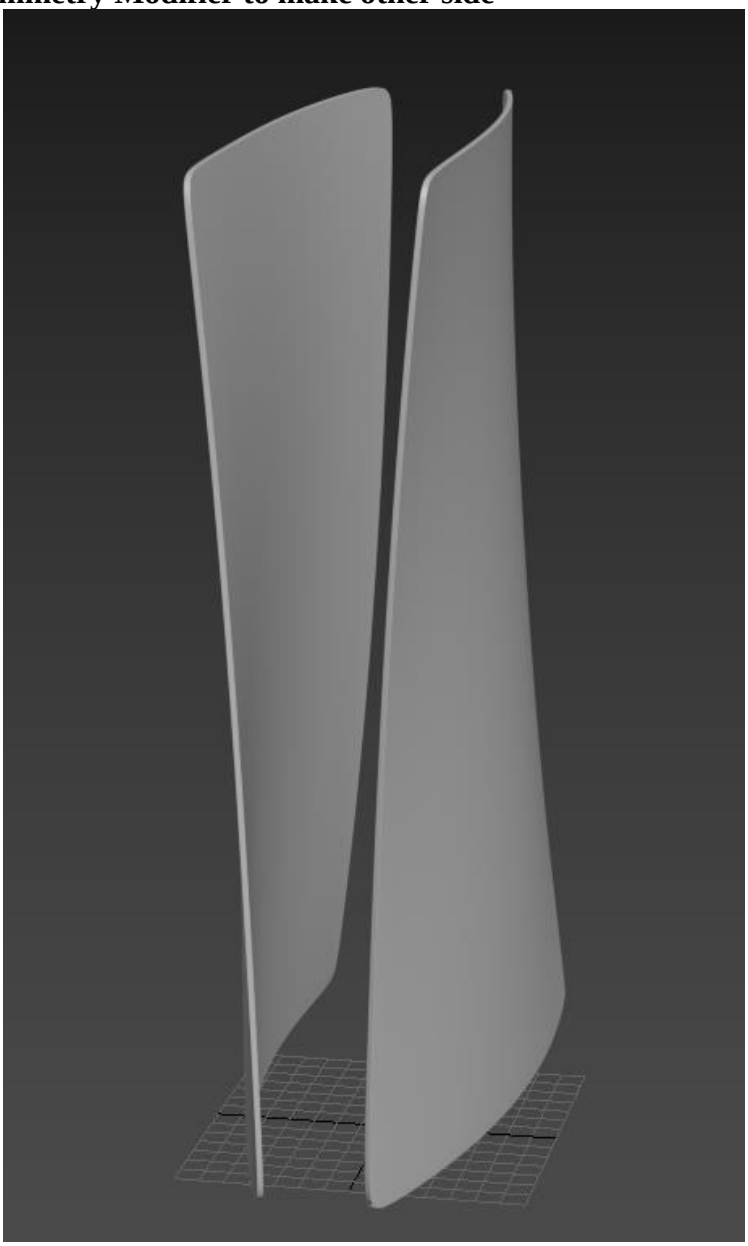

Figure 5.1.4.1.: Using Symmetry Modifier to make other side

In Figure 5.1.4.1. We used symmetry modifier and made a similar copy on the other side. Sometime symmetry modifier don't mirror properly. To make it work you have to reset you private point of your object and make their value 0 on each axis.

5.1.5. Making front panel using plane

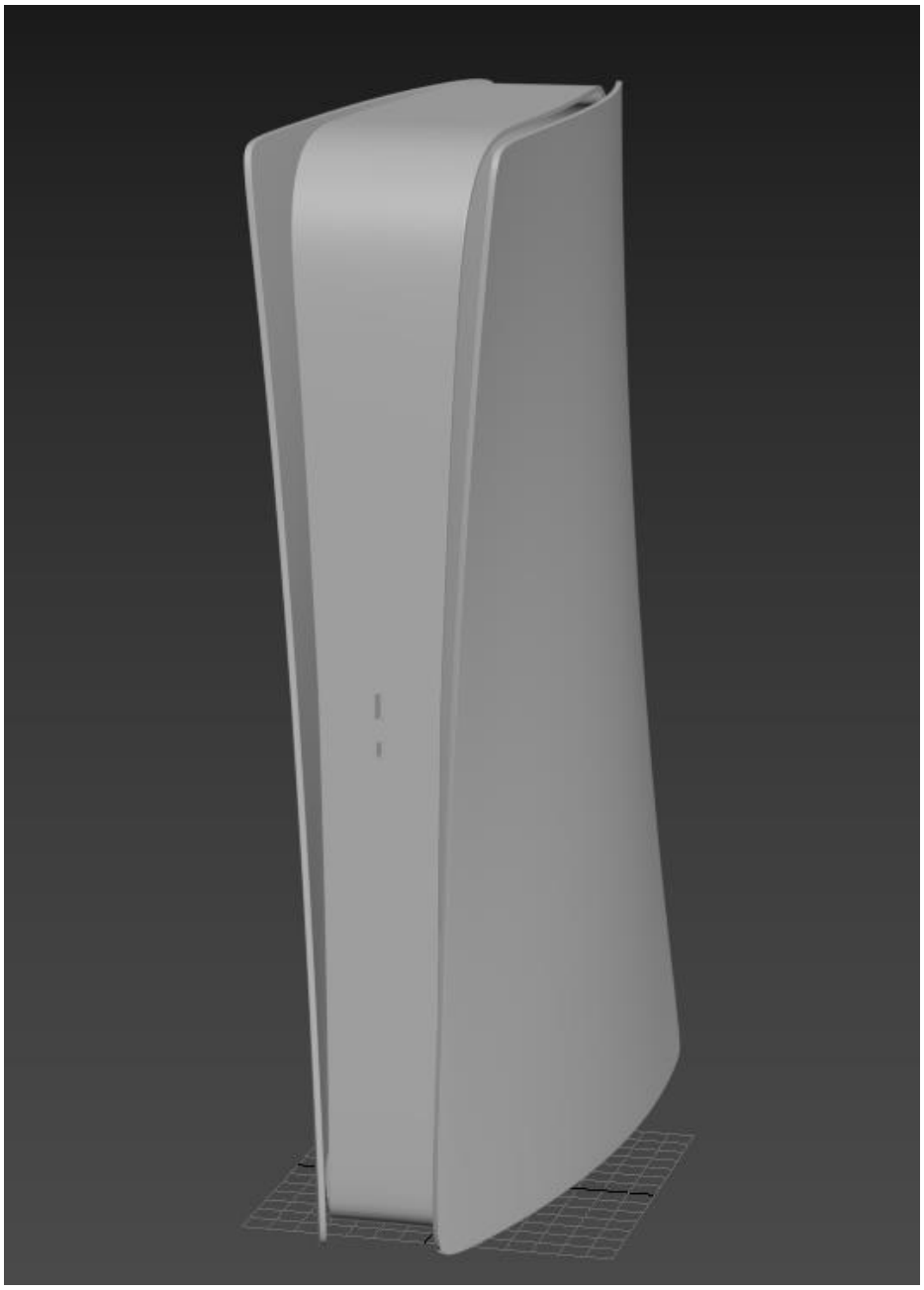

Figure 5.1.5.1.: Making front panel using plane

In Figure 5.1.5.1.: I made front panel using plane. First take a plane and add edit poly or convert to edit poly to adjust. After that use chamfer on the front top edge to make is smooth like the reference.

5.1.6. Making front blades & RGB light strips

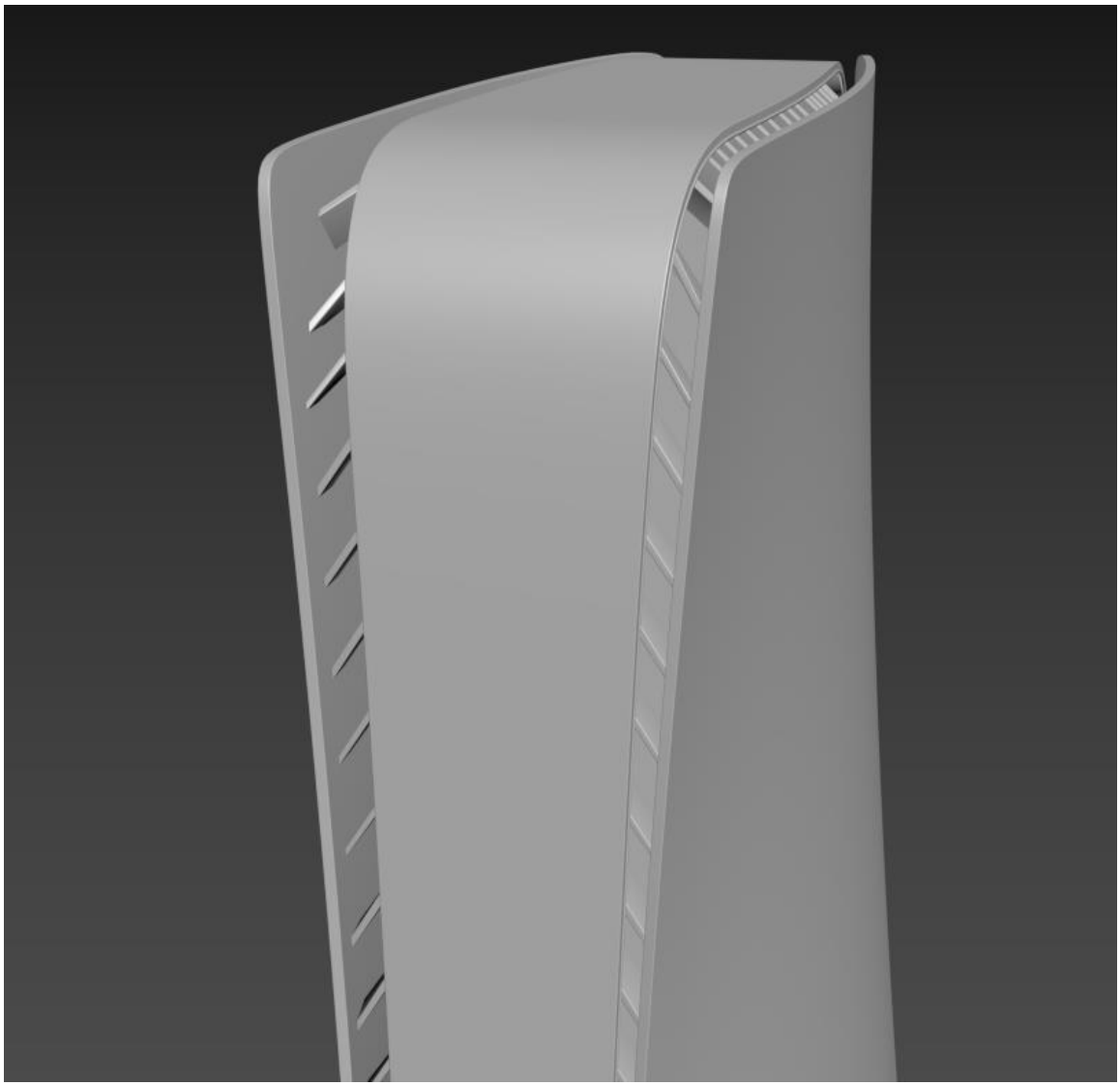

Figure 5.1.6.1. Making front blades & RGB light strips

In Figure 5.1.6.1. Making front blades & RGB light strips. To make it first we have to make 1 blade using plane and editing it and add shell to give thickness also use chamfer modifier to make edge smoother. After first blade done, duplicate it multiple time to make it similar to reference.

Now to make the RGB light strip, select an edge loop where you want the light strip to be from front panel. Once selected select Create Shape to make line and enable in viewport

and enable in renderer to make the tube visible in viewport then adjust parameter to give thickness to the tube.

5.1.7. Making front USB ports

Figure 5.1.7.1.: Making front USB ports

In Figure 5.1.7.1. Use edge loop to make a rectangle shape polygon and extrude in inside. Take a box and adjust it to make it like the wide pin inside the USB port. After that use chamfer to smooth edges. To make edges sharp, give extra edge loop.

5.1.8. Making front lights and base holder

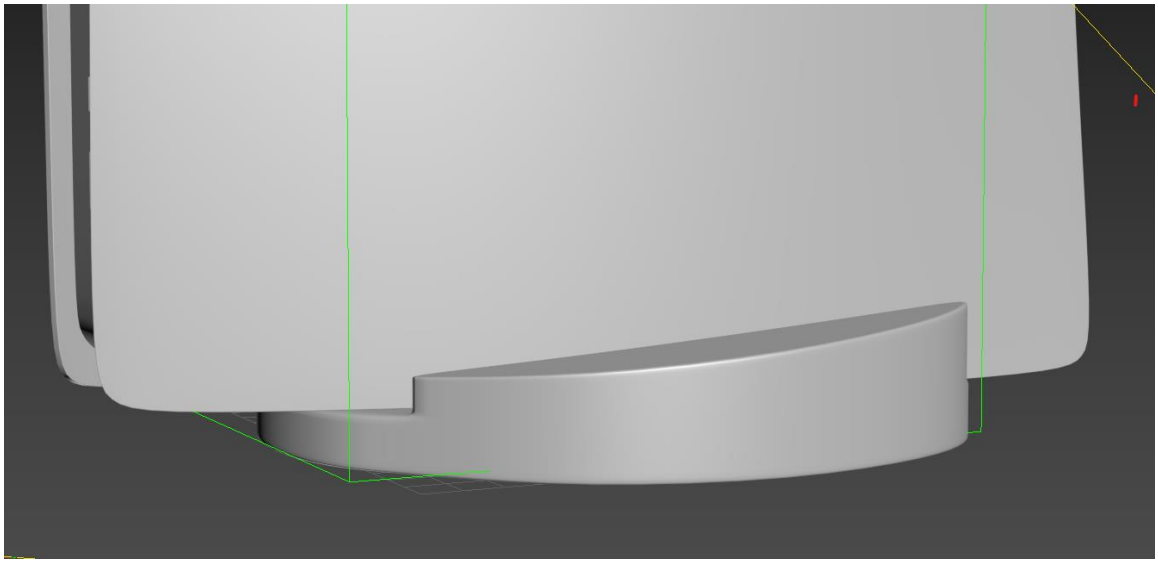

Figure 5.1.8.1. Making front lights and base holder

In Figure 5.1.8.1. Making front lights and base holder, we take cylinder and extrude top face of the cylinder but leave the middle polygon of top face. Once done give edge loop then turbo smooth. Next use FFD 2x2 and select only one side and lower it until it looks like the reference.

5.1.9. Making back blades & ports

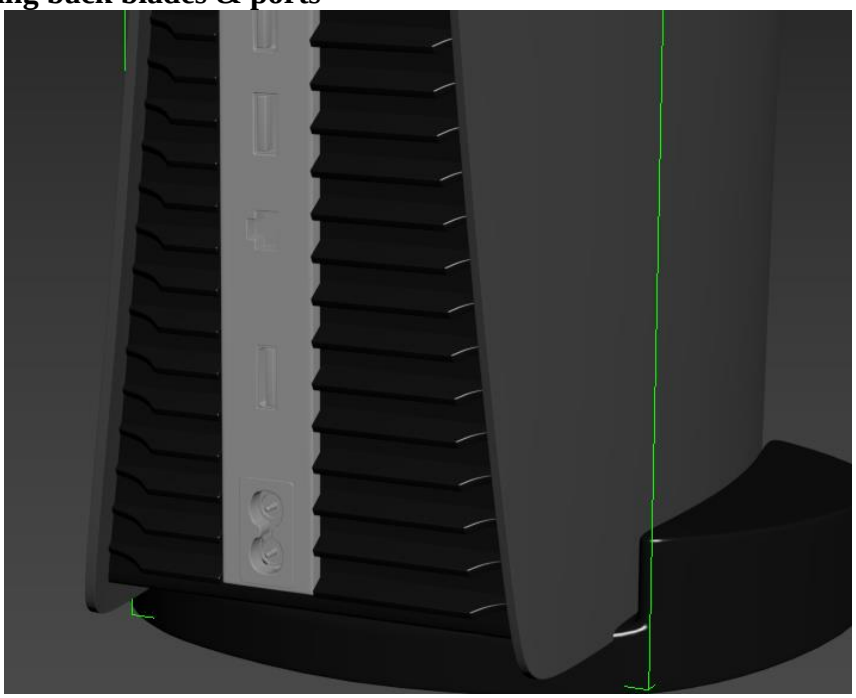

Figure 5.1.9.1.: Making back blades & ports

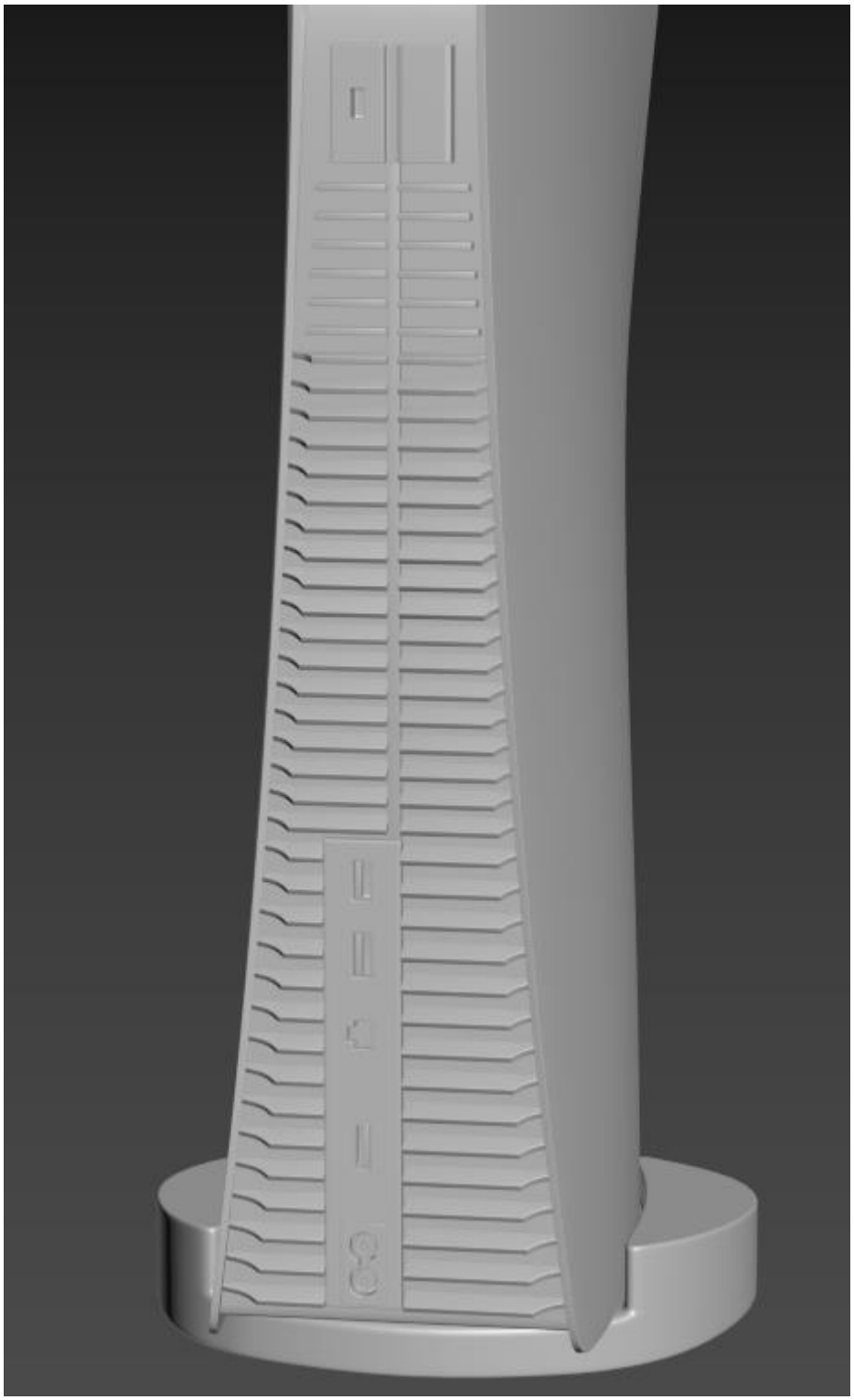

Figure 5.1.9.2.: Making back blades & ports 2

5.1.10. Setting studio lighting setup and texturing

Figure 5.1.10.1.: Setting studio lighting setup and texturing

Make texture in Substance Painter and export all maps into PNG or JPG format and assign then in object using 3ds Max Material library. Use V ray mtl material format and load all PNG according maps. Then to see them in viewport, turn on show in viewport in Material library.

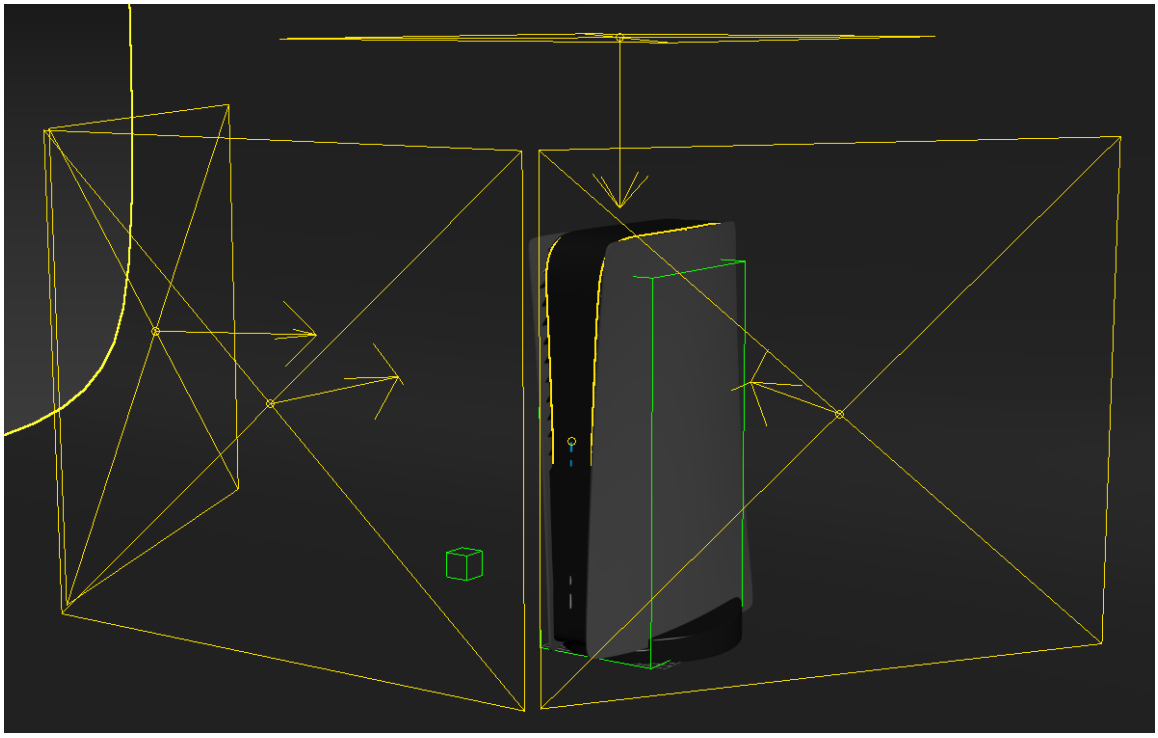

Figure 5.1.10.1.: Setting studio lighting setup and texturing - 2

Go to light select V ray, inside V ray select VRayLight and click and drag on viewport to make plane light. Now adjust the height and weight with scale tool. Next use move and rotate tool to adjust light according to your needs as showed in the figure. Now use V Ray light lister and control all parameter and get the perfect lighting you want.

5.1.12. Setting camera and animating camera

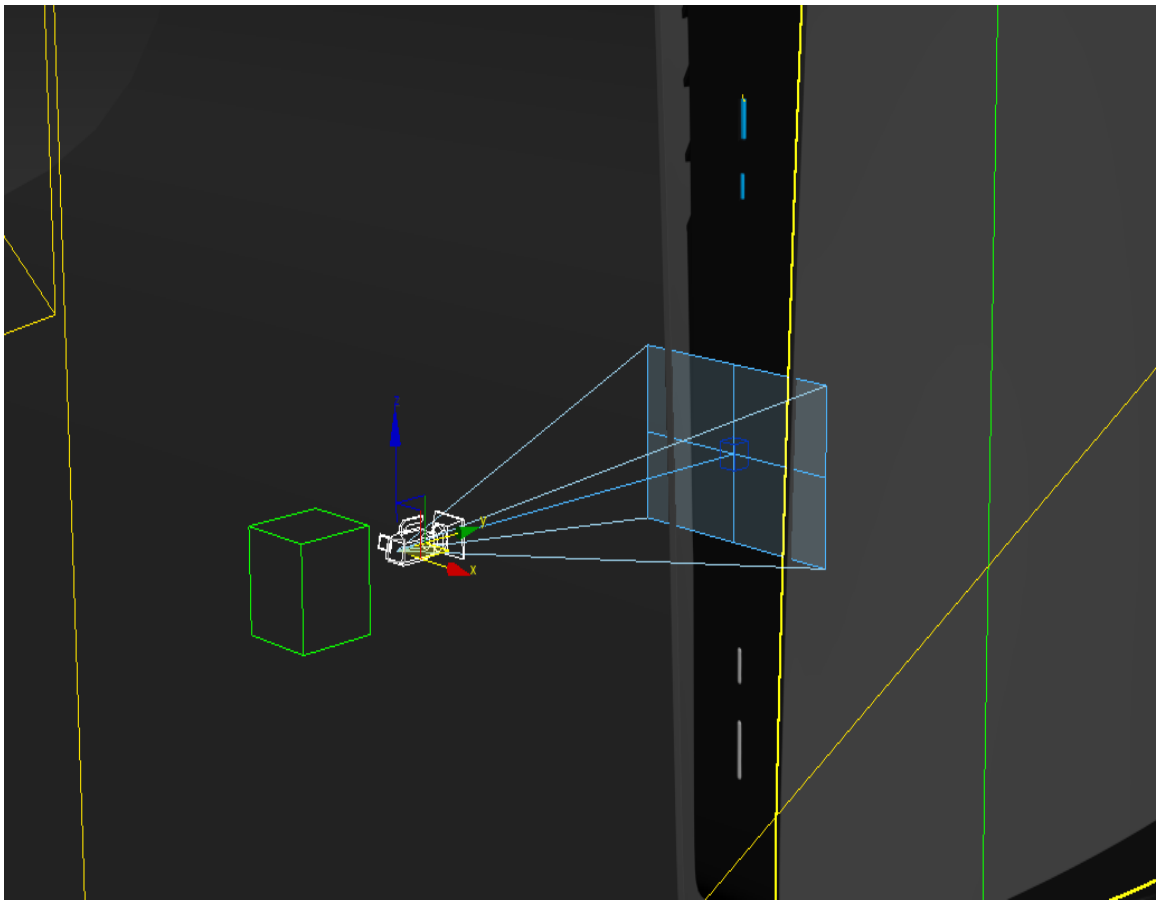

Figure 5.1.12.1.: Setting camera and animating camera

Once lighting and texturing done, we move to camera. Go to camera and add a camera to viewport. You can use V Ray or Physical camera. Then select the camera and camera target and link it to a dummy object. Then animating dummy will affect camera movement.

5.1.13. Rendering using V ray

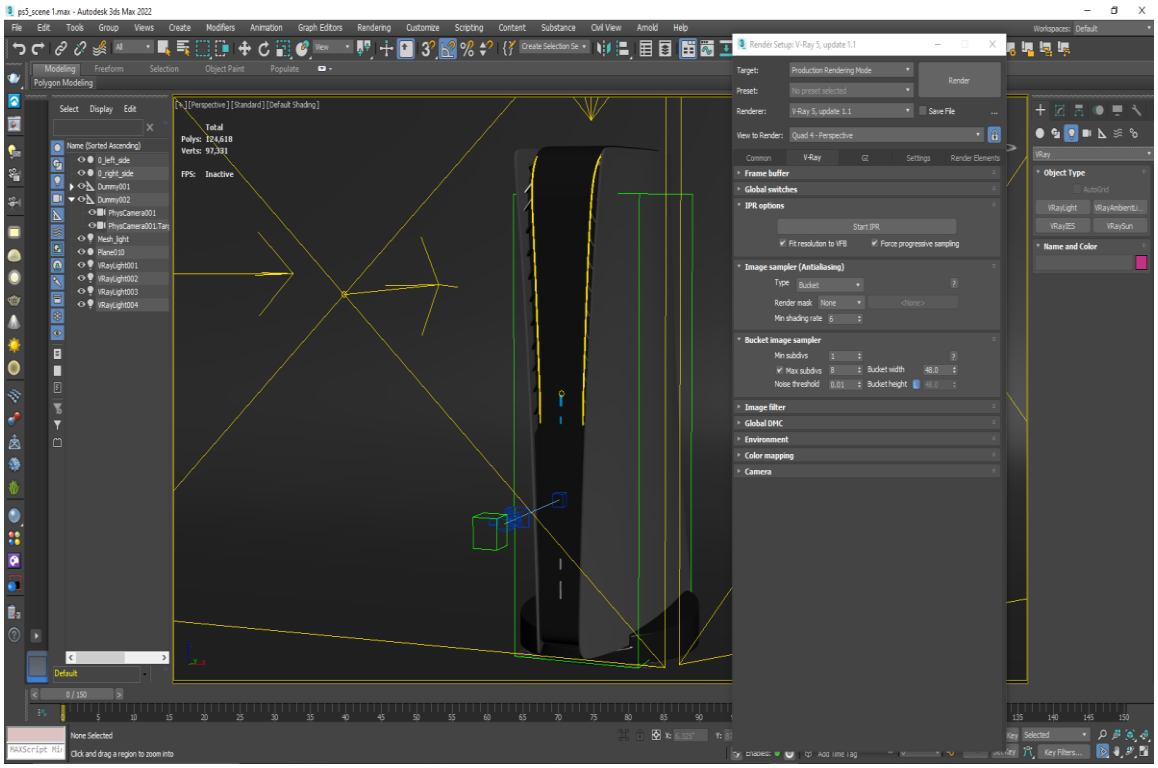

Figure 5.1.13.1.: Rendering using V ray

Once camera animation done, it's time for rendering. Go to render setup and select vray from Renderer dropdown menu. Now adjust vray parameter according to you needs and set range for your animation.

5.1.14. Using After Effect to compose frame into animation

Once rendering finish, you will many image. Each of the image is called frame. Now if we do 30fps (Frame per Second), we will need 30 image to make 1 sec animation. Now open after effect and import all images. Now create a composition with parameter 30 fps. Now drag and drop image folder in composition. Now we can preview our animation although it's not recommended because it will lag during its play through. Now add adjustment layer and do some color correction to make the animation look better.

5.1.15. Using Media Encoder to render mp4

Now add render que in Media Encoder. This will open media encoder. In media encoder select your desired video format like mp4 avi or mov etc. Now select the folder you want to save and name your file. After that click render and it will start rendering your video.

Figure 5.1.15.1.: Media Encoder rendered mp4

5.1.16. Final output of product visualization

Figure 5.1.16.1.: Product Visualization Final Animation

5.2. Research Work: Simulating Local (Asian subcontinent) Costumes For 3D Animation & VFX.

5.2.1. Opening Maya and Set project folder

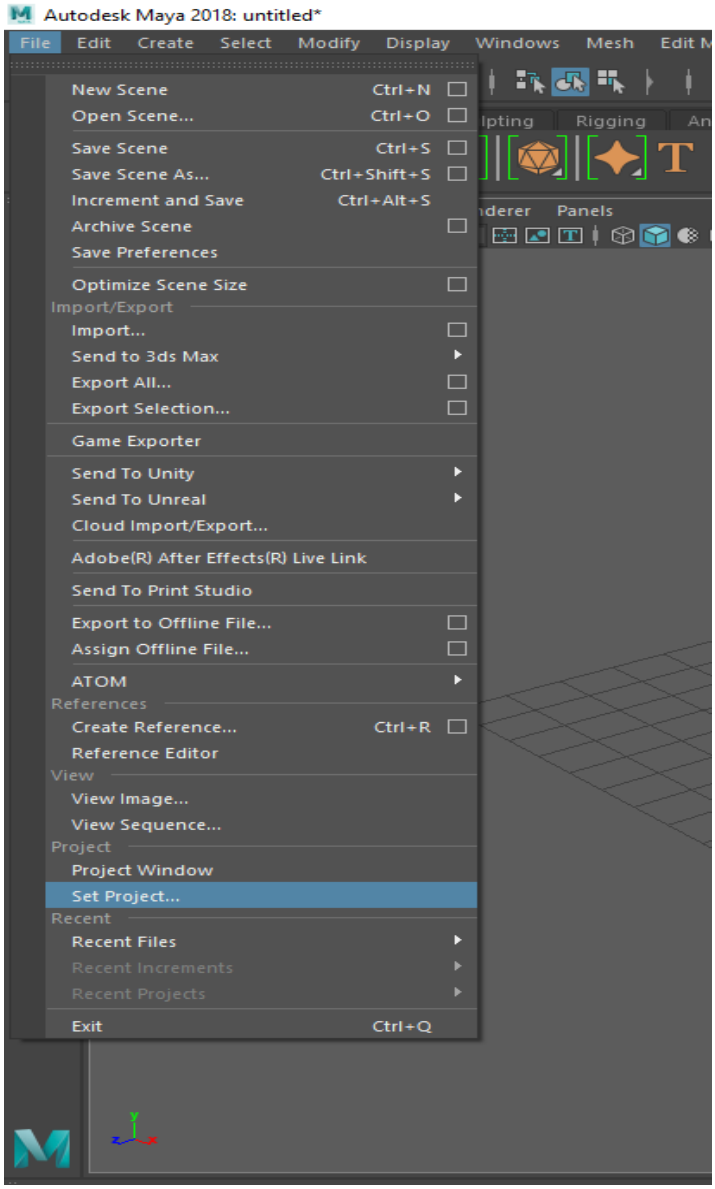

Figure 5.2.1.1.: Opening Maya and Set project folder

Open Autodesk Maya and go to file then set project. Select the folder that you want your Maya file to save. Organizing you files and folder will help you and your team to work.

5.2.2. Importing female turnaround sketch photo

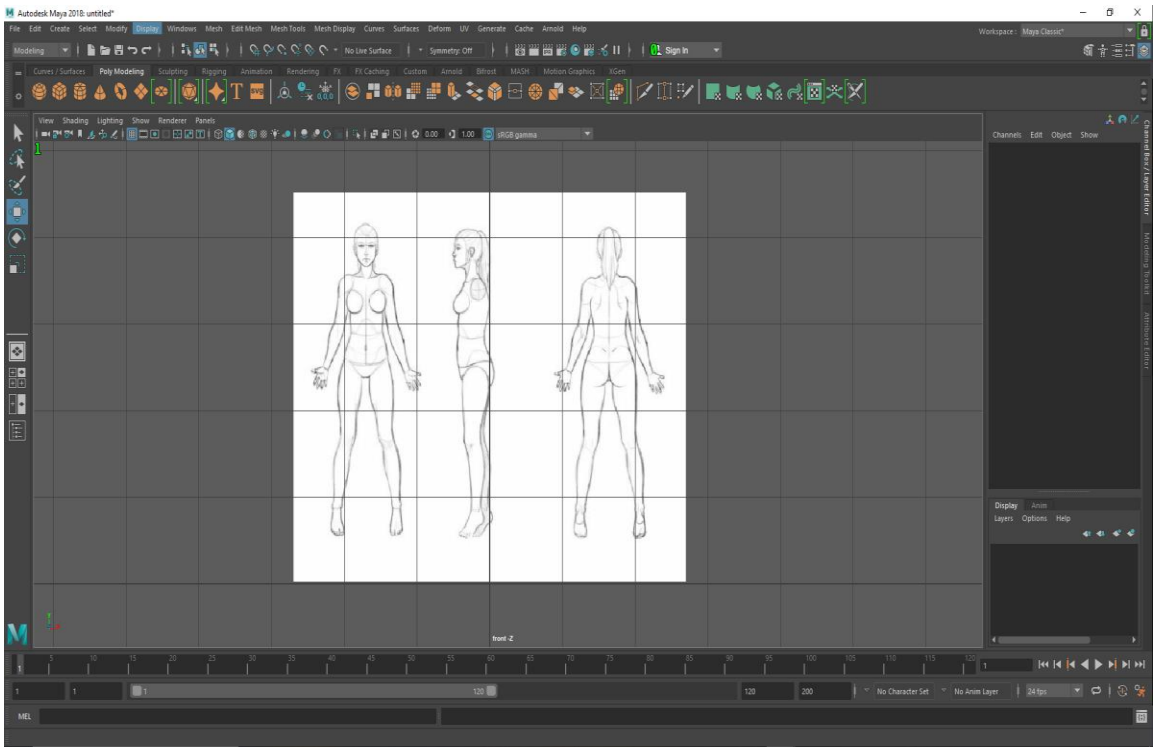

Figure 5.2.2.1.: Importing female turnaround sketch photo

Select View option on the top left corner of you viewport in Maya and select import image. Select the image you want. For I have to make a female character which will be animated. So I made a rough sketch with pencil and scan it. After that use move tool shortcut W to move the image plane above ground level in Maya. After that we can start modeling our character. I always like to work with the body “torso” first. Start with a box and increase polygon according to our need to outline sketch figure.

5.2.3. Modeling female mannequin torso

Figure 5.2.3.1.: Modeling female mannequin torso

In this project I had model a mannequin to simulate sari. So, to model this we need that reference turnaround image. Now we start with a box with low poly. Then we us to front, left and try to outline the image by moving box vertex.

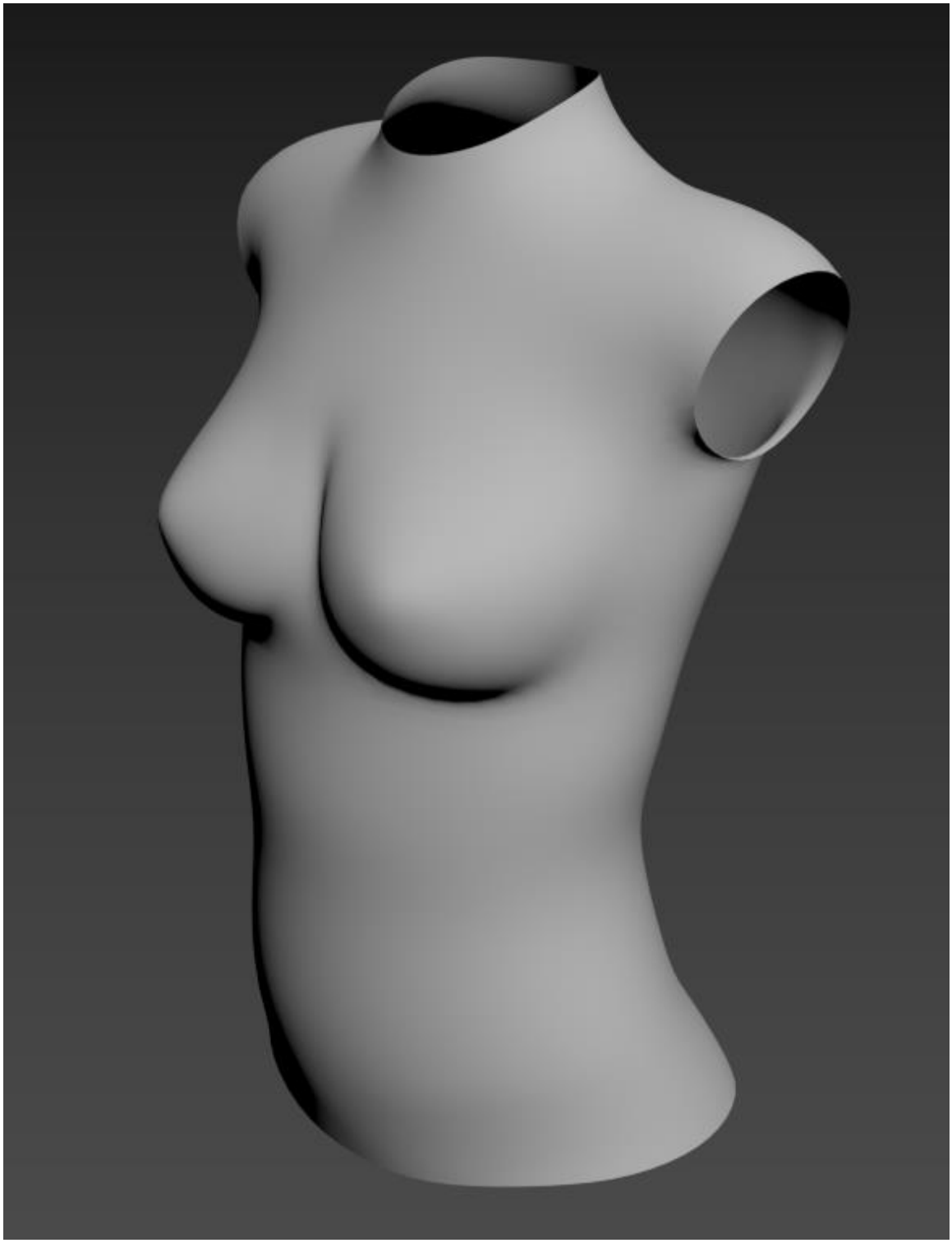

Figure 5.2.3.2.: Modeling female mannequin torso 2

5.2.4. Modeling female mannequin hands

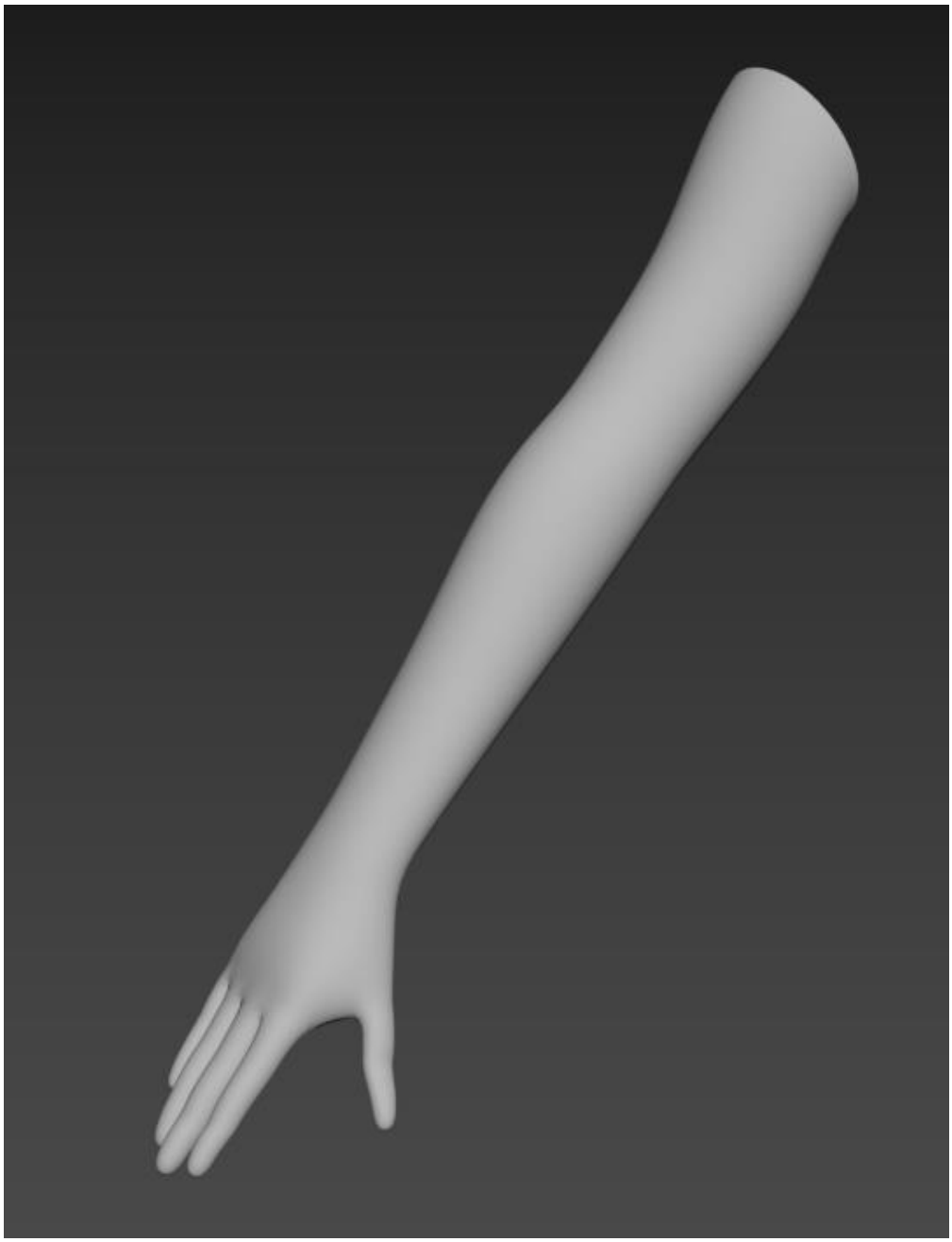

Figure 5.2.4.1. Modeling female mannequin hands

To make hand, we have to follow reference image and move vertex and edges to make it similar to reference. Once in a while, use subdivision smooth to check how it looks.

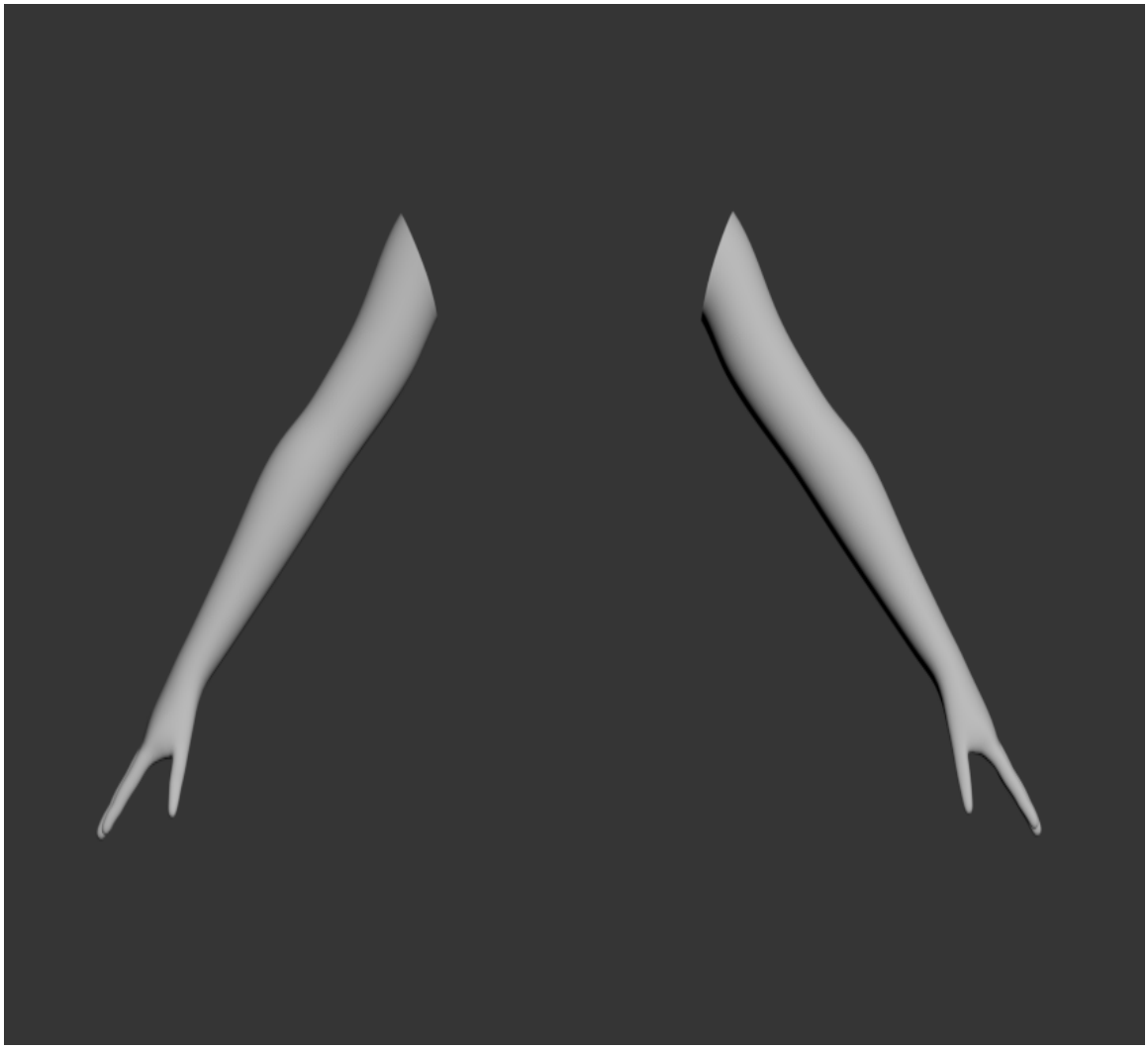

Figure 5.2.4.2.: Modeling female mannequin hands both side

When left hand is done all you have to do is mirror the object to make the other hand. Then move around and bridge them with body and check using smooth.

5.2.5. Modeling female mannequin head

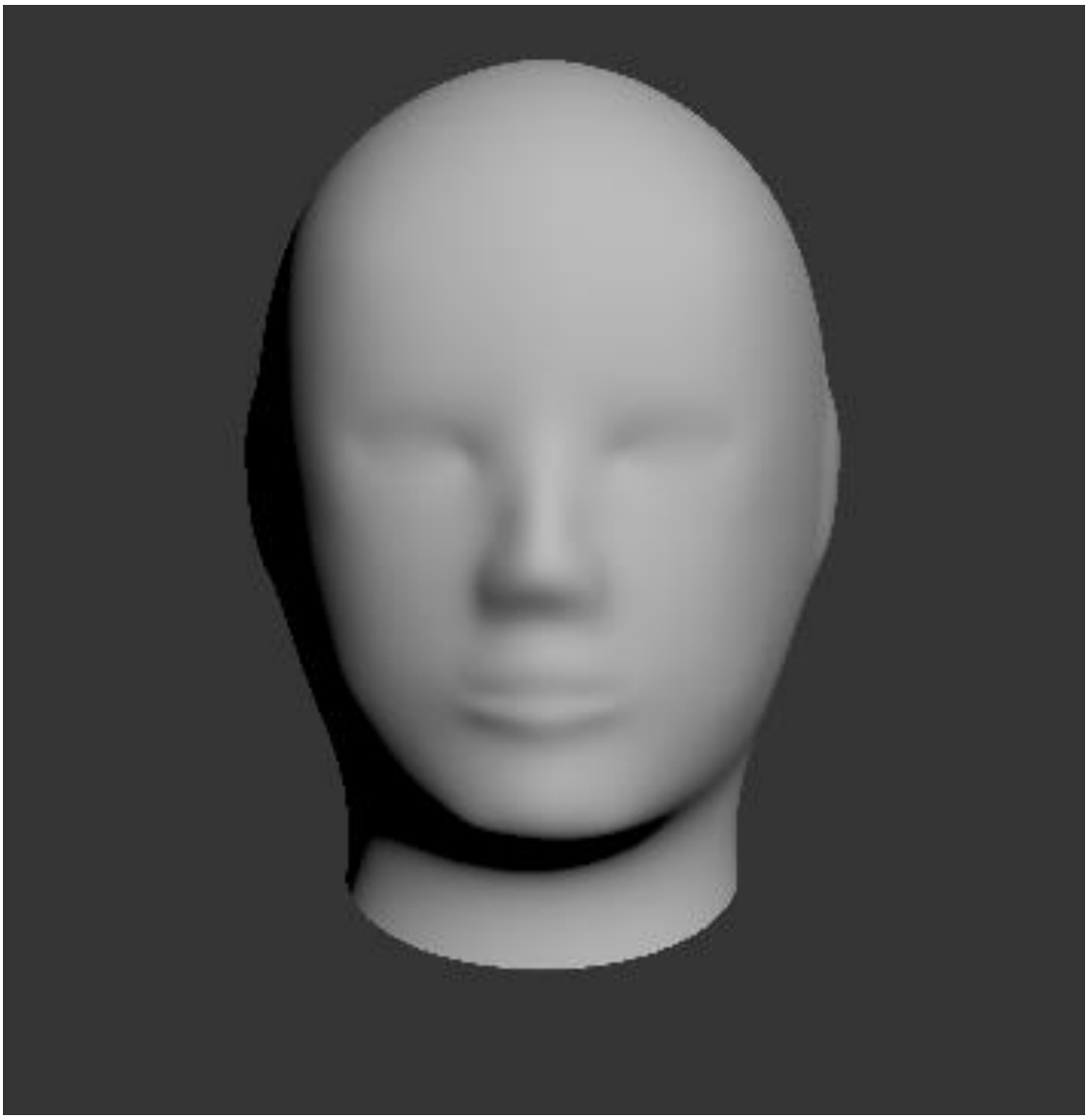

Figure 5.2.5.1.: Modeling female mannequin head

Looking at the reference and pay close attention to topology of head. We start with lowpoly box like 2x 2 and blocking out eye then nose mouth. We don’t have to make it close, we just have to make it look like mannequin head.

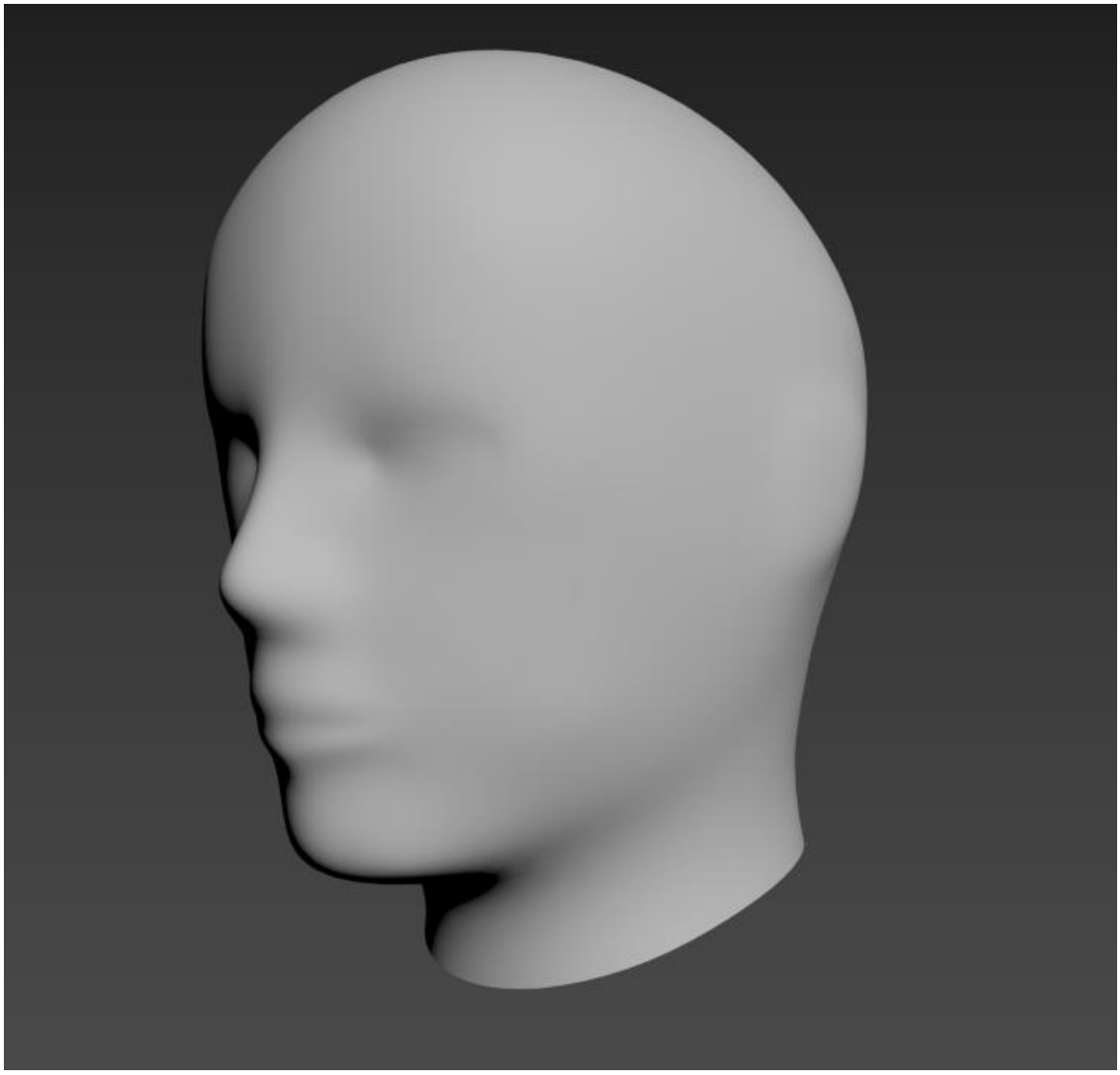

Figure 5.2.5.2.: Modeling female mannequin head -2

In this figure, we are looking at the side view of mannequin head. Once the head done, bridge with torso and apply smooth to observe how it looks. If it doesn't look good we have to edit vertex and edge to make it close to reference.

5.2.6. Modeling mannequin female legs

First, block out leg in reference image with low poly box. We will only work with one leg. When left leg is done will mirror it to make the other leg. Once mirror done we have to weld them together.

Figure 5.2.6.1.: Modeling mannequin female legs

After that apply smooth and check weather is there any missing weld that need to be done. If not adjust in low poly mode and try to get closer to reference image. To make the finger we have to extrude where we want our finger to be. After that we will just have to poly modeling to make it close as toe and fingers.

5.2.7. Finishing complete female mannequin body modeling

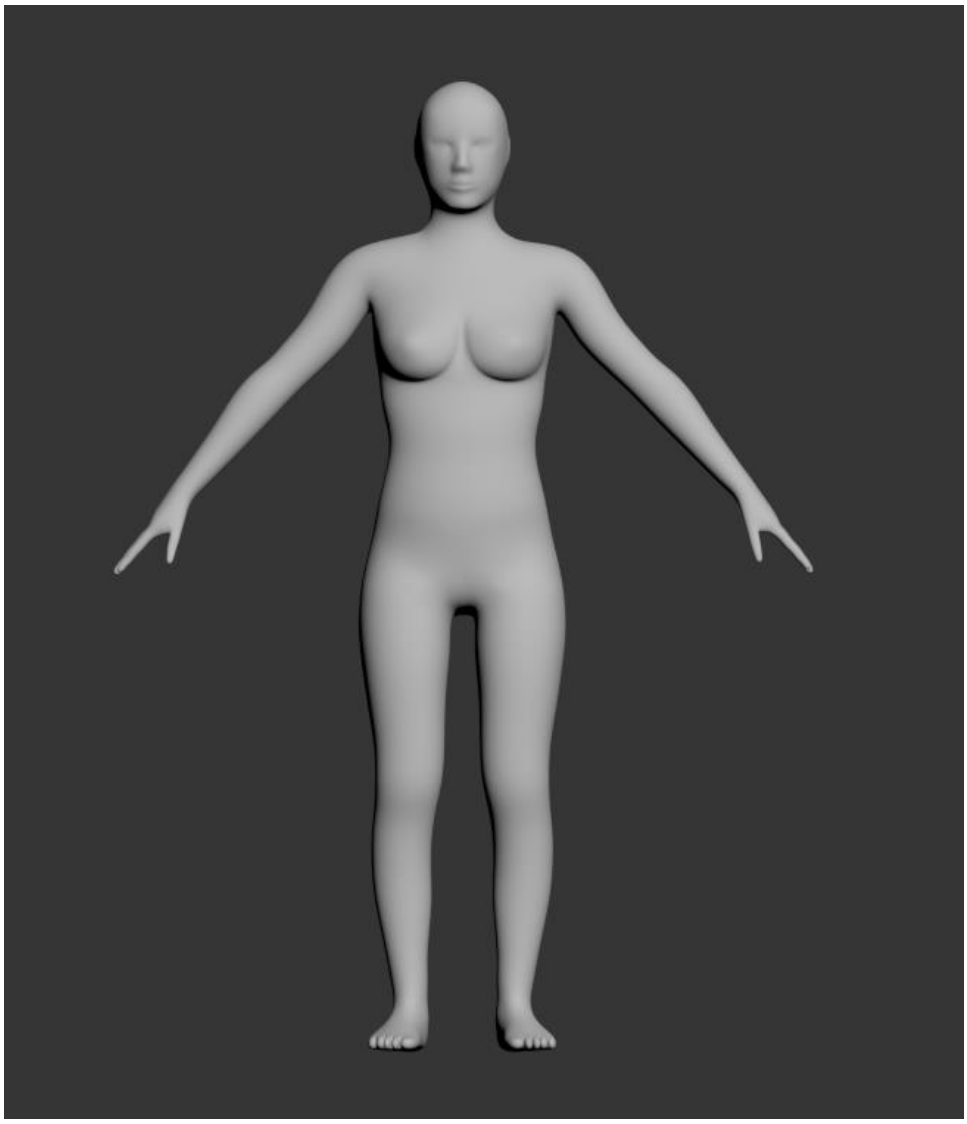

Figure 5.2.7.1.: Finishing complete female mannequin body modeling

After finishing all parts and combine them we get full body mannequin. Now do adjustment.

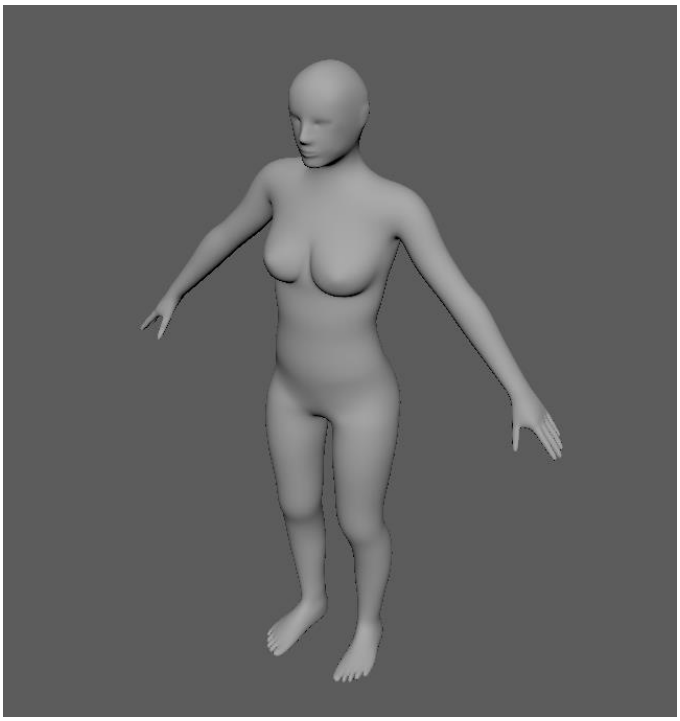

Figure 5.2.7.2.: Finishing complete female mannequin body modeling - 2

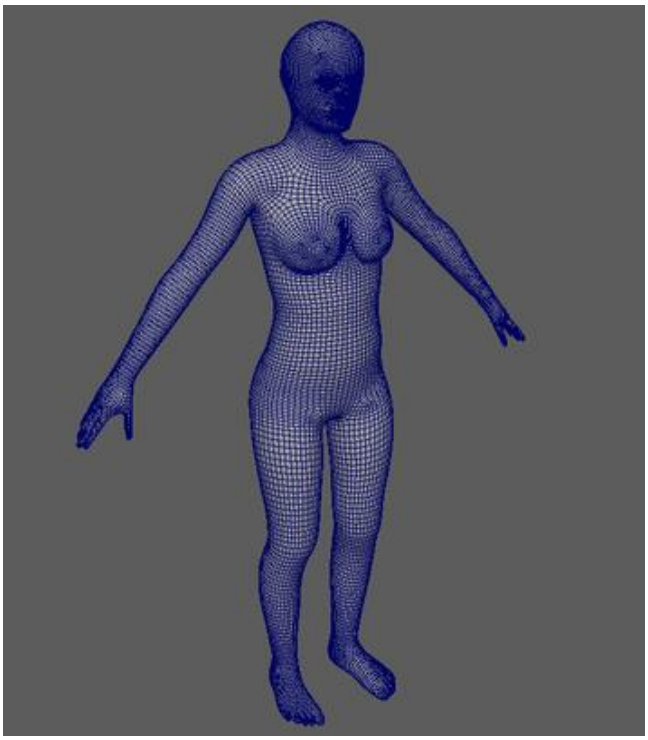

Figure 5.2.7.3.: Finishing complete female mannequin body modeling – 3

5.2.8. Rigging mannequin character

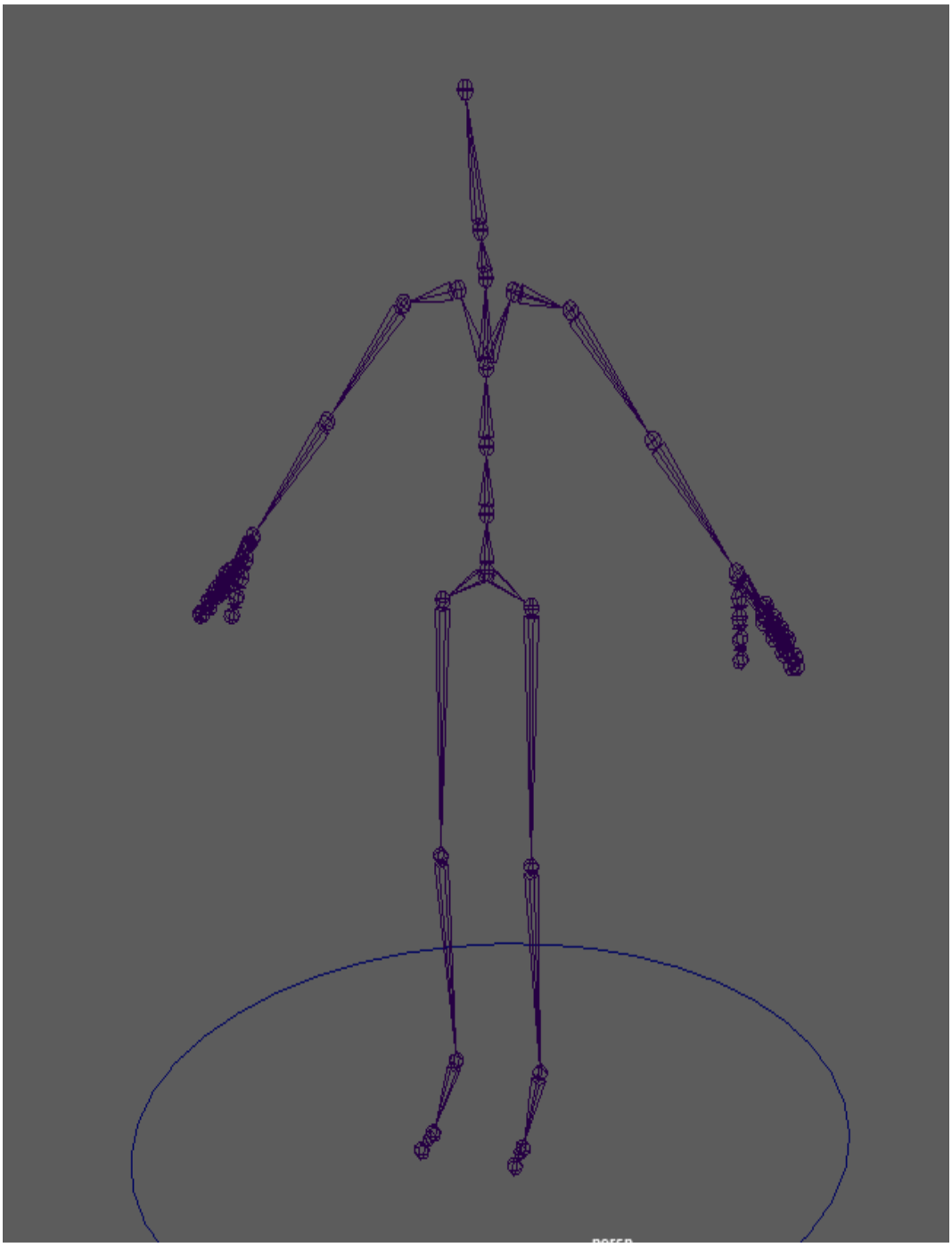

Figure 5.2.8.1.: Rigging mannequin character

Now we go in Rigging option and start setting bone and join model with bone. Once we done joining all bone. Also we add circle and connect them as our main control.

5.2.9. Making rigging controller

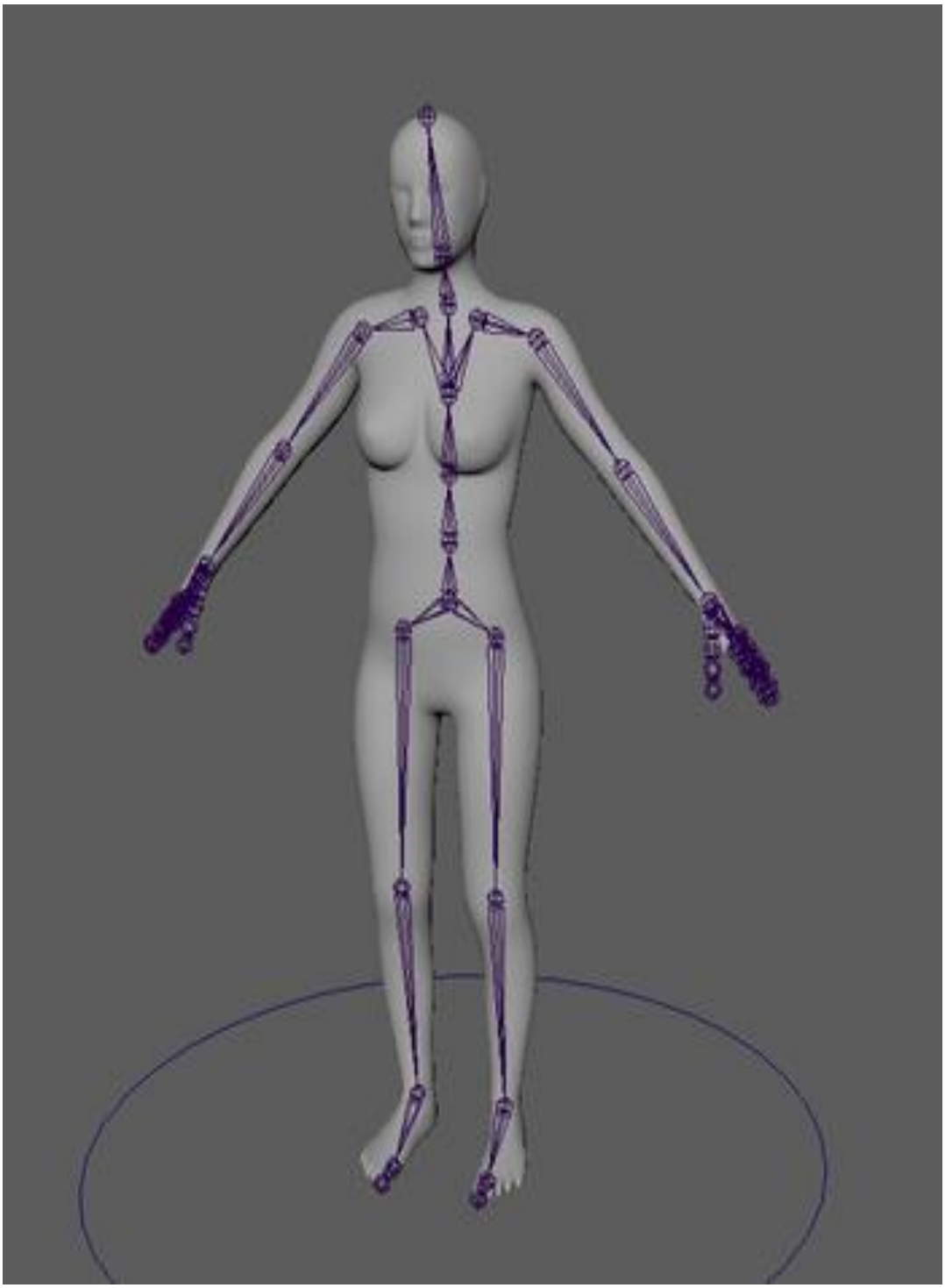

Figure 5.2.8.2.: Rigged mannequin character with controls

5.2.10. Animating rigged mannequin character

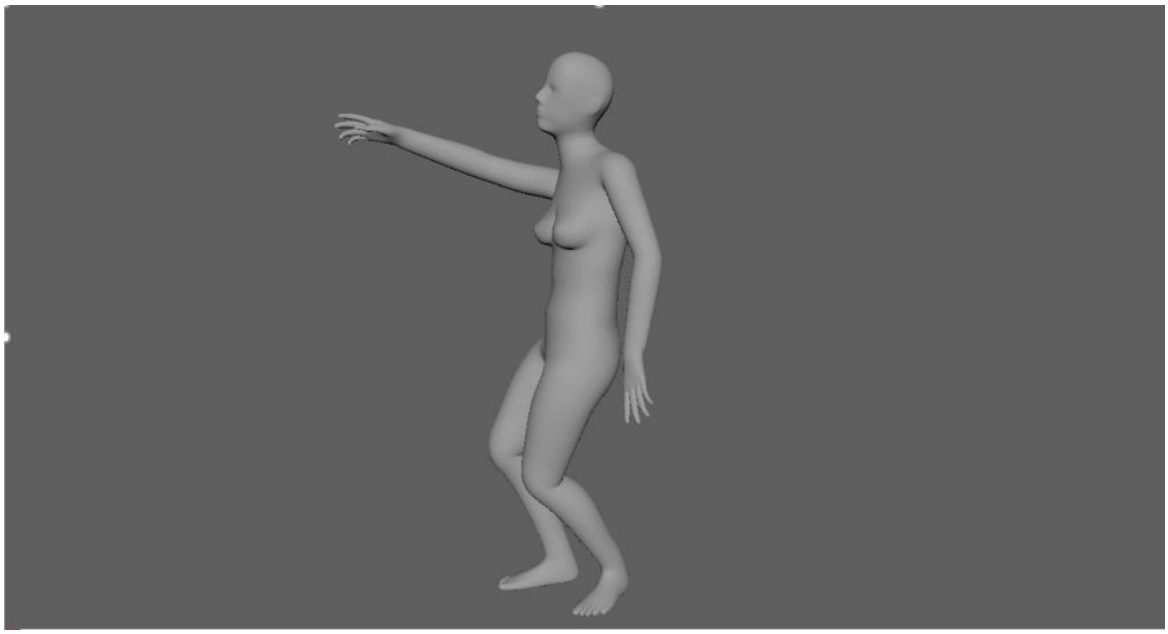

Figure 5.2.10.1.: Animating rigged mannequin character

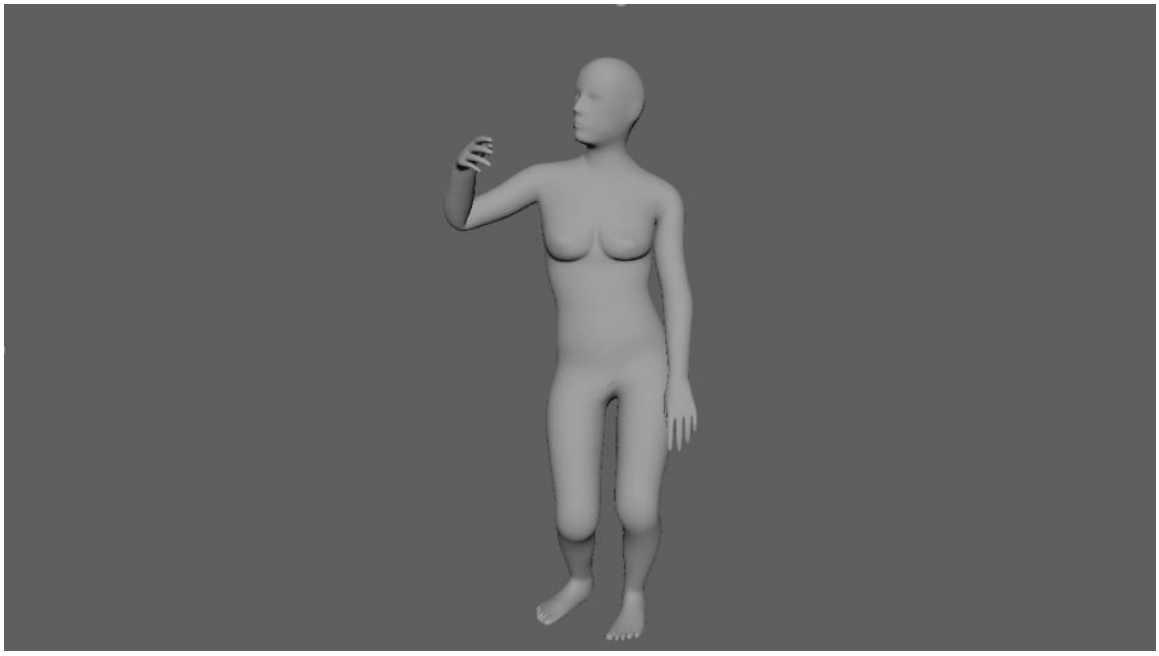

Figure 5.2.10.2.: Animating rigged mannequin character 2

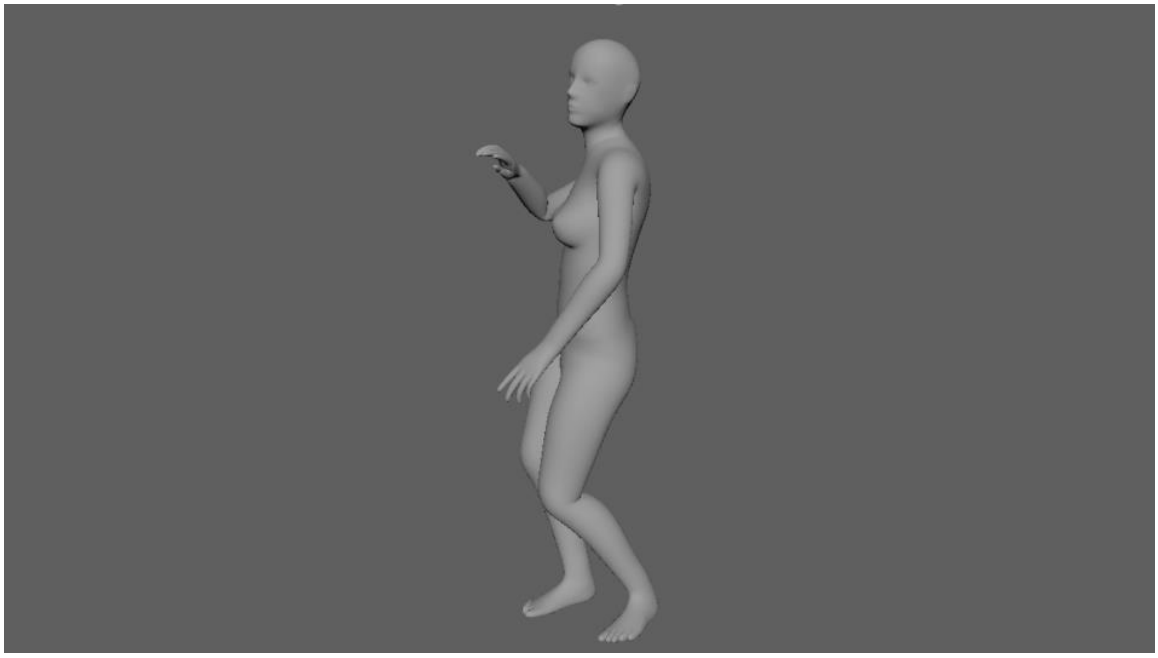

Figure 5.2.10.3.: Animating rigged mannequin character 3

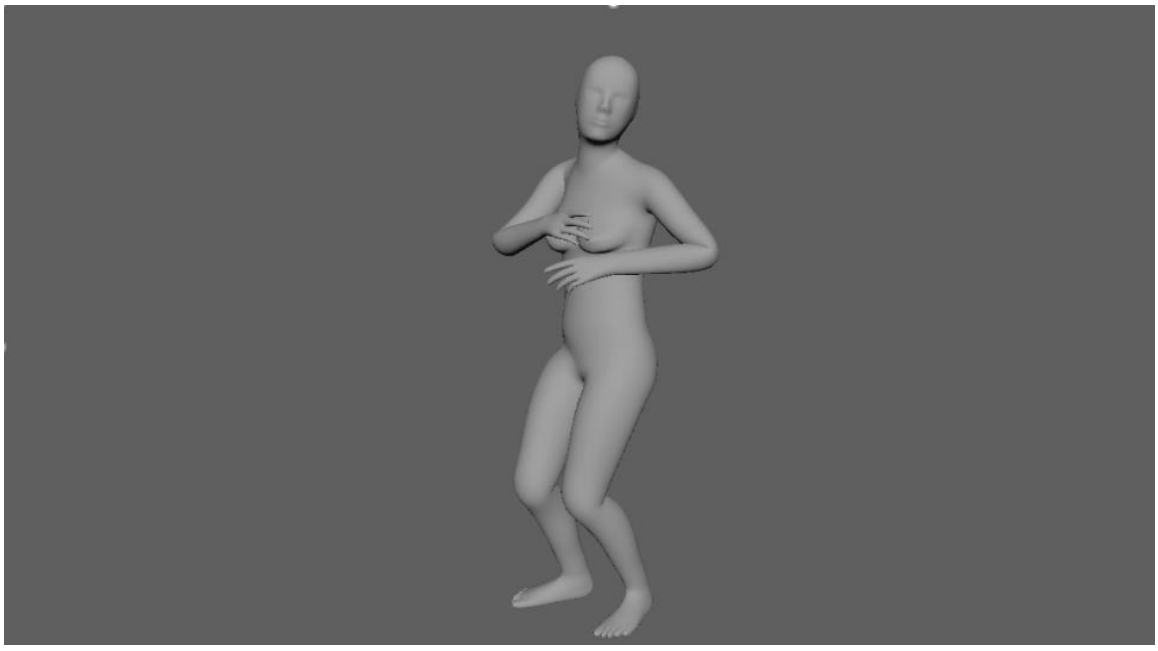

Figure 5.2.10.4.: Animating rigged mannequin character 4

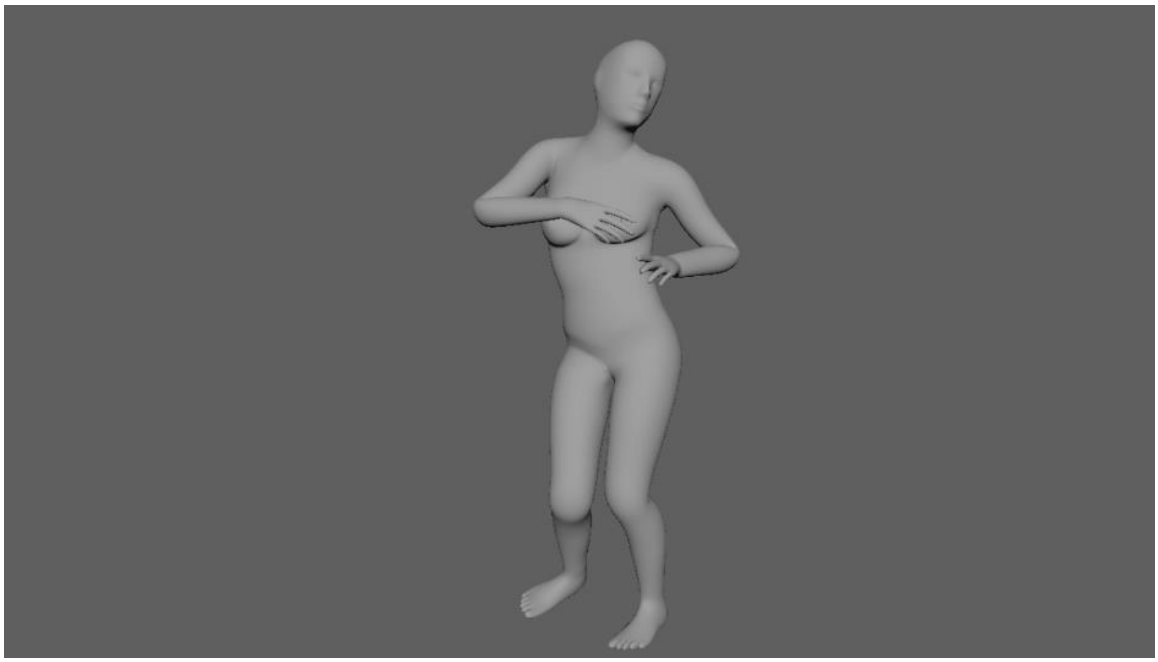

Figure 5.2.10.5.: Animating rigged mannequin character 5

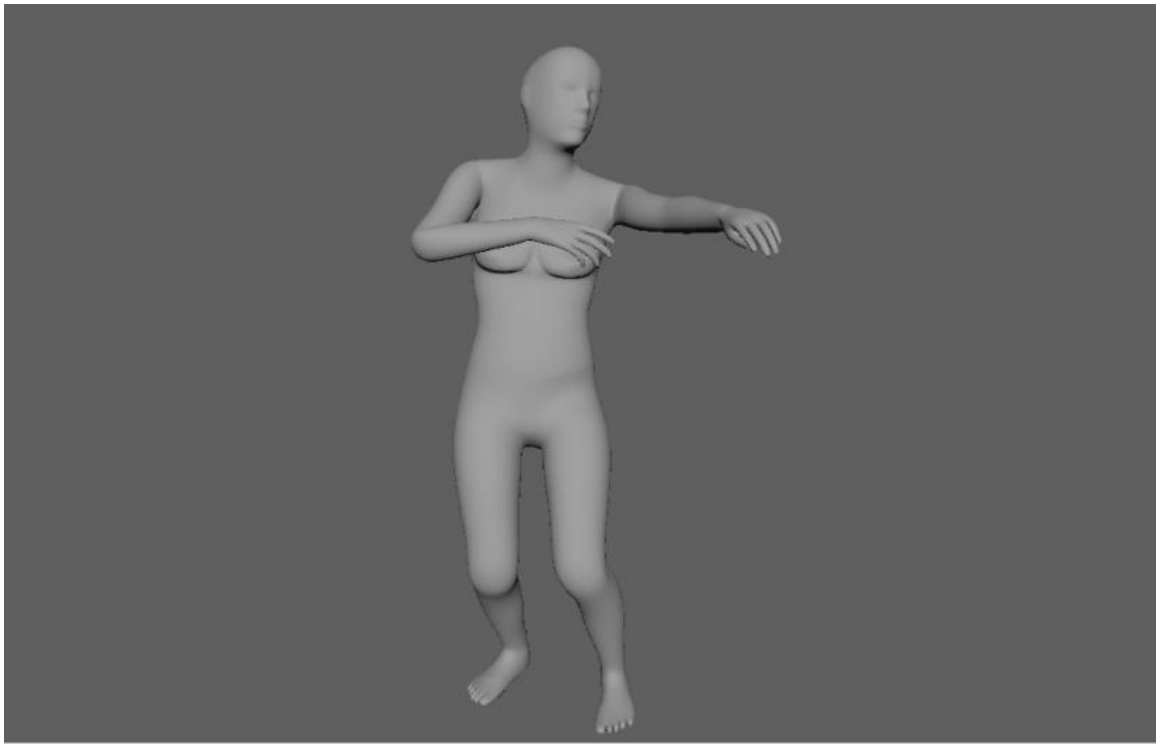

Figure 5.2.10.6.: Animating rigged mannequin character 6

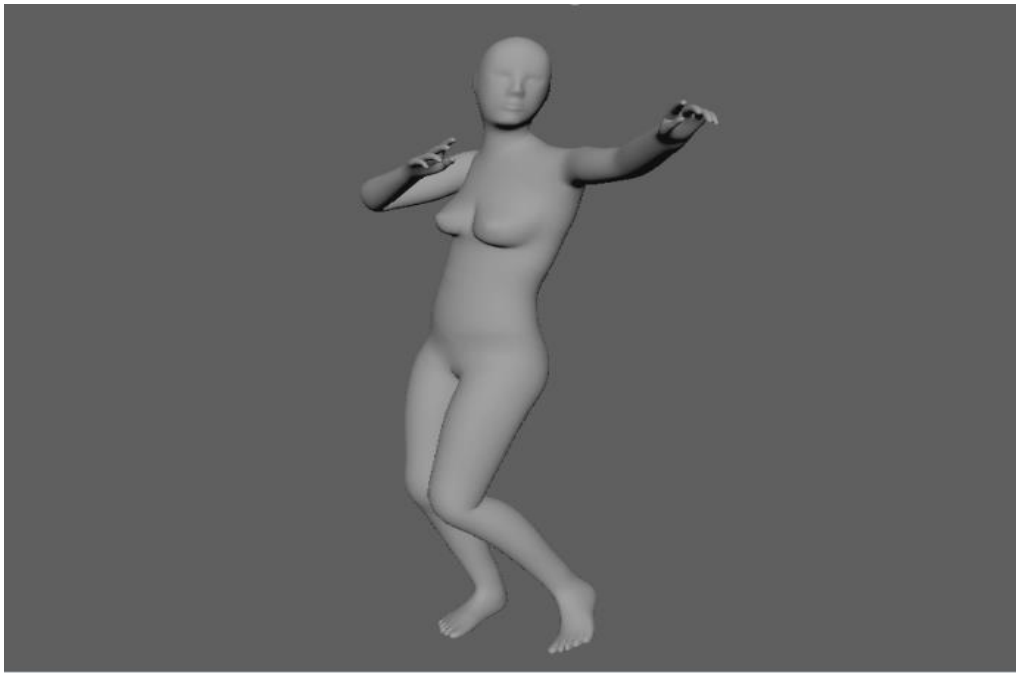

Figure 5.2.10.7.: Animating rigged mannequin character 7

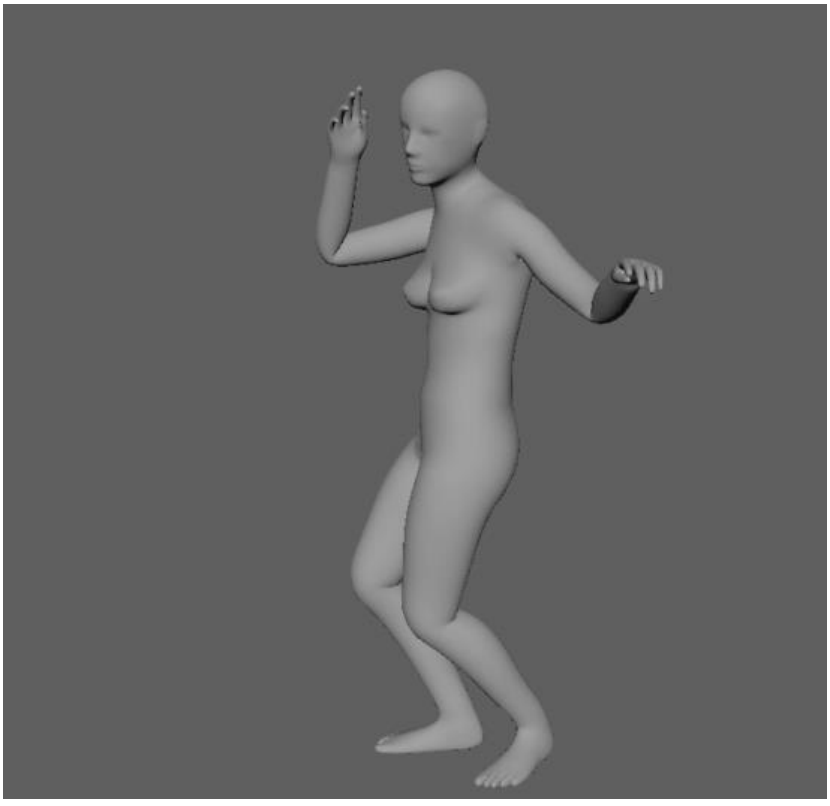

Figure 5.2.10.8.: Animating rigged mannequin character 8

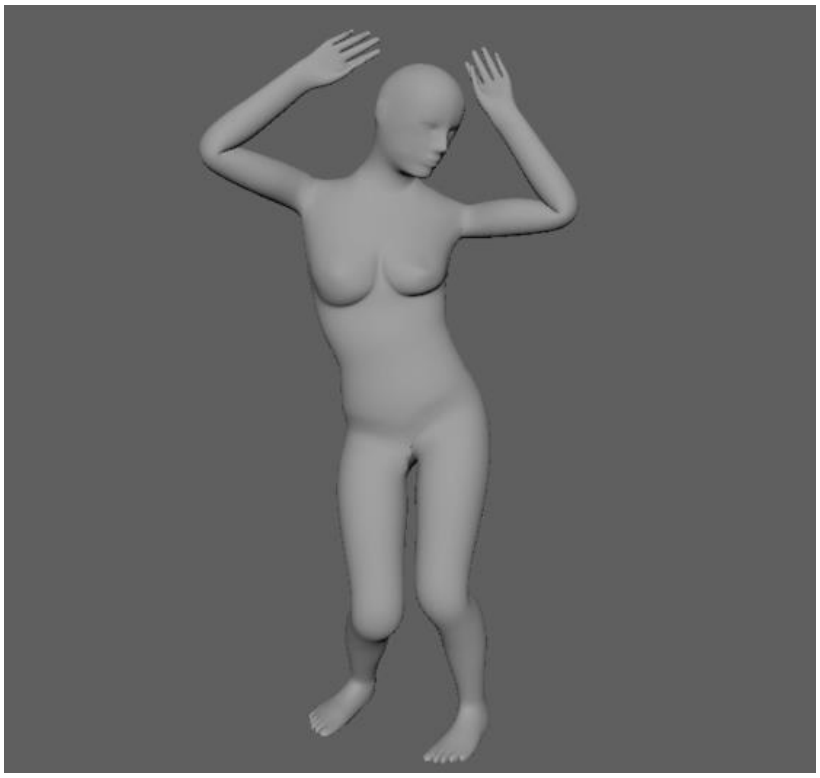

Figure 5.2.10.9.: Animating rigged mannequin character 9

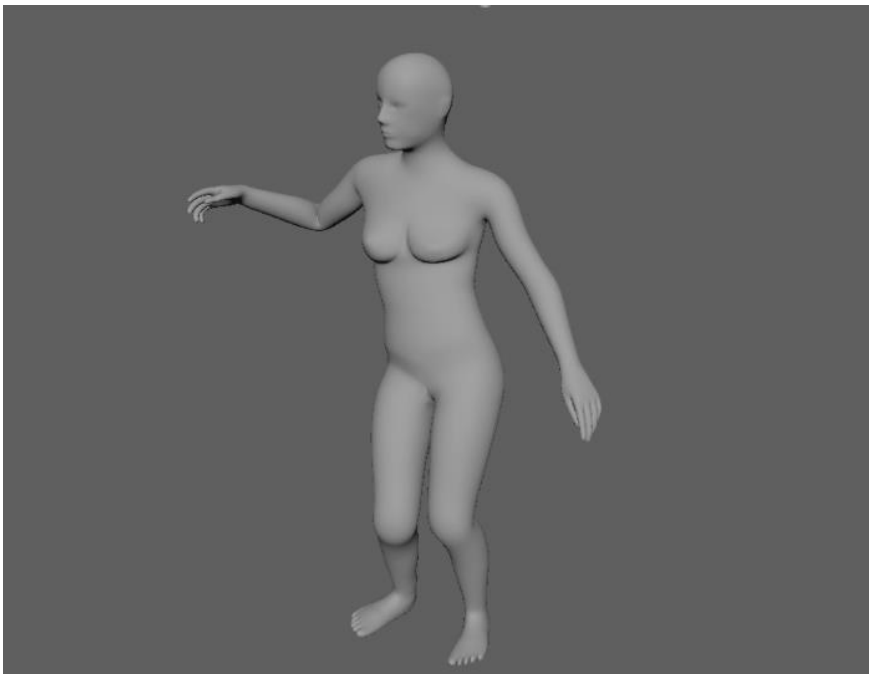

Figure 5.2.10.10.: Animating rigged mannequin character 10

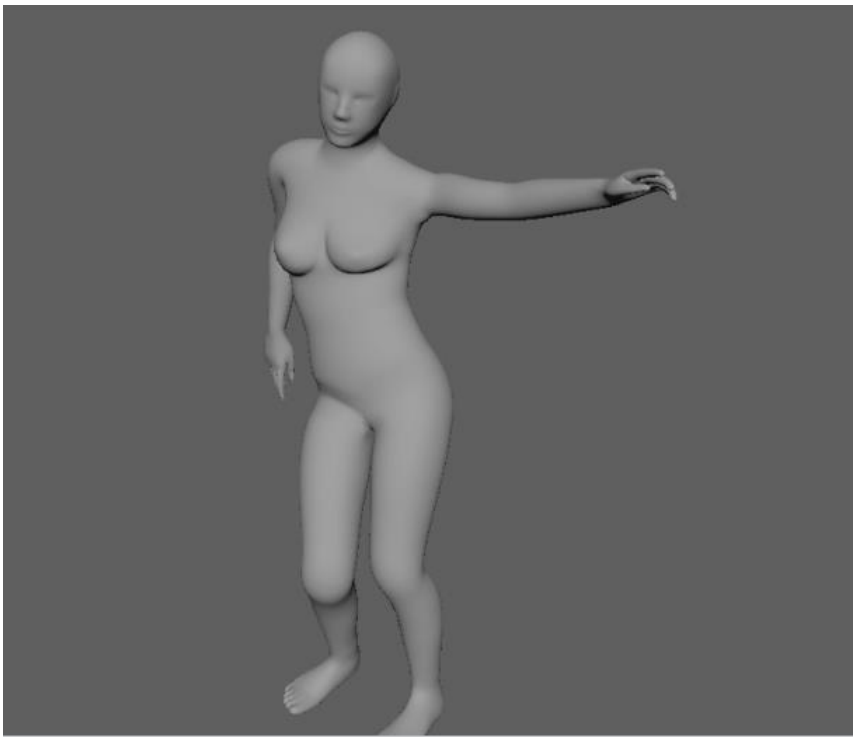

Figure 5.2.10.11.: Animating rigged mannequin character 11

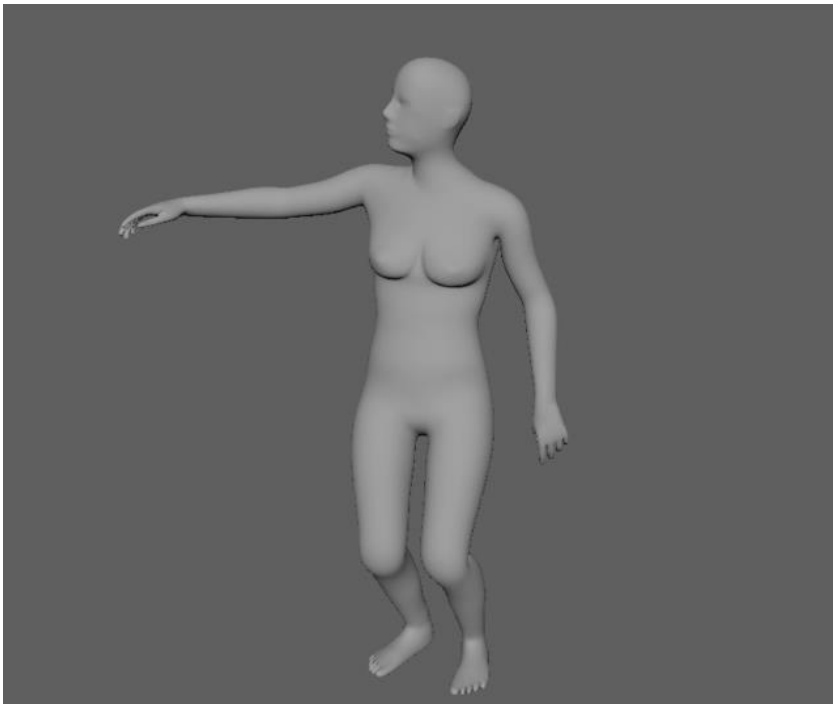

Figure 5.2.10.12.: Animating rigged mannequin character 12

5.2.11. Exporting animated character for Marvelous Designer

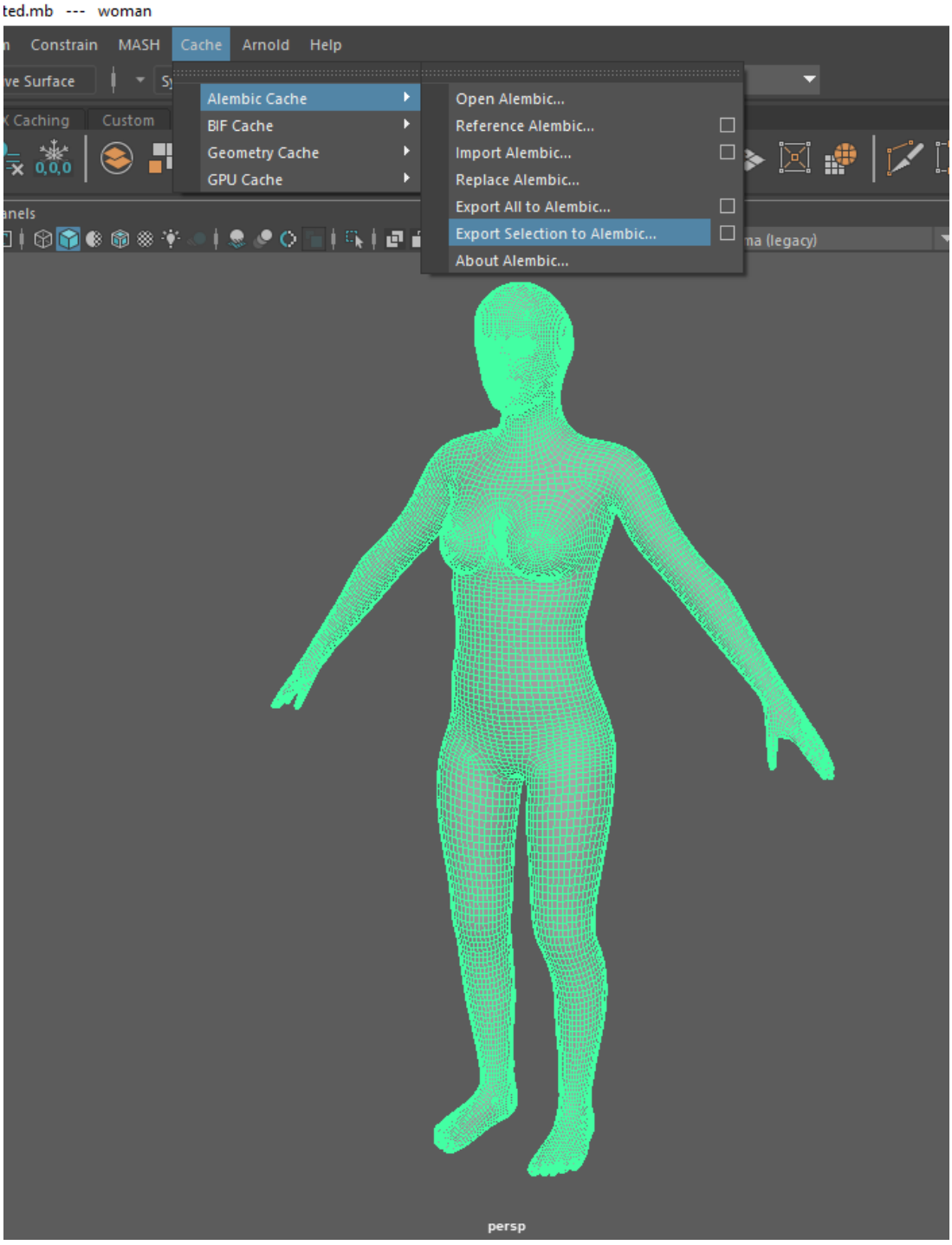

Figure 5.2.11.1.: Exporting animated character for Marvelous Designer

Now go to cache option on top middle of Maya window and select Alembic Cache. Inside Alembic cache select Export selection to Alembic. Now select the folder you want you alembic cache to save which you can import to Marvelous Designer.

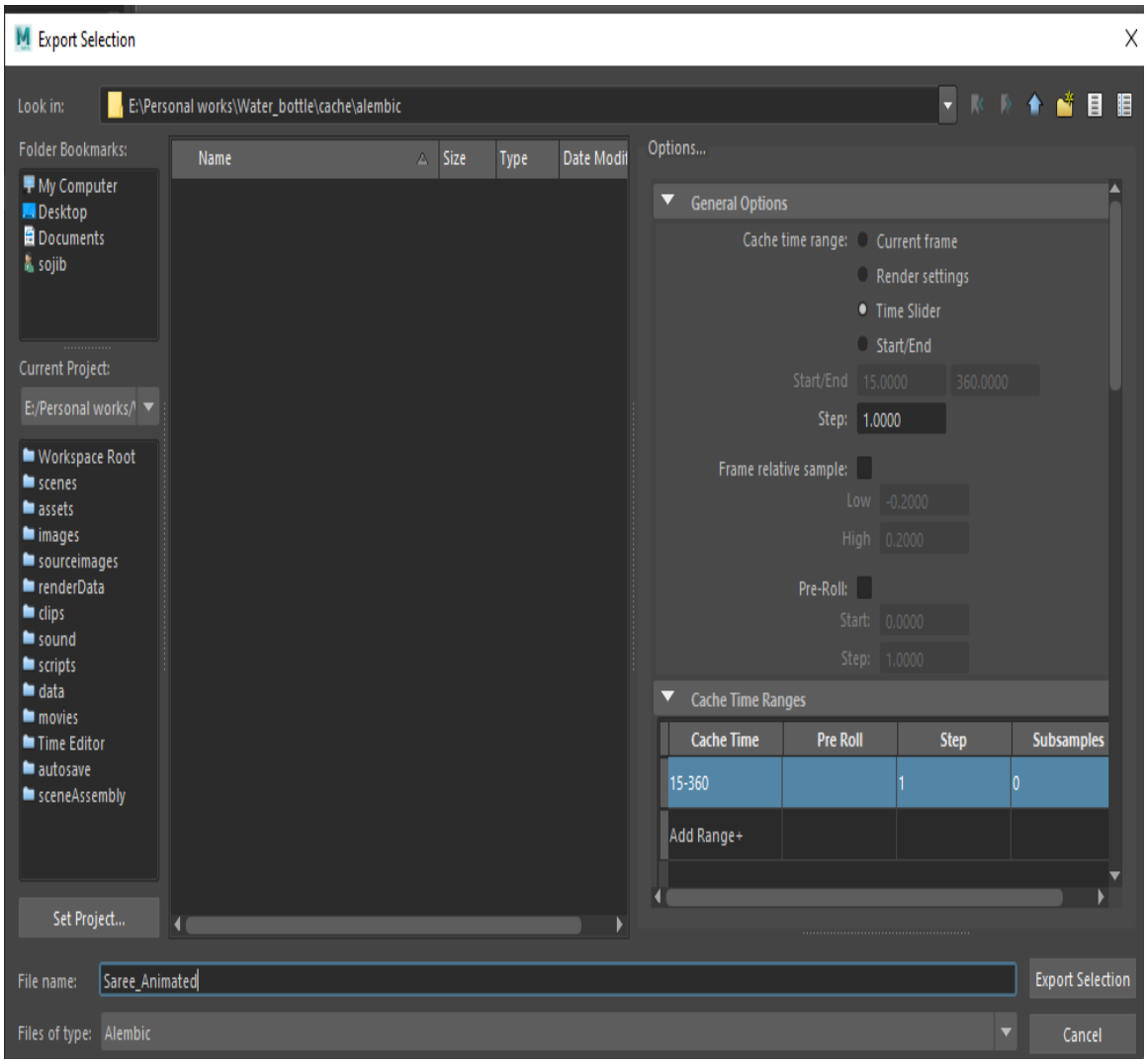

Figure 5.2.11.2.: Exporting animated character for Marvelous Designer 2

5.2.12. Importing character to Substance Painter for Texturing

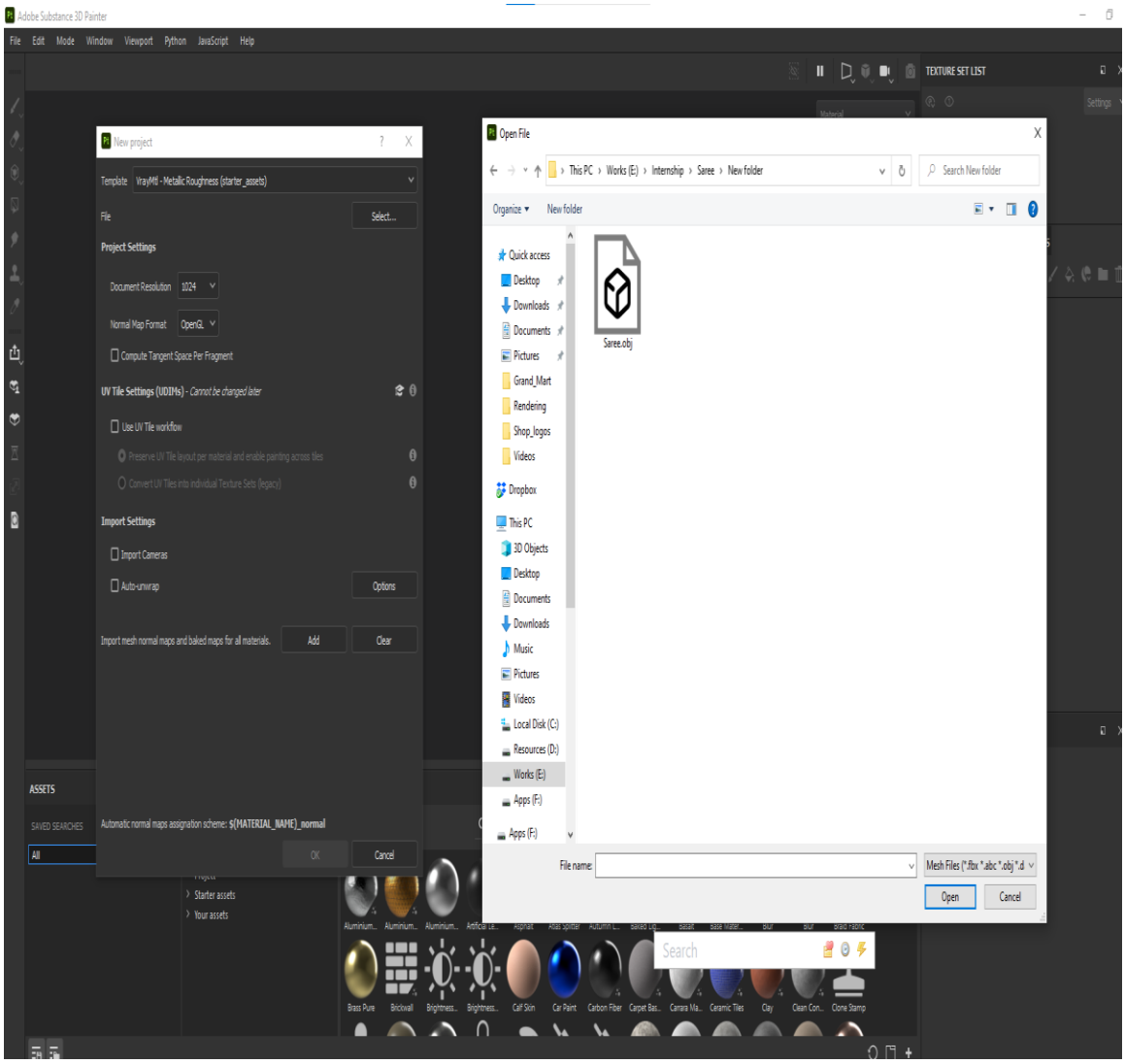

Figure 5.2.12.1.: Importing character to Substance Painter for Texturing

Once we open Substance painter, go to file and select new project. Now Select V Ray metallic roughness and from file select the obj file that we have. Then hit open. It will open your object in Substance painter.

5.2.13. Baking Mesh Map in Substance Painter

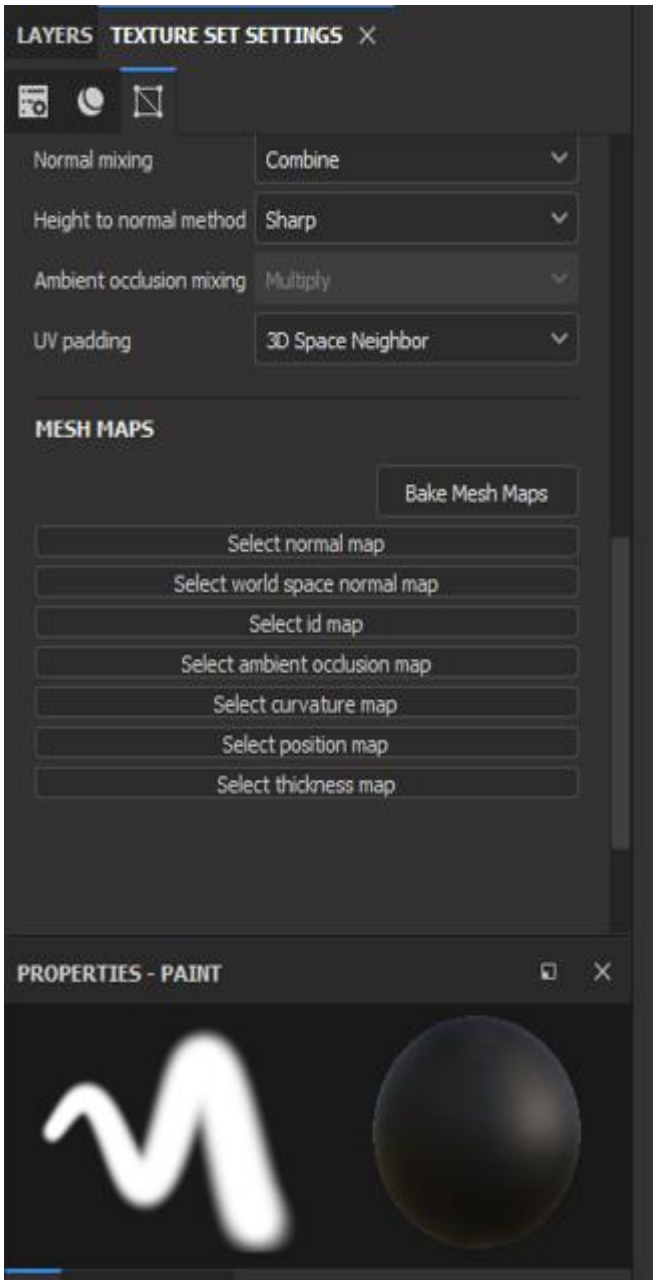

Figure 5.2.13.1.: Baking Mesh Map in Substance Painter

Now go the TEXTURE SET SETTINGS and scroll down. Keep everything same when you come across MESH MAPS select Bake Mesh Map. It will bake all you map and now you can start applying texture on your object.

5.2.14. Changing HDRI environment in Substance Painter

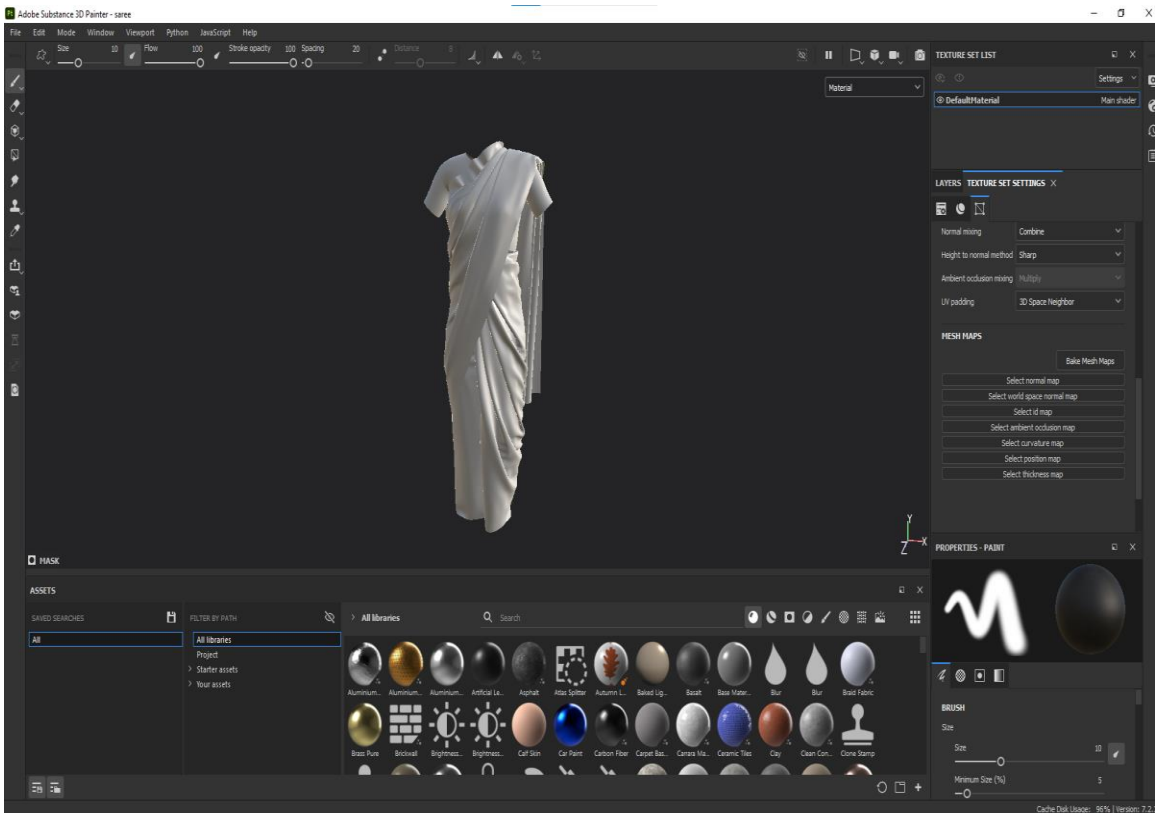

Figure 5.2.14.1.: Changing HDRI environment in Substance Painter

Before starting to texture, change HDRI environment use a HDRI that has neutral studio light setup. Otherwise object will absorb other color from HDRI which will ok in Substance Painter but if we export texture where we don't have that HDRI but texture will still contain color value that we changed because of those absorbed light from that HDRI in substance painter. So to prevent that we will have to use HDRI maps that dose have only white lighting in that environment.

5.2.15. Making fill layer and applying base color

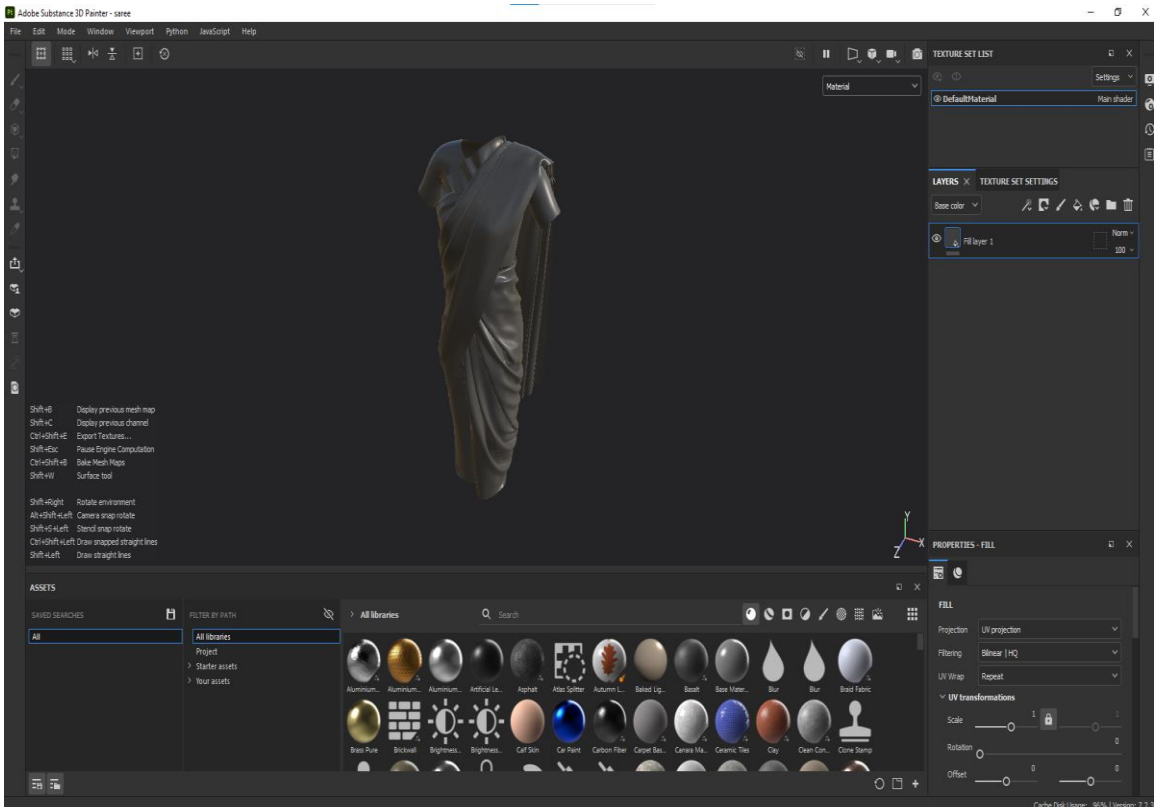

Figure 5.2.15.1.: Making fill layer and applying base colors

After baking mesh map, go to LAYERS located on the left side. Now right click on the layer tab and add a fill layer and give the color you want you base color to be. Now adjust the fill layer properties to get the result you want.

5.2.16. Making pattern in Adobe Illustrator and using Alpha Map

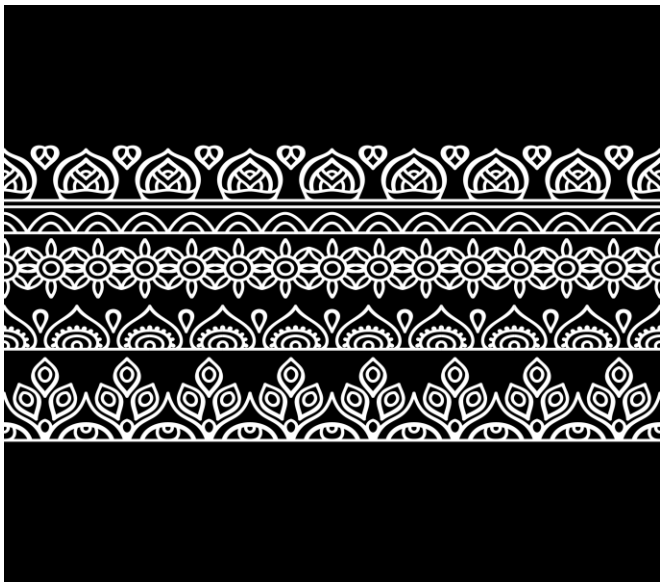

Figure 5.2.16.1.: Making pattern in Adobe Illustrator and using Alpha Map

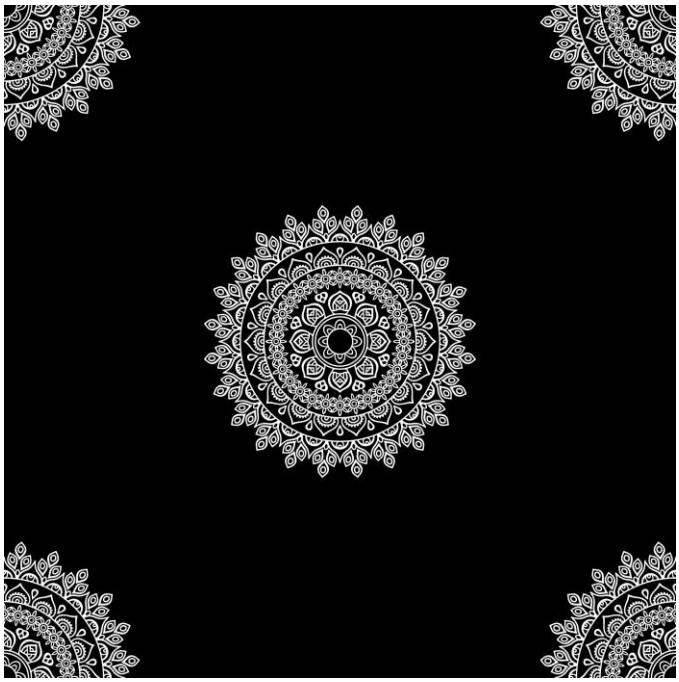

Figure 5.2.16.2.: Making pattern in Adobe Illustrator and using Alpha Map 2

Now we use the pattern we created in Adobe illustrator as the pattern in your sari. To do that we import this pattern in our resource for this project.

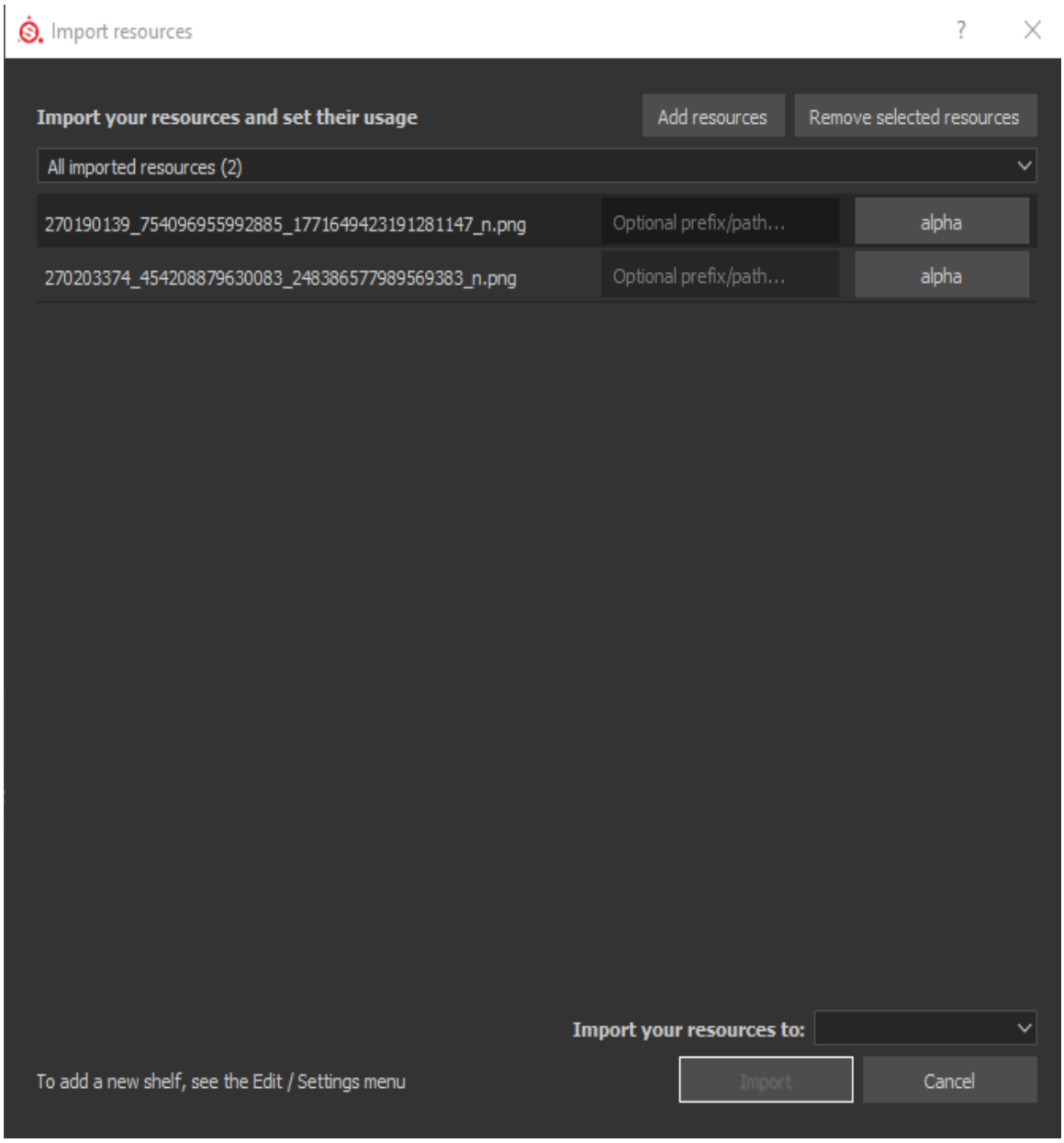

Figure 5.2.16.3.: Making pattern in Adobe Illustrator and using Alpha Map 3

Go to file and select import resource and that will open import resource tab. Now select add resource and select your image then open. Now you will see them as undefined. Now From undefined select alpha shown in above picture. After that select import your project to “project” and then click import.

5.2.17. Finishing Texture in Substance Painter

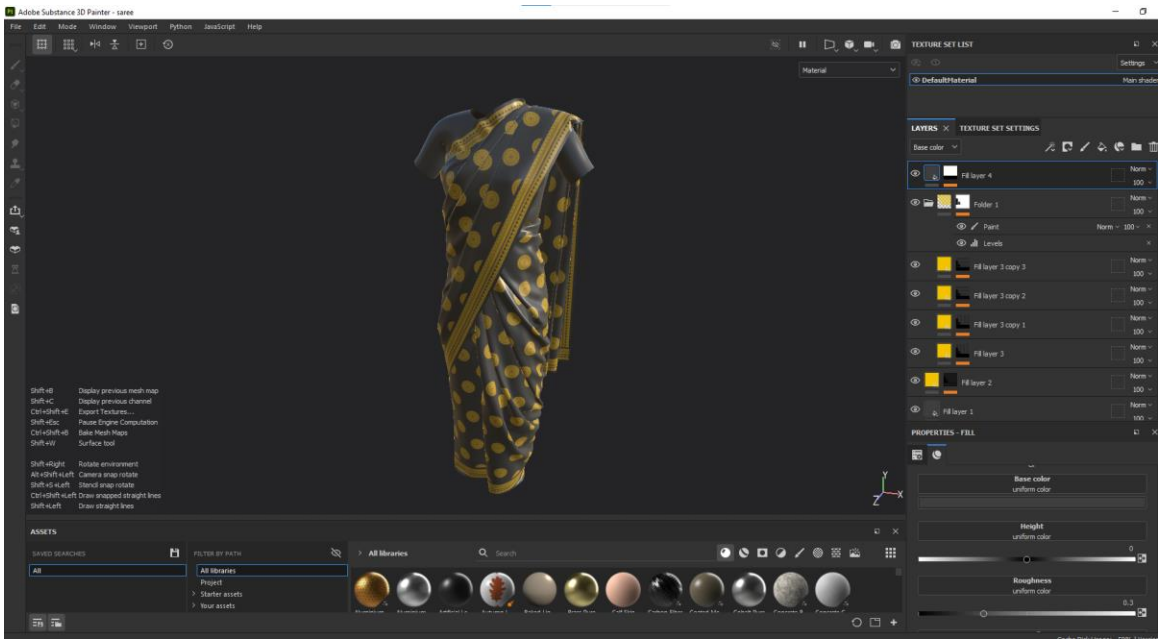

Figure 5.2.17.1.: Finishing Texture in Substance Painter 1

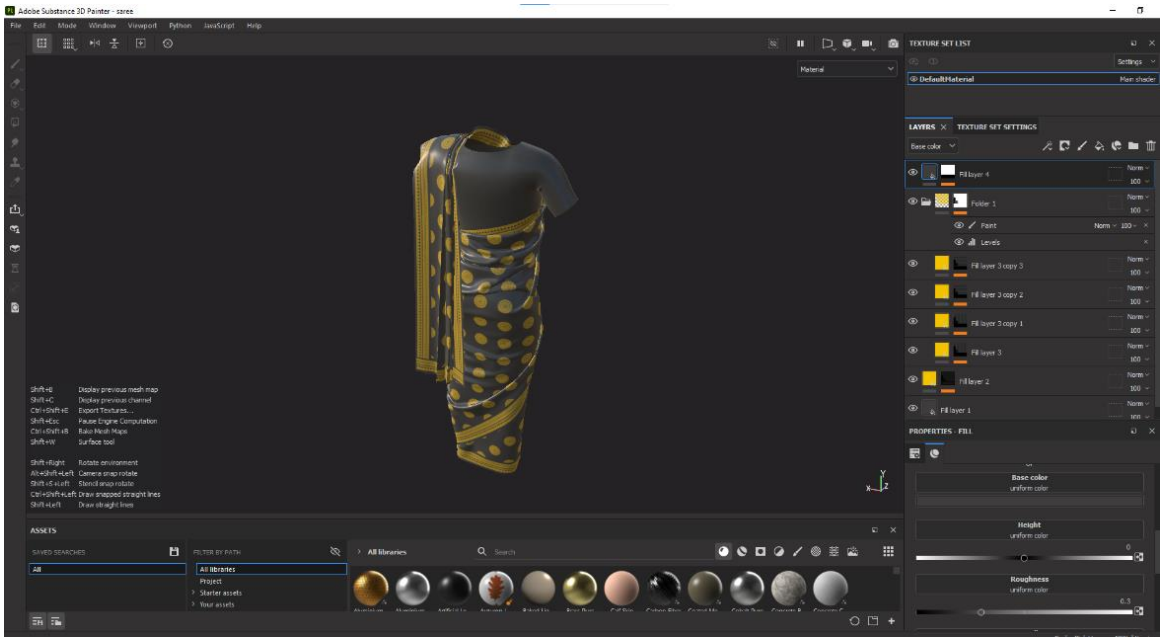

Figure 5.2.17.2.: Finishing Texture in Substance Painter 2

5.2.18. Exporting texture from Substance Painter

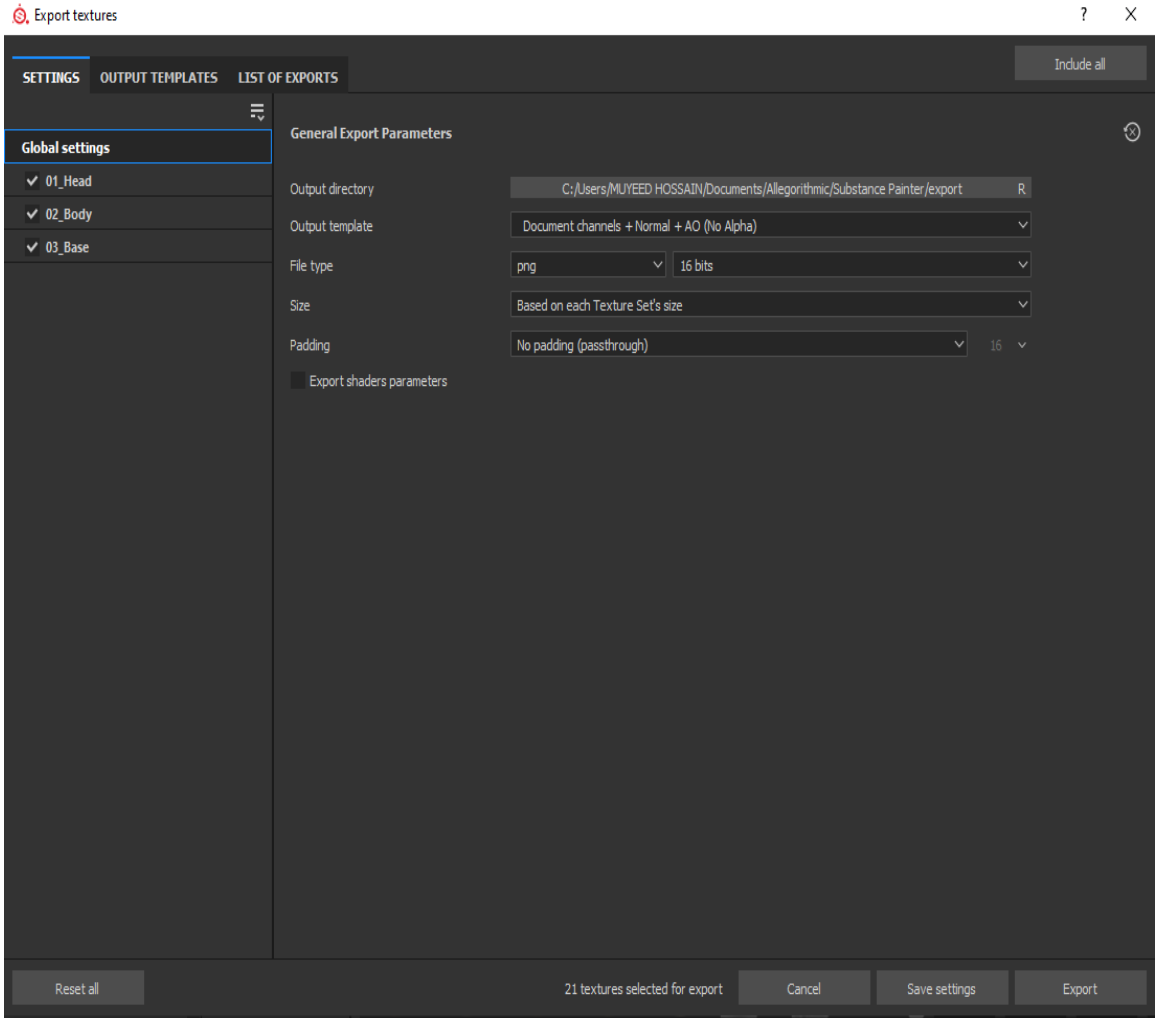

Figure 5.2.18.1.: Exporting texture from Substance Painter

After finish every details, go to file and select export texture. Now select the file type as PNG and select the folder where you want your texture to export to by output directory. Now go to output templates and select output map you want for me its base color, height, Normal, roughness.

5.2.19. Importing and applying texture in 3ds Max

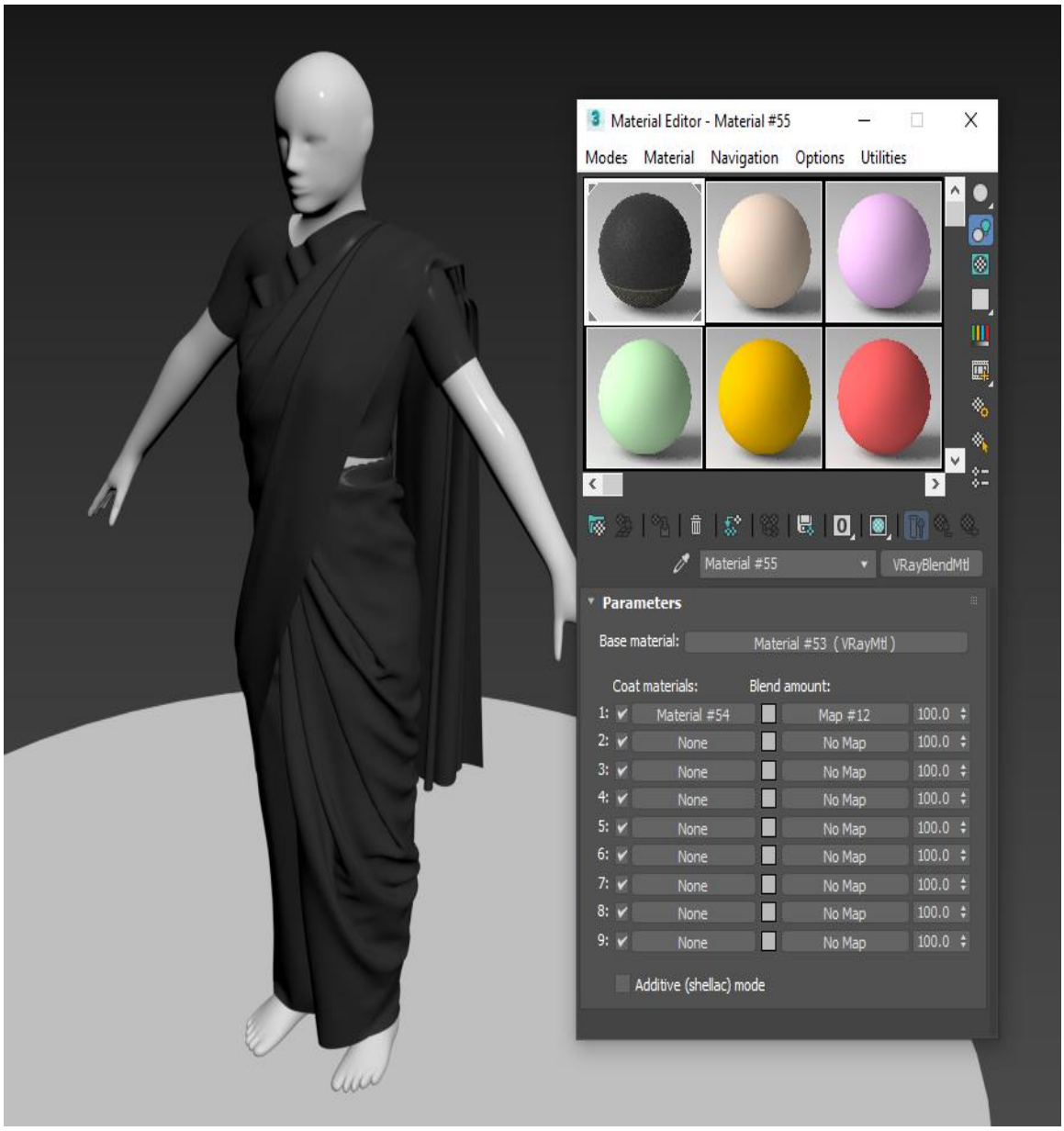

Figure 5.2.19. Importing and applying texture in 3ds Max

After exporting texture from substance painter, now it's time to import those texture in 3ds Max. Go to material editor and select VRayBlendMtl. Use all the map add it on the material.

5.2.20. Using V Ray Light for studio light setup

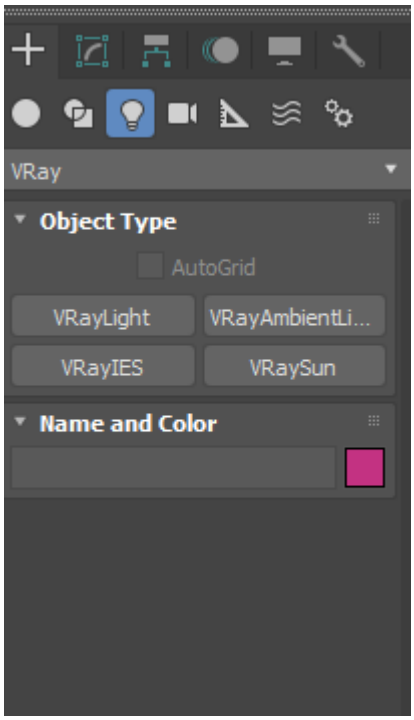

Figure 5.2.20.1.: Using V Ray Light for studio light setup

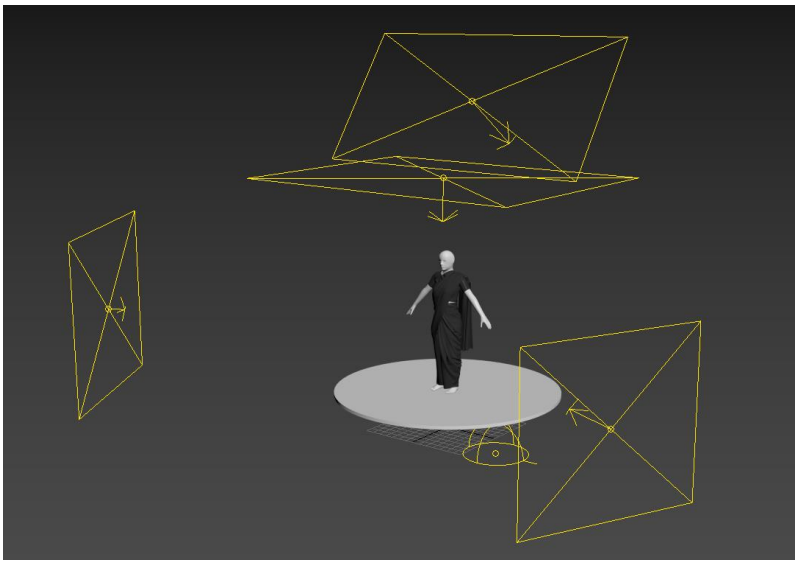

Figure 5.2.20.2.: Using V Ray Light for studio light setup 2

After Texturing, now we move to lighting. Now go to light tab and select VRay from dropdown menu. Click on the VRayLight and click and drag where you want your light. We added few plane light as main light and few as fill light.

5.2.21. Using V Ray Light Lister to control light in scene

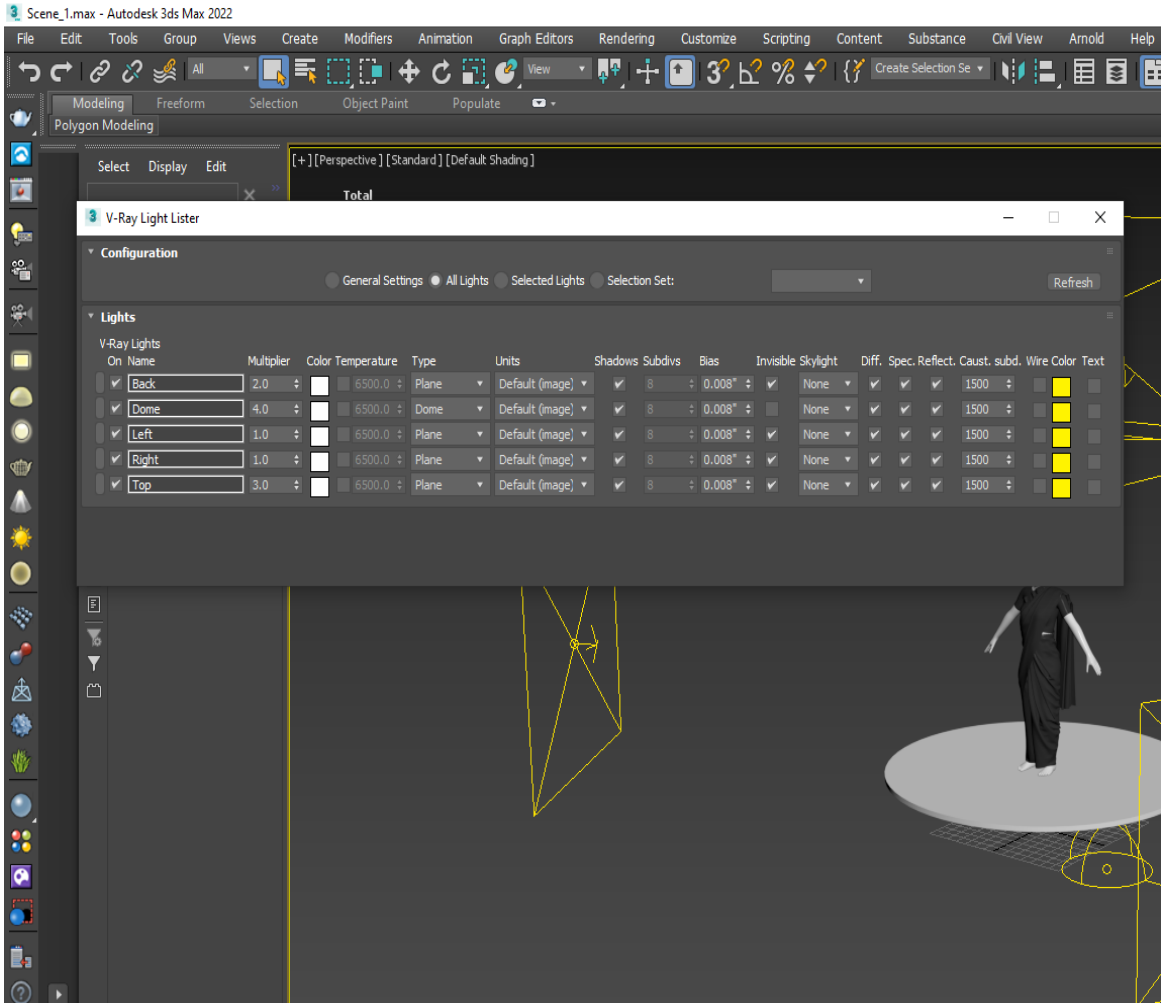

Figure 5.2.21. Using V Ray Light Lister to control light in scene

Now we will use VRay Light Lister to control all the light in our scene. It's very hard to select and edit parameter of all light 1 by 1. So, light lister bring all the light in scene into one list and we can edit and control light more efficiently. We always have to remember that main light will always have higher multiplier and fill light will always have low multiplier value because fill light is just there to remove any blind dark shadow spots.

5.2.22. Using V Ray Renderer

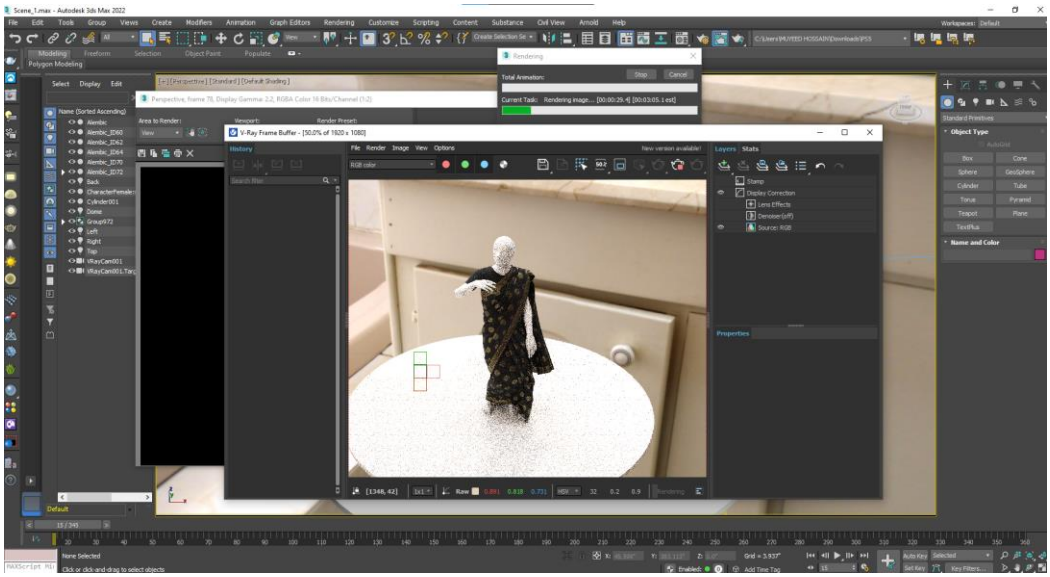

Figure 5.2.22.1.: Using V Ray Renderer

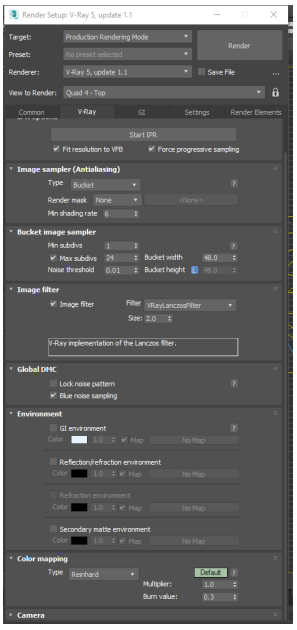

Figure 5.2.22.2.: Using V Ray Renderer 2

Now we render our animation. For that we go to render settings and select VRay as our renderer. Then select the frame range and resolution of the video. Also change the render from progressive to bucket for more efficiency.

5.2.23. Rendering animation in EXR format for post-production

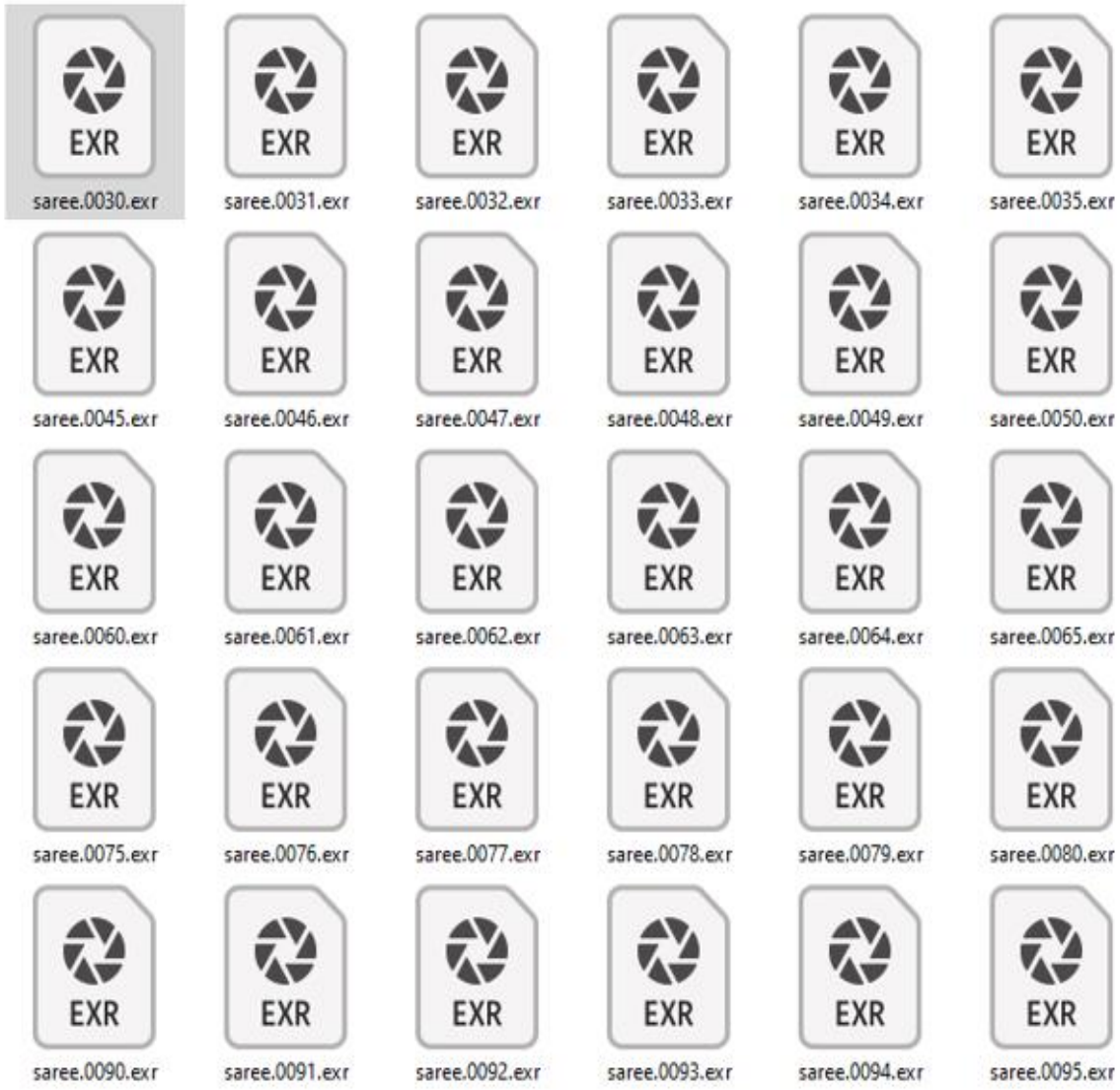

Figure 5.2.23.1.: Rendering animation in EXR format for post-production

All the rendered frame will be in EXR format for more details and quality animation. Also using EXR help you for post-production. EXR files are raster image files that use the OpenEXR format to hold images. Industrial Light & Magic created this dynamic-range image format, which enables a variety of visualizations, including multi-layer images.

5.2.24. Opening After Effect making New project

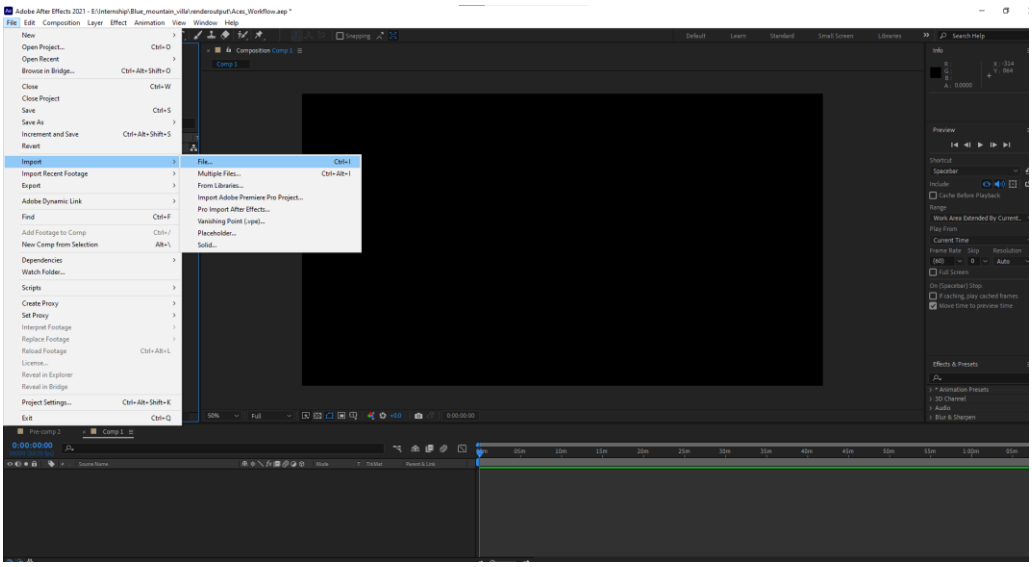

Figure 5.2.24.1.: Opening After Effect making new project

Now we use after effect to composite all frame into animation. For that we open after effect and go to file and create a new project and save .aep file.

5.2.25. Importing multiple EXR file

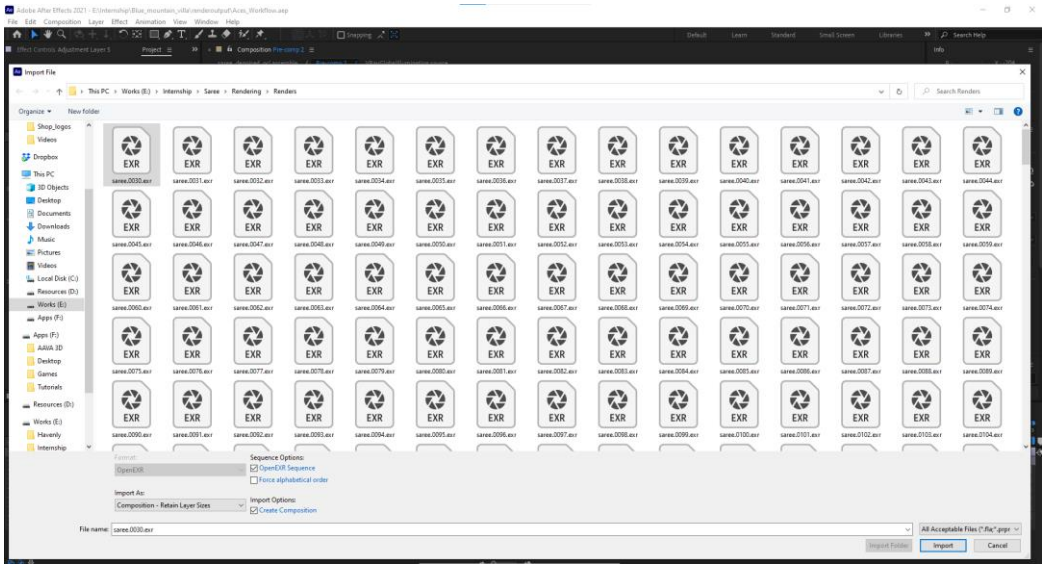

Figure 5.2.24.2.: Opening After Effect making new project 2

Now inside project tab right click and make a new composition. Again right click select import then files and select 1 EXR and file and fill OpenEXR sequence to import all file.

5.2.26. Using adjustment layer for color correction

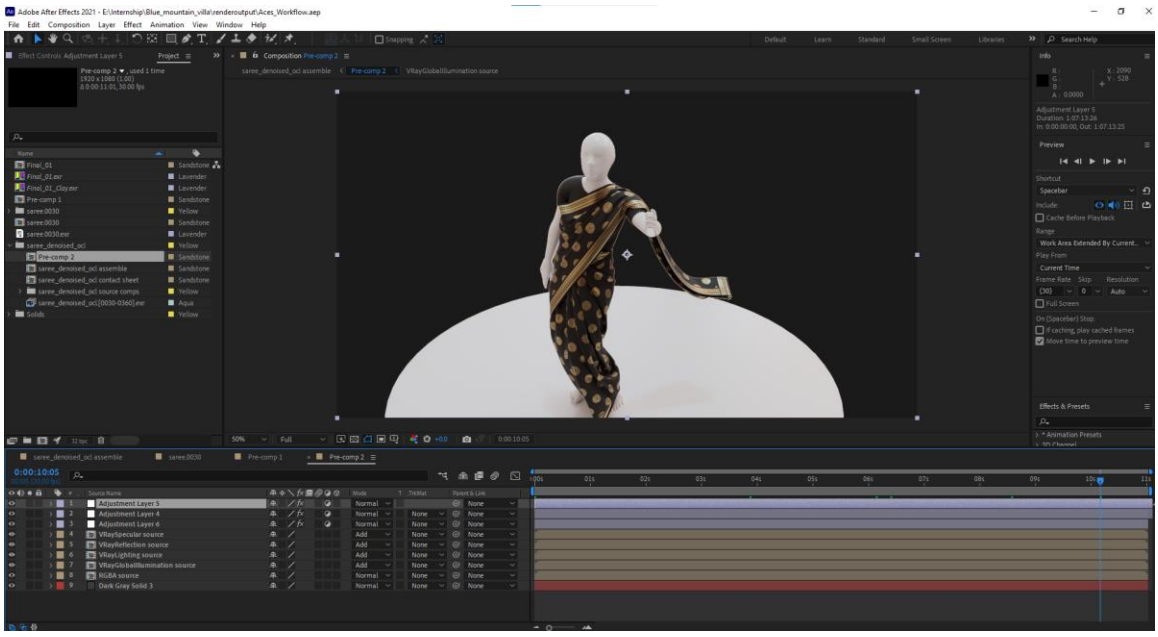

Figure 5.2.26.1.: Using adjustment layer for color correction

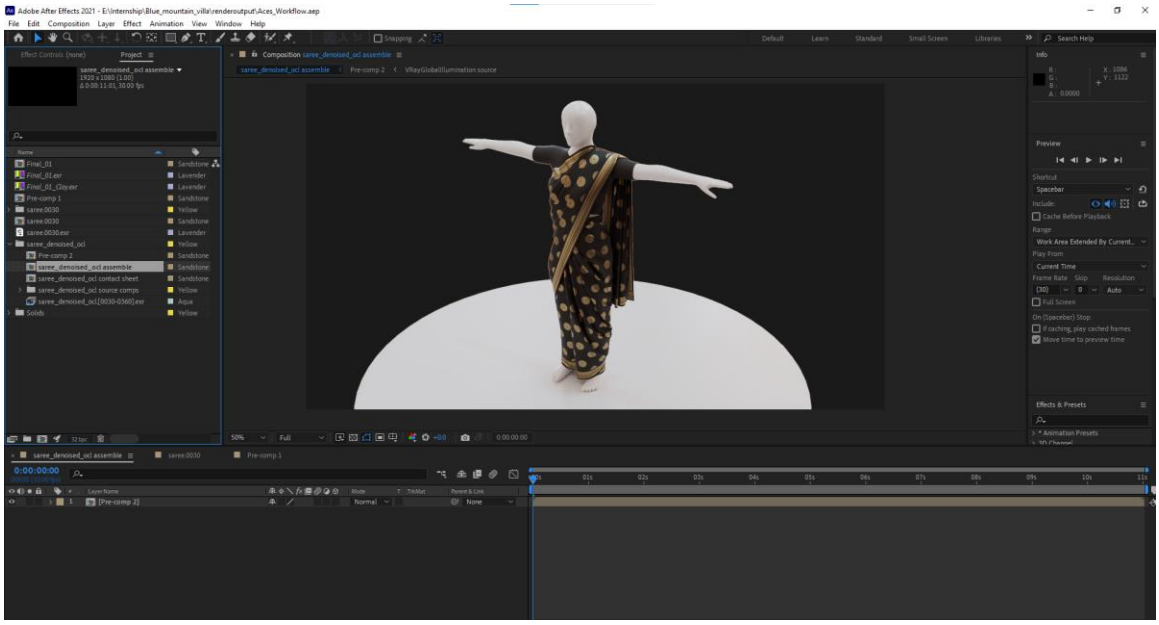

Figure 5.2.26.2.: Using adjustment layer for color correction 2

Now we add adjustment layer to color correct our animation. Also we will add a black solid which will be our background. Also, we increase the vibrancy to make the animation look more colorful and alive. Now we pre comp all layer into 1 layer.

5.2.27. Sending File in Media Encoder render que

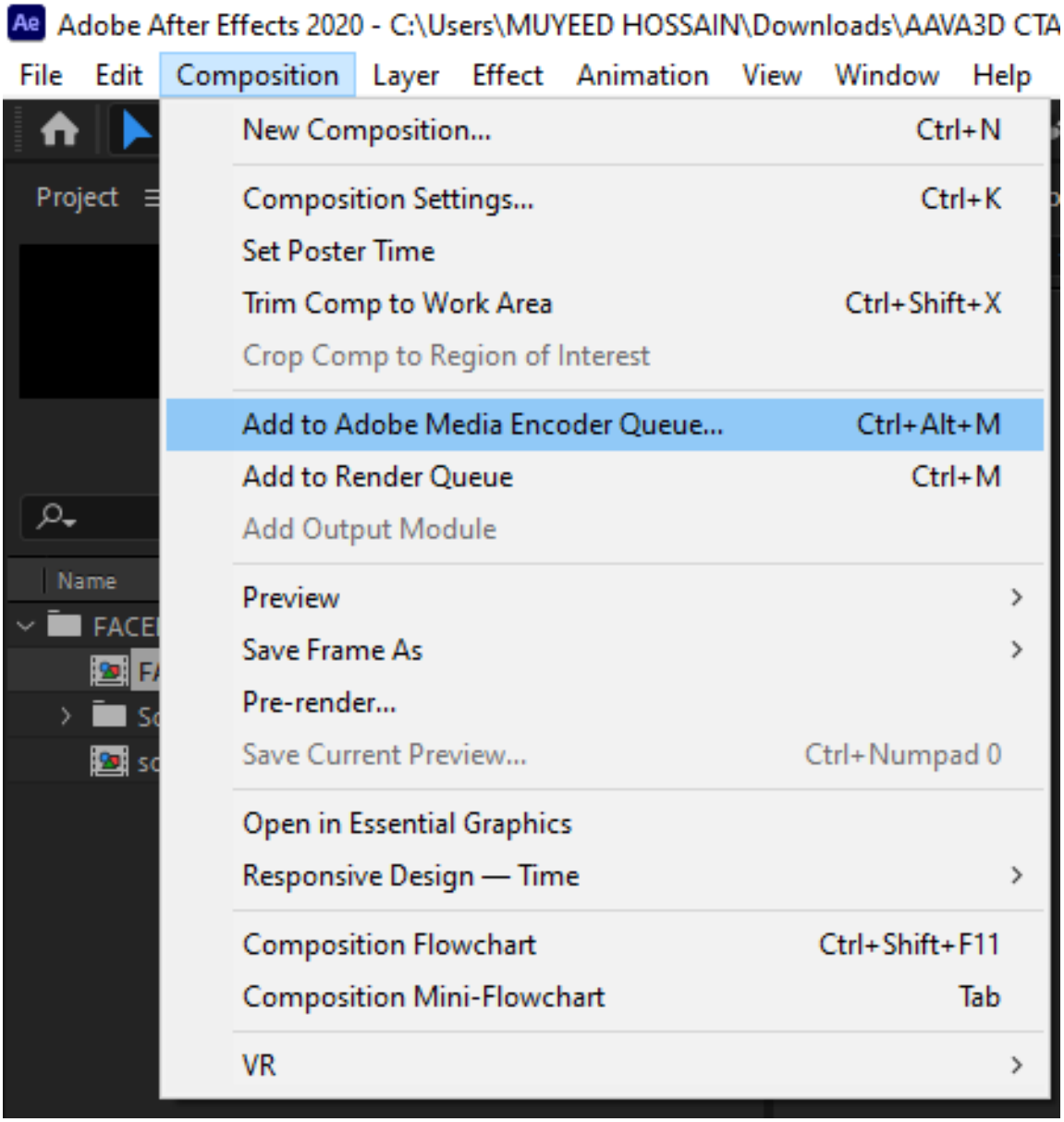

Figure 5.2.27.1.: Sending File in Media Encoder render que

Now click Composition from the top left corner and select Add to Adobe Media Encoder queue. That will open media encoder will a bridge hyper link with after effect as source file. Then we make file format into mp4 animation video.

5.2.28. Final Output

Figure 5.2.28.1.: Final Output

Figure 5.2.28.2.: Final Output 2

Now we will be get a mp4 file which will look like this. Also we check the animation and see if there any mistake with the video.

CHAPTER 6

LIMITATIONS AND CHALLENGES

6.1. Limitations

Every mistake is an opportunity to learn something new. Materializing an idea isn't as easy as planning. Giving form to my idea wasn't much easy. There I had to face several problems, confusion and error in my design. Some problems happen due to my mistake and ignorance in the workflow. Though every problem killed my time and energy I come suitable to break and avoid them coming time. In this chapter challenges, I had faced and the results will be discussed. A lot of impalpable limitations were faced while working on this design. These limitations affected the affair of our design in one way or another. Some of these are discussed below. The most impalpable limitation was the lack of experience. There were some gests in all the way in this process but the proper channel was no way followed. Also, the compass of skill perpetration was also limited. When it came to such a big design with a proper channel was to be followed, we fell suddenly on the experience which affected time operation and chancing results to problems faced. A 3D vitality is a form of art that combines a lot of other forms of art. For initiating a design like this a lot of effects from the cultural angle need to be considered. Similar to the color palette of the film, the aesthetics of the models, camera angle, camera movement, a sense of composition, etc.

6.2. Challenges:

As this is a group project it was important that all the members work together with close propinquity so that whenever any member faces a problem they can reach out to other members. This makes problem- solving much easier and carrying blessing faster. As of now, we've a big issue that's the Corona virus time so we did our work in the home as a home office. Living in different homes at first there were no fixed spots where we could work together. All the software used for 3D vitality and picture requires high configuration computers. In this case the higher the configuration the better the quality. But for our average quality computers, we faced a lot of challenges to work with.

Personally, me who has no graphics card so I cannot run the render work. Lots of times my PC got crash for the poly count. The software kept crashing or getting wedged. Occasionally they came slow and couldn't read the commands and execute them properly. These kinds of problems wasted a lot of time which would not have been an issue if there were better quality computers available. Computers with advanced configurations can drop render time exponentially. Render time is a big factor when it comes to producing any computer graphics. Keeping computer limitations in mind sufficient time places demanded to be allocated for the picture member. In order to produce the asked labors, a many new software and commands from known software were demanded to be learned in a veritably short time. As the knowledge of this software was limited so problem- solving came a big issue. When I was imported some object with mirror effect that doesn't show in Marvelous Designer. Light set and the camera movement are different from the other 3D softer like Autodesk max and Autodesk Maya etc. Also, they have a shortage of time so we need to minimize the quality of some work and give the output in the given time schedules. For the large work, we need a lot of patience and time management because the animation needs a lot of time to render a frame. Per frame needs 5-8 minutes some are more than needed which is very annoying for us.

CHAPTER 7

CONCLUSION

This task has given us the possibility to take a look at a few new software program programs, greater widely the software program programs we already know. Challenge Workflow, modeling techniques, Simulating in Marvelous designer and UV unwrapping texturing, Animating, Rigging, lighting are defined with inside the Challenge document. In this challenge, we found some brand-new method with Cloth Modeling Character, Rigging, and Animating, lighting and Rendering and editing technic which was new to me. As a financial factor, this picture helps to get the buyer`s interest via way of means of displaying the right characteristics of the product with inside the shortest possible time. An organization or producer can convey it to the marketplace with a much shorter length of spin-off visualization at a mile decrease cost. 3D Product visualization work offers producers sufficient room to innovate and gift to consumers in the space. Instead of searching out engagement via banner commercials and movies on mobile devices, from the marketing and marketing era, the organization has used 3D commercials to permit producers to have interacted with and interact with their audience. It may be tough to create good general product animations that draw colors, brainstorm, and draw the visitor's interest to the whole ad.

The is the most important general and precis shape up to now for developing consumers with miles better go back on investment. The concept of 3D product modeling for commercials is virtually modern in our country, however, developing superb 3D commercials isn't a smooth task. With 3D commercials, consumers can experience locating products more than still images. Our intention is to offer an entire 3D visualization of hard surface modeling such as product modeling, furniture modeling, and different architectural artwork on tough floors. As the client requires we did our work with a high quality within a short time. As they are satisfied we are glad to work with them and also with the Aava 3D Institute.

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