

# **RIGS OF COLOR**

## **CHARACTER CREATION**

### **A MAJOR QUALIFYING PROJECT**

SUBMITTED TO THE FACULTY OF  
WORCESTER POLYTECHNIC INSTITUTE  
IN PARTIAL FULFILLMENT OF REQUIREMENTS FOR THE  
BACHELOR OF ARTS IN INTERACTIVE MEDIA & GAME  
DEVELOPMENT DEGREE

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Authors: Hannah Belan and Carrie Grella

# ABSTRACT

Rigs of Color (2021) aims to bring diversity to websites hosting accessible 3D character rigs. Animators, hobbyists, and animation students download and use paid or free rigs from these websites. Unfortunately, the rigs available on these sites tend to lack ethnic and cultural diversity; most rigs are white or non-human in nature. This lack of representation for other ethnic backgrounds inspired the Rigs of Color (2021) project.

All models were designed by the student team or inspired by other artists' stylized concept art. The characters were fully modeled, clothed, and painted by the Rigs of Color (2021) team. The entire process, including the production of turn-around illustrations, block-outs, clothing and hair modeling, as well as critiques and suggestions, was documented and detailed in this report.

This project is expected to inspire other artists to create their own diverse rigs and animators to create content with more representation.

## ACKNOWLEDGEMENTS

WE WOULD LIKE TO THANK OUR ADVISOR, FARLEY CHERY, OUR GRADUATE STUDENT ADVISOR, RYAN WEBSTER, OUR HELP, SKYE PRITCHARD, THE STUDENTS OF IMGD, AND ALL WHO HELPED PROVIDE CRITIQUES AND REVIEWS.

## GENERAL TIMELINE

A TERM	B TERM	C TERM	D TERM
CONCEPT ART COMPILATION AND CREATION, LEARNING SIMPLE ANATOMY FOR BLOCKOUTS	CREATING AND DEFINING BLOCKOUTS, WORKING WITH PAINTOVERS, AND DEVELOPING STYLE	FINISHING BLOCKOUTS, DEFINING MODELS, AND TEXTURING	DEFINING MODELS, TEXTURING, UV UNWRAPPING, AND RETOPOLOGIZING



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# INTRODUCTION

## THE PROBLEM

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Animators and animation students often use downloadable rigs from the internet provided by 3D artists. Websites such as Animation Buffet, Animation Methods, and ArtStation provide access to rigs for free or for a listed price.

A large portion of the rigs available on these sites is comprised of monsters, fan-made rigs of anime and video game characters, or original characters. Unfortunately, there are very few rigs portraying diverse characters. The few non-white rigs that do exist do not represent varying body types, styles, or ethnic backgrounds. In addition, some rigs are incomplete, missing components necessary for complex animation.



(Haas, 2008)

The Animation Buffet logo.

## THE GOAL

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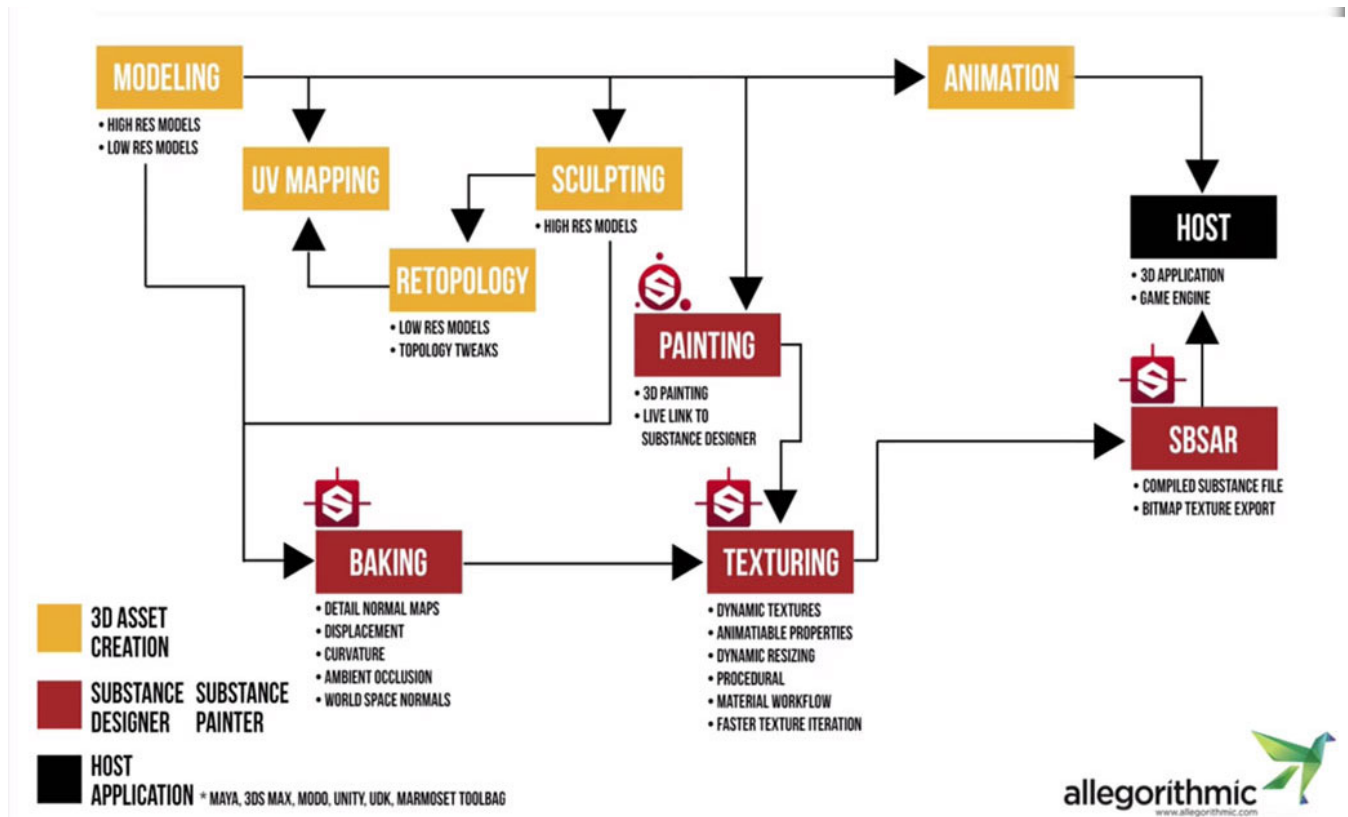
To fill rig libraries' lack of diversity, Davina Dawson and Project Advisor Farley Chery created six rigs of diverse characters for online publication. The project, Rigs of Color (2020), was then continued by Carrie Grella and Hannah Belan in 2021.

Six 3D models would be made by each student. Characters modeled for this project would represent various ethnic backgrounds, genders, and body types. Much of the attention would be dedicated to creating models with appeal, stylization and personality. Over the course of four terms, the team created 12 models, 4 male characters and 8 female characters. Additional models were created with the help of Skye Pritchard, another WPI student working with Farley Chery.

# MODELING PIPELINE

## GENERATING CONCEPTS

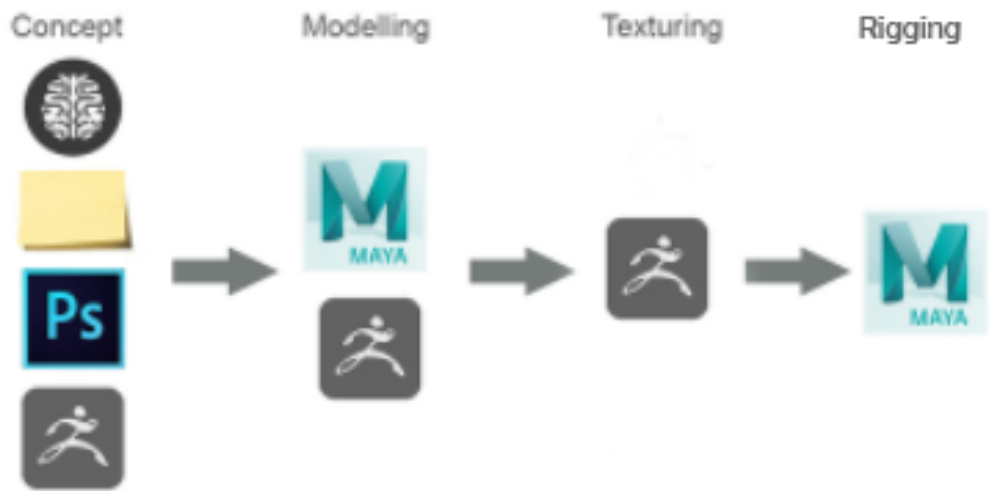
To start production, the team researched or illustrated 2D stylized character concept art. Throughout each character's modeling process, concept art and orthographic illustrations were frequently referenced to retain adherence to the original designs. The team was prompted to choose nine characters that appropriately reflect the project's goal of diversity and work with those designs for the duration of the project. Each member of the team balanced their selections, choosing both male and female characters of various ethnic backgrounds and body types.



(Waterman, 2014)

A diagram detailing the modeling pipeline.

# MODELING PIPELINE



## **BLOCK-OUTS**

With a concrete selection of character concepts, the team began the block-out phase. The block-out phase summarized the portion of the modeling process when general body shapes and anatomy are laid out in a mannequin-like manner. By blocking out, modelers plan the proportions relevant to the original design. The block-out phase is the most important part of the process. The first term of the project largely consisted of discovering the most efficient way to form a simple base character that could be altered to produce different body types. The team studied a method of combining different shapes, with little focus on sculpting. Sculpting and smaller details would be developed later on in the modeling process. This phase was the longest-lasting in the production because the block-out establishes body type, definition, facial structures, and general posture of the character.

## **BODY MODELING**

After successfully blocking out the characters, the team moved on to sculpting detail. For each model, the shapes making up the block-out were merged together to create one cohesive body. Using sculpting brushes, the anatomy was refined and styled as desired. While this step took less time to complete, its significance still lies in the detail and life that was breathed into each character.

# MODELING PIPELINE

## OUTFITTING

Hair and clothes were the final parts to be modeled. Outfits reflecting the characters' personal styles were designed prior to modeling. During this stage, the characters' bodies, outfits, and hair were tweaked and changed to better fit their observed personalities and cultural backgrounds. The team spent a great amount of time exploring efficient methods for modeling these complex parts.

## ADDING COLOR

Finally, the models were painted using Zbrush's polypaint feature. Adding color was the final step of the actual modeling. After the characters were finished, the team planned to retopologize and UV wrap the models to prepare for rigging. The models could then be unwrapped and textured. A fully-textured, retopologized, and rigged character model would be the final product.





# REFERENCE

Finding and Developing Reference

## AMMA

Amma was the first character to be developed for this project by Hannah Belan. She was designed to be a Ghanaian-American girl with a frog-inspired outfit. Her outward-appearing personality served to amplify her cuteness and fun-loving demeanor. A pear-shaped body type was decided upon for Amma to show her soft and round personality.



Amma concept art by Hannah Belan.



Izzy concept art by Hannah Belan.

## IZZY

Izzy was created later in the project by Hannah Belan to be a stoic character. Her background is East-Asian. Izzy's main feature is her bear-inspired outfit. A tall and lean body type was decided upon for her to evoke a more delicate frame. The body is thin to accentuate the fluffy jacket and exaggerate its size.

# REFERENCE

## JEY

Early in the project, Jey was developed by Hannah Belan. He is an African-American man with a Saint Bernard-inspired outfit. His outwardly appearing personality is a juxtaposition between gentle and punk-inspired. Jey was given a tall, thin frame to make the fluffy Sherpa neckline on his jacket more prominent.



Jey concept art by Hannah Belan.



Efe concept art by Hannah Belan.

## EFE

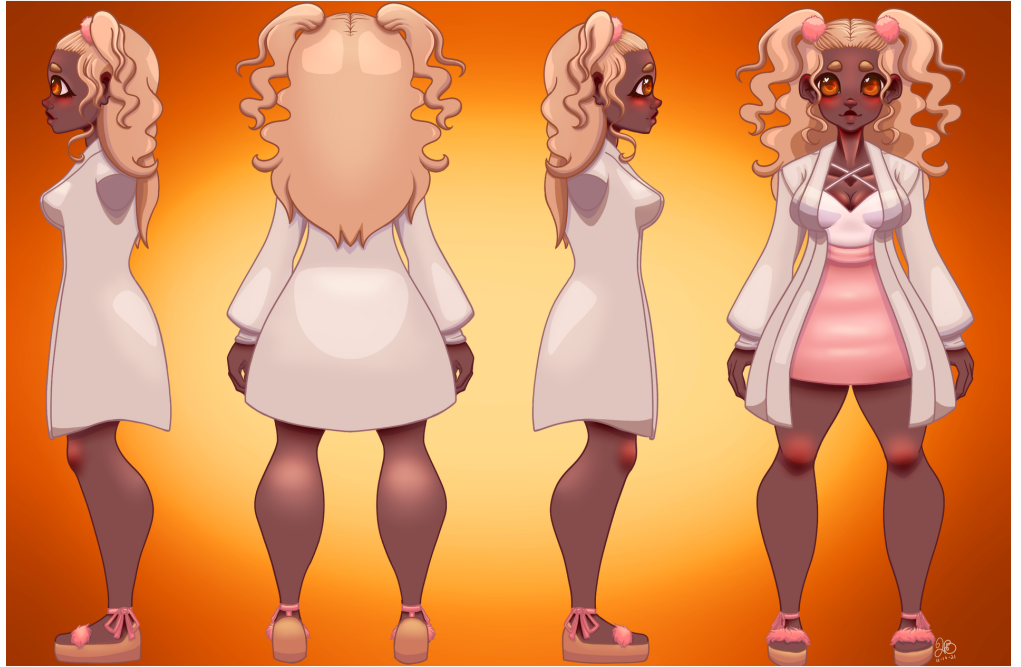
Efe was designed early in the project by Hannah Belan to be a sassy and smart character. She is a Nigerian woman with a mouse-inspired outfit. Her body type is thin and lanky to provide a gentle, bookish frame. Her short dress compliments her height by making her legs appear longer.



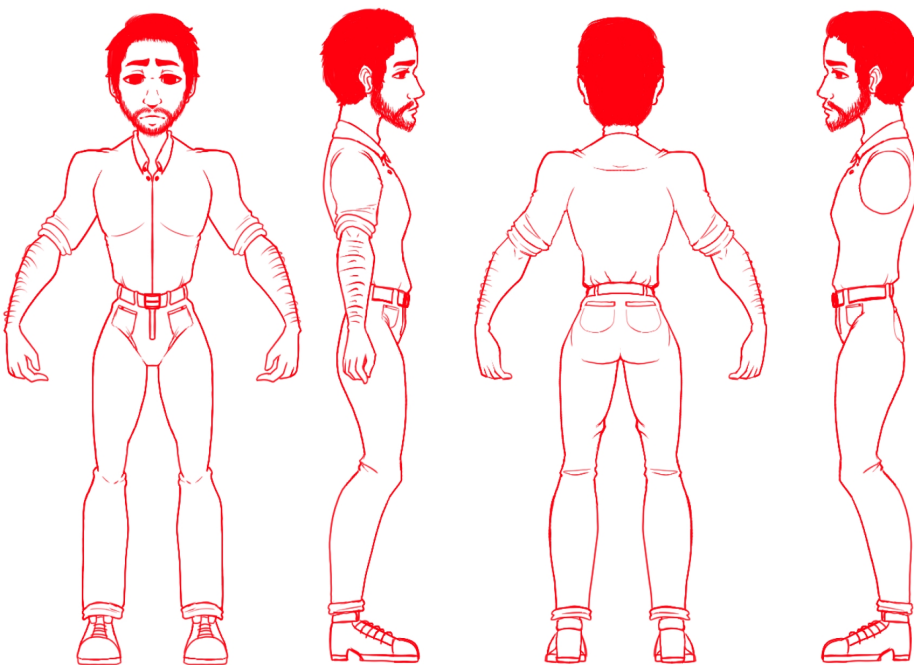
# REFERENCE

## LEILAH

Designed by Hannah Belan, Leilah's concept was added later in the project. Leilah is a friendly, energetic character. Her outfit and hairstyle were inspired by rabbits. Her demeanor is soft and cute. It was decided that her body type would be thick to accentuate her bouncy and fun personality.



Leilah concept art by Hannah Belan.



Rayaan concept art by Hannah Belan.

## RAYAAN

During the project, Rayaan was designed by Hannah Belan to be a buff, short character. He is an Indian character with a beaver-inspired outfit. His outward appearance is meant to be tough and bulky, his build reminiscent of a lumberjack. Broad shoulders and a buff chest were worked into the design to further a strong-man narrative.

# REFERENCE

## DEBRA

Debra was created by illustrator Libby Frame. Debra was chosen to be modeled because of her cartoonish proportions and expressive concept art. Her cavalier attitude is shown in her face, posture, and style. Her design is very stylized and appealing. For these reasons, Debra was a perfect character to model.



Debra concept art by Libby Frame on Tumblr.

(Frame, 2014)



Miyu concept art by Xenvita on Toyhouse.

(Xenvita, 2019)

## SAITOU MIYU

Saitou Miyu is a character created by artist Xenvita. Miyu's body type and proportions are more realistic compared to other chosen character concepts. Miyu's colors are simple greyscale tones with an attractive pop of red in her hair. Her outfit was a major motivation because the pieces are simple but give the character depth.

# REFERENCE

## DEATH

Death was created by artist Xenvita. There was some difficulty in finding male characters to model. Death's dark and macabre style juxtaposed with his positive and lighthearted expression made his design interesting. His masculine body type is not very exaggerated like other stylized male designs, but instead takes a realistic approach.



(Xenvita, 2019)

Death concept art by Xenvita on Toyhouse.



(mjj\_nz, 2016)

Alex concept art by mjj\_nz on Instagram.

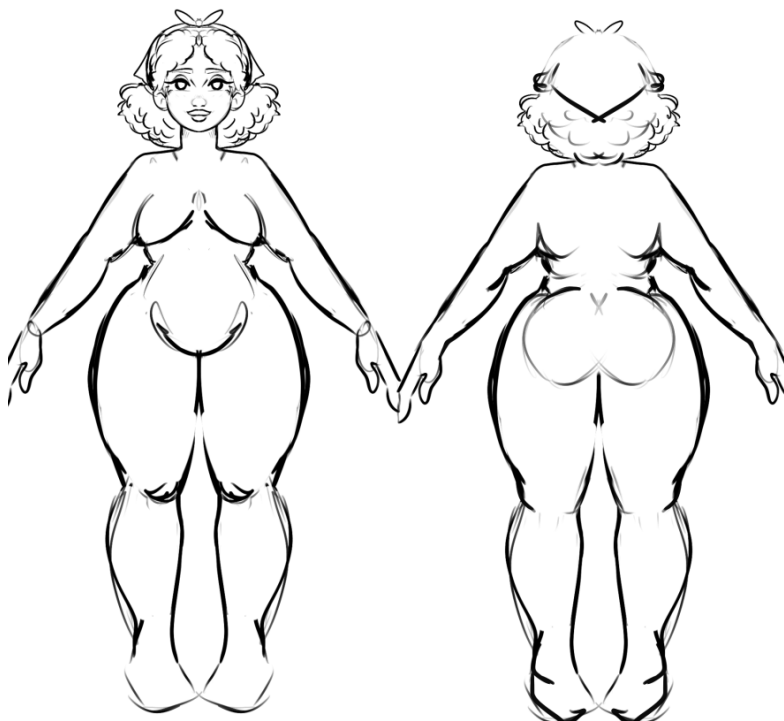
## ALEX

Designed by @mjj\_nz, Alex is a simple and very expressive character. The style of his concept art sits between cartoony and realistic; his face has exaggerated expressions while his body has realistic proportions. His overall fun-loving and friendly demeanor made him a great choice of an appealing male character.

# REFERENCE

## VALENTINA

Valentina was designed by Carrie Grella. Her concept intended to provide more representation for fat body types. Valentina was one of the first concepts for Rigs of Color (2021) and sparked discussion about the importance of having characters with realistic body types. Great consideration was put into making her design proud and confident.



Valentina concept art by Carrie Grella.



(CT, 2021)

Rae concept art by @ctchrysler\_ on Twitter.

## RAE

Rae is a strong female character designed by artist @ctchrysler\_. Her design has a heavy emphasis on her muscular form and confident demeanor. Rae's body type is very different from other stylized female designs, which meant modeling her would be somewhat challenging.



# INDUSTRY MODELING STANDARDS

## OUR RESEARCH

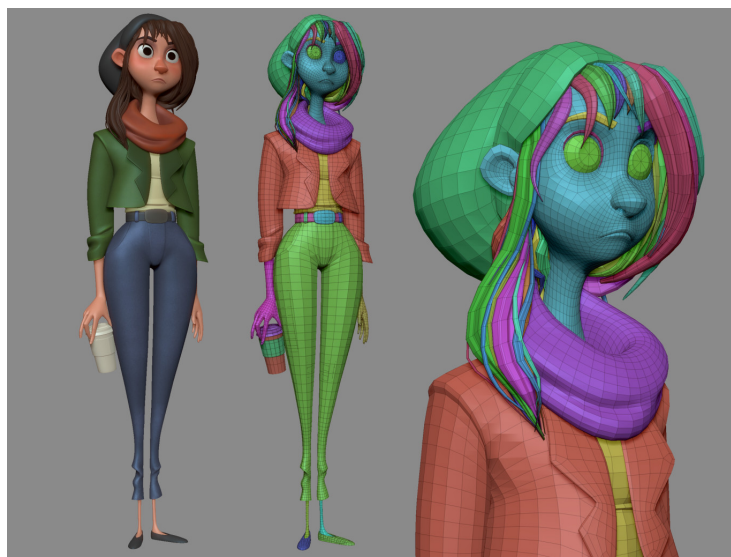
In the industry, one could find pipelines differing from artist to artist. Within this project's first few weeks, the team strived to find similarities between these unique pipelines to develop a pipeline of their own.

First, the team learned of a baseline workflow from Professor Chery. The baseline defined the main steps of the process that need to be followed to create a viable product.

Then, several 3D artists' workflows were studied to gain an understanding of what portions of the process require the most attention. While many artists follow their own pipelines during production, commonalities can be found within these differing workflows and streamlined to develop the most efficient method for the team.

## ARTIST INSPIRATIONS

The team first studied Dylan Ekren's art style and character designs. Practice block-outs were modeled in an attempt to mimic Ekren's soft and expressive style while gaining an understanding of his process. Ekren's detailed tutorials on creating block-outs were referenced throughout the project.



(Ekren, 2017)

Example of Dylan Ekren's work

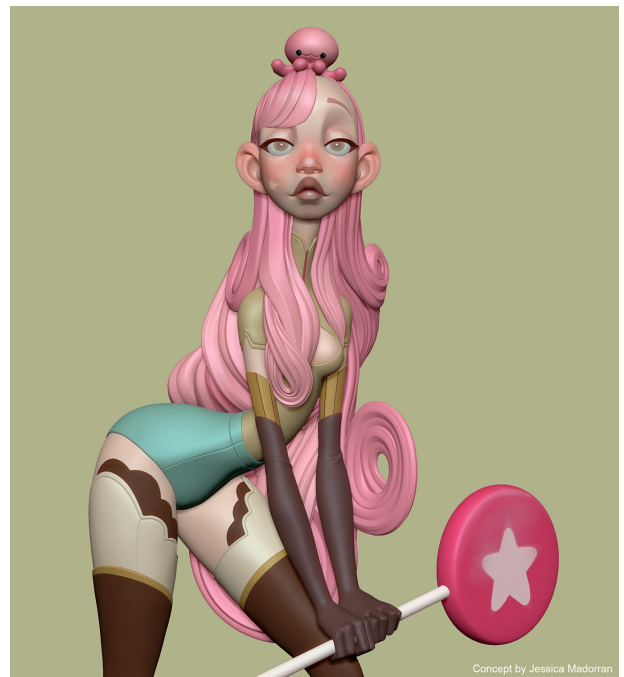
# INDUSTRY MODELING STANDARDS

The team observed several other 3D artists. Follygon, 3D artist and Youtube personality, has uploaded several videos detailing how to create stylized 3D characters. While Follygon's method of modeling focuses more on sculpting rather than block-outs, his tutorials showing how to quickly create body parts in a range of styles were extremely helpful. His tutorials were especially useful for modeling stylized faces.

Hannah Kang is a 3D artist with a wide range of styles. One of her models, which exhibits exaggerated proportions and a high level of appeal, was used to develop an understanding of manipulating anatomy to give a character more personality.

An in-depth look at a professional character modeling process was observed in Shane Olson's 3D Character Workshop. The detailed workshop served to demonstrate successful production of industry-standard models.

By referencing other 3D artists and viewing tutorials by professionals, the team gained comprehensive knowledge of character modeling and were able to apply learned strategies to their own artwork. Combining these workflows and styles, the team was able to establish a pipeline that focuses on speedy development with a heavy emphasis on a strong block-out stage. The established pipeline circumvented a lot of the modeling and smoothing repetition that tends to occur when creating the soft and texture-less appearances of stylized 3D rigs.



Concept by Jessica Madorran  
(Kang, 2019)

Example of Hannah Kang's work



# INDUSTRY MODELING STANDARDS

## DEVELOPING A PIPELINE

The next step after studying the standards of industry professionals and finding the similarities between them was to create a defined standard for the team's work. This included creating a style for each team member's character line as well as focus points throughout the creation process.

The largest amount of focus went into the block-out process, which preceded detailing and sculpting. This point in the process was important to the team's workflow, as it gave each character a strong base to be modified and built up. In conjunction with the block-out process, the team received thorough paint-overs from the advisor and graduate advisor, which were then incorporated into the final block-outs.

After creating strong block-outs, the team's focus shifted towards merging and defining all portions of the models, creating a smoother finished look for the bodies and faces of each model. Only after the body was defined could decorative work could begin. At this point in the process the team focused on hair, clothing, and accessories to create cohesive outfits for each character.

To finalize the creation of the models color was added through polypainting. One character received a retopology treatment. Retopology alters the geometry of the model, giving a lower poly-count, which aids in ease of rigging. This character was also textured and UV wrapped.

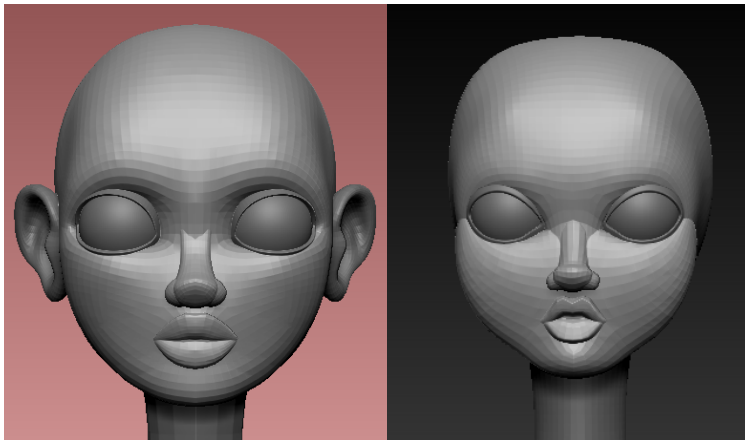
# THE BLOCK-OUT PROCESS

## WHY BLOCK-OUTS?

Blocking out is a method of modeling that uses simple shapes to define the general form of a character. This method was used both for the bodies and faces of each character. Blocking out allowed for quicker and far more forgiving detailing, creating creases and curves that become vital to the definition of the character's facial features.



A semi-realistic facial block-out with many shapes.



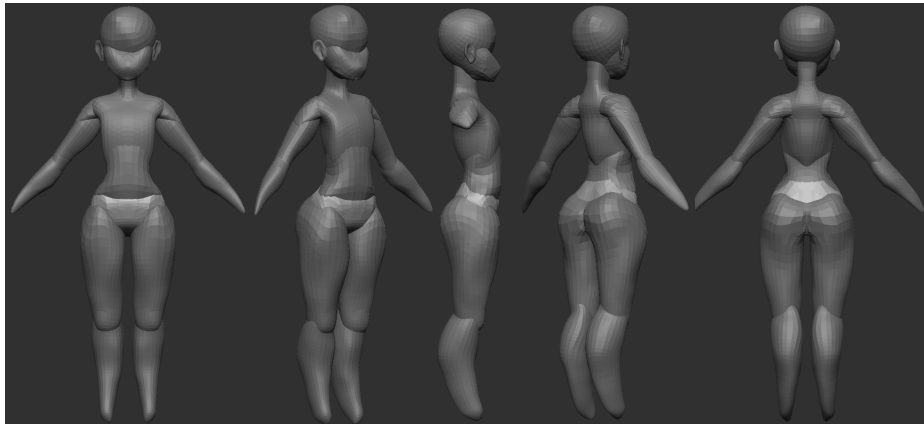
Individual shapes are made for the eyes, nose, lips, and ears.

## THE BLOCK-OUT METHOD

To create block-outs, various shapes were put together to form parts of the body. The more shapes a block-out had, the more realistic the style of the model was. Less shapes meant more stylization.

Blocking out the form of a character and slowly adding geometry results in a smooth finish, preventing the inevitable degradation of details that occurs when sculpting and polishing. By allocating shapes to different parts of the body, areas of the anatomy could be changed without affecting the entire body. Forms that were modeled in the block-out process include facial features such as lips, noses, and eyelids. The body was separated into sections for the torso, hips, arms, legs, pelvis, hips, etc.

# THE BLOCK-OUT PROCESS



Basic, low-poly body block-out with minimal detail.

## EFFICIENCY OF BLOCK-OUTS

While models can be created fully in traditional modeling methods, the block-out process speeds up the development of form. Any modifications can be incorporated quickly, as each section of the body is its own tool.

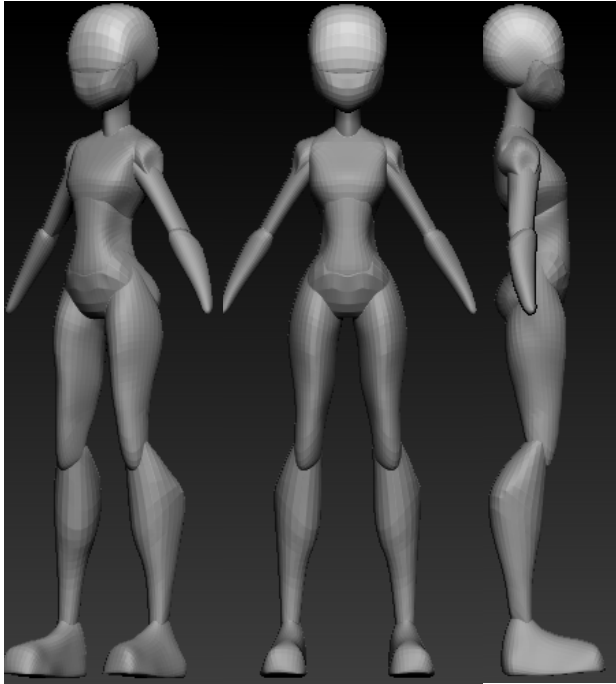
Block-outs allow the modeler to create all of their characters with similar base forms. Using a base gave the artwork some consistency, as any models created had a similar style to each other by default.

Block-outs were edited and altered in slight manners to create new body types and facial features for different characters; the same block-out could be used to create a tall, thin character, then altered to be used as the base for a short, stout character. Alterations were surprisingly fast; changing facial features specific to one ethnicity into facial features of a different ethnicity took only a few minutes.

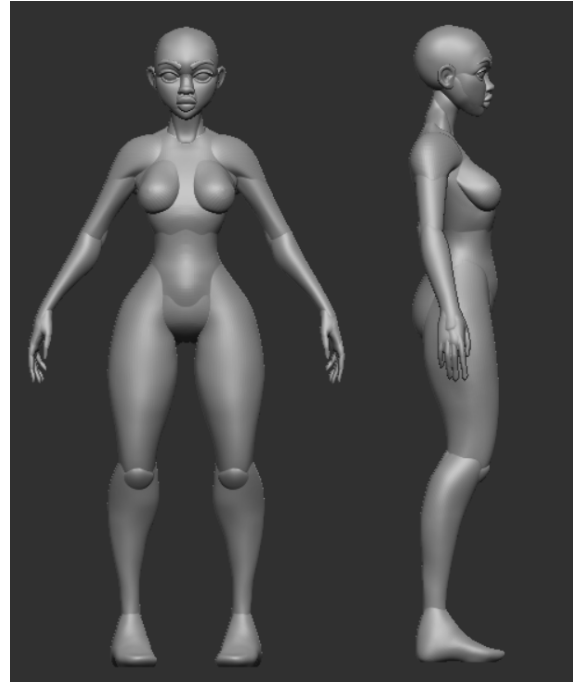


To express the efficiency of block-outs to his 3D modeling class, Prof. Chery used the facial block-out model of Alex to create two more example facial block-outs. By moving parts of Alex's face around, two widely-different characters with differing ethnicities were achieved quickly and easily.

# THE BLOCK-OUT PROCESS



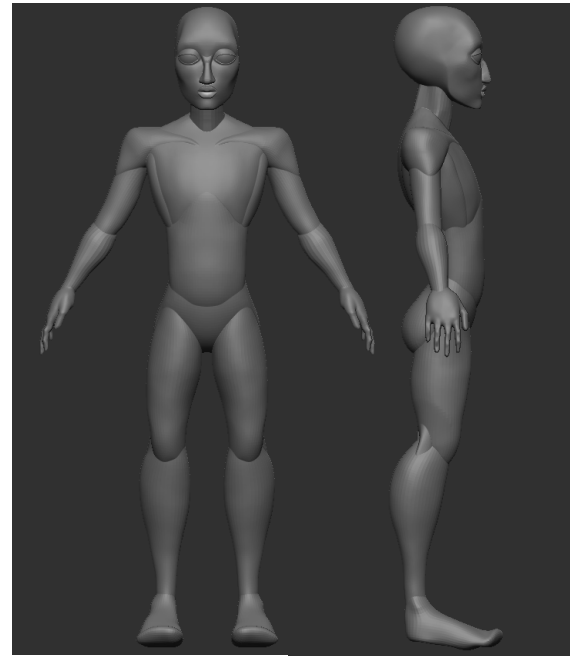
Early Efe block-out.



Debra block-out.



First Valentina block-out.



Rayaan block-out.

# THE MODELING PROCESS



A merged and detailed body model.

## DETAILING BLOCK-OUTS

When a block-out was considered complete, the shapes were merged together and a complete body was created in a matter of minutes. After combining the sub-tools that made up the block-out, smoothing and building up form was carried out with detailing brushes, such as the clay buildup brush, standard brush, and pinch brush. These brushes, which were strictly avoided during the block-out process, became integral to giving the characters a finished appearance.

The modeling process is comprised largely of building up and knocking down forms by using an additive brush and a strong smoothing brush. Adding and smoothing geometry over unwanted creases creates a flow between the shapes, achieving a polished look. Tools such as the pinch brush define creases and corners of the build. The pinch brush was used heavily on locations such as the eyelids, nose, and mouth to enhance sharp edges. A stylization was formed using the pinch brush in unison with the standard brush to create dramatic creases on faces.

Detailing resulted in a complete, defined, and polished body ready to be clothed and decorated. The final body models were used not only as the physical body of the characters, but also as tools for speedily creating tight-fitting clothing models.

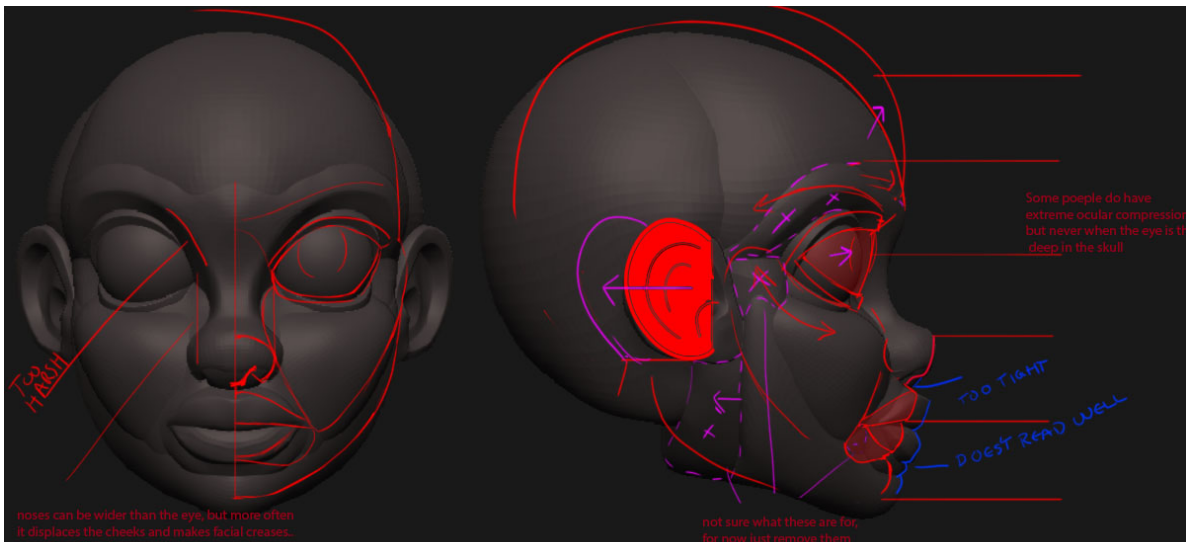


The creases and sharp edges that make the face readable are still kept even after merging the shapes together and smoothing.

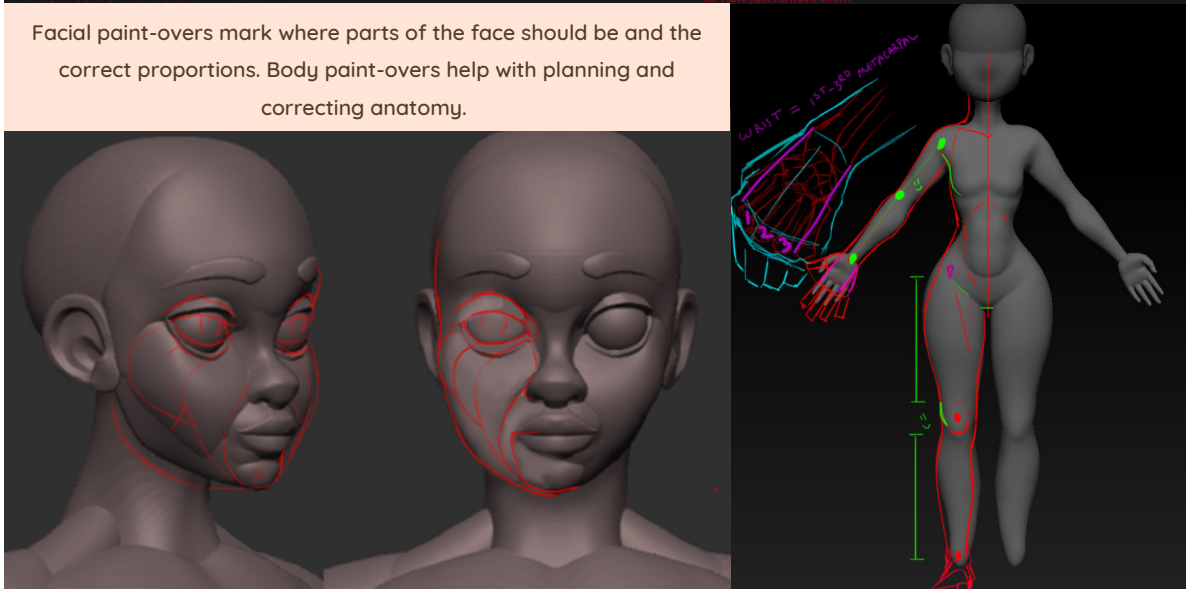
# THE CRITIQUING PROCESS

## PAIN-T-OVERS

The critiquing methods followed in this project largely consisted of paint-overs performed by Professor Chery and Ryan Webster. With their guidance, the team was able to find a meeting point between anatomy and stylization for their characters' body proportions. Weekly meetings were dedicated to discussion about what needed to be worked on before the next week's meeting and what portions of the character needed extra attention in that time. This allowed for guided edits to be performed quickly so the team's work was never slowed down.



Facial paint-overs mark where parts of the face should be and the correct proportions. Body paint-overs help with planning and correcting anatomy.





# THE CRITIQUING PROCESS

When a model was painted over, the screenshot was placed behind the ZBrush window. Using ZBrush's "See-through" gauge, the opacity of the program was lowered and the paint-over could be viewed in the background of the program. The paint-over acted as a guideline and the model was pushed and pulled to fit the observed markers.



Profile-view facial paint-over.

During WPI's Alphafest in November of 2021, Rigs of Color (2021) held a table where work-in-progress pictures of models were displayed. Throughout the event, many students, faculty members, and experienced modelers provided extremely helpful feedback. The experience yielded valuable insight from outside perspectives, which is important when creating content that will be available to the public.

Paint-overs were the most important resource for improving models. At times, members of the Rigs of Color (2021) team were prompted to critique themselves and each other. The critiquing process provided invaluable feedback from a variety of perspectives.

## ADVICE ON STYLES

Chery and Webster demonstrated very different styles of anatomy, which was evident in their critiques. While Prof. Chery provided tips on how to achieve a very stylized look, Webster divulged in-depth explanations about ways to retain realistic anatomy.

## OUTSIDE PERSPECTIVES

The team had several opportunities to receive feedback from other faculty and students as well.

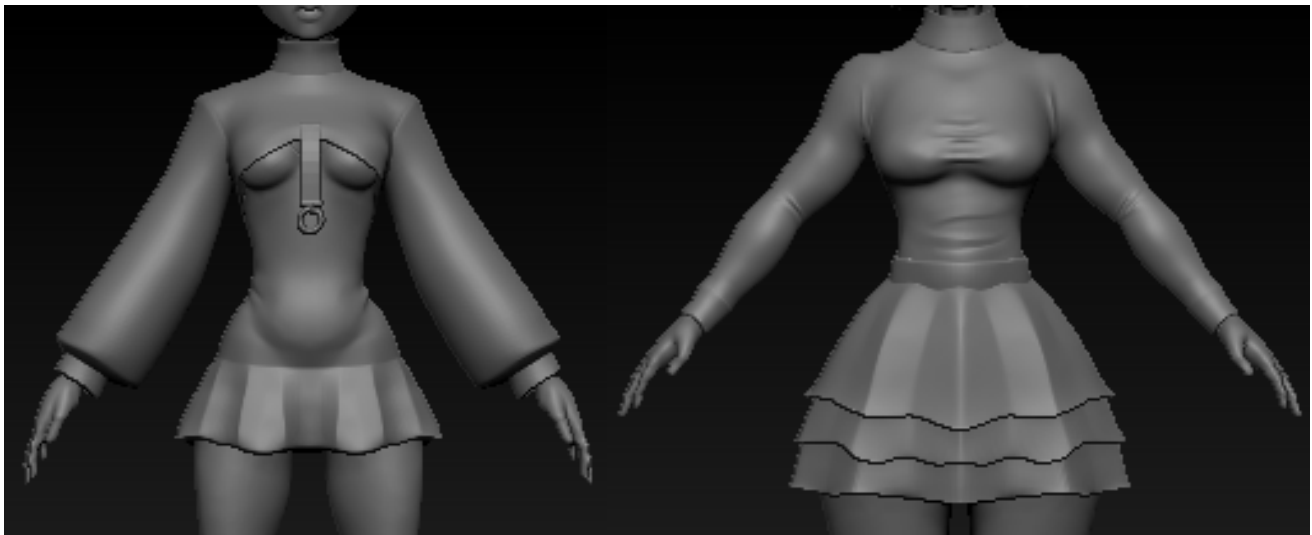


Nearly-finished models received paint-overs to ensure the anatomy was perfect.

# CLOTHING CREATION

## FINDING A FASHION STYLE

Designing a complimentary outfit for each character was a valuable step for creating an appealing model. Several outfit designs were explored for many of the characters and the end results were designs that brought out each character's personality. A mixture of simple and complex outfits were created from modifying concept art. Some characters dressed in layered outfits and others dressed in everyday clothing. Outfit design was another method in which a cohesive style could be translated across several characters. Through common stylization choices - such as the layering of clothing pieces and added accessories - each member of the team further clarified the world in which the character line was to be set.



Two examples of clothing modeling.

## APPROACHES TO OUTFITTING

After the team watched tutorials and explored potential methods, basic pieces of clothing were modeled and then personalized to fit the character's feel and concept art. Details such as folds and pleats were added as last steps in the clothing modeling process. These features broke the symmetry of the model and added visual interest to the overall design.



# CLOTHING CREATION

A method that was commonly used for clothing modeling involved masking off part of a character model and extracting the masked part. This results in a skin-tight piece of clothing with an adjustable thickness. This method is much quicker than modeling clothes from scratch and was used for almost every clothing article. Extraction also allows for creation of more delicate items like lace, straps, tights, and others.



Using the masking and extraction method to model leggings.

A huge challenge for the team was modeling shoes. Shoes, having obscure shapes that don't mimic human form, offered difficulty for the team, and strategies like extraction didn't work well. Aspects of shoes like size and stylization had to be heavily considered. Instead, shoes were blocked out and built with different 3D shapes that would eventually be merged together and smoothed out. Tutorials from Youtube artists Follygon and Deryck Pelegrini aided with practicing shoe modeling.

# CLOTHING CREATION



The cut-out on the chest and slit on the thigh make Valentina's dress asymmetrical and interesting.

## INCORPORATING REALISM

Once the forms of outfits were created using extraction and modeling, the details of each piece were individually added. This meant cutting out sections of clothing such as decorative holes, slits, and tears as well as adding additional folds at points of motion. Using a clay standard brush, standard brush, and a pinch brush, folds were rendered and placed in their desired location. Furthermore, these brushes were used to render highly textured areas of clothing, such as fur and fluffy accessories.

A combination of modeled folds and textured shadows added to the complexity of many of the outfits created for this project. Texturing allowed for an added level of depth and readability to the clothing that would be difficult to achieve through modeling alone.



Straps, fur, clothing folds, and rips add depth to the outfit. Having few components keeps the outfits simple. Adding detail to a simple base increases appeal while keeping rigging easy.



# HAIR MODELING

## TEXTURE STUDIES

Hair texture is organized into different types based on the tightness of the curls. For this project, many characters have hair types between type 3A and 4C. When designing characters, diversity in hair texture was a very important aspect. By modeling various hair types, we can gain a better understanding of hair creation and more stylization experience.



(Living proof, 2021)

A reference for the various types of hair.

# HAIR MODELING

## MODELING TEXTURED HAIR

Several methods were taken to develop stylized textured hair. Depending on the team member's stylization choices and characters' hair types, different grouping and defining methods were followed while modeling hairstyles.

To create an illusion of highly groomed curly hair, large swirled sections of the hair were hard-modeled and pinched into sharply creased spirals. Baby hairs, bangs, and accessories were added to hairstyles with this stylization to add visual interest and definition.

When working with hair to create the illusion of coily hair rather than smooth curls a method of sectioning and grooming was followed. Sections of hair meant to be further defined would be separated. Then, the sections were textured with help from ZBrush's grooming and noise brushes. The result was visually-interesting bouncy hair with significant volume. This method was slightly modified for straight groomed hair; the move brush was substituted for the grooming brush to avoid adding texture.



Jey's hair was made by making basic chunks of hair and adding noise to the geometry. The noise brush is an efficient tool for making the hair look tight and coily.

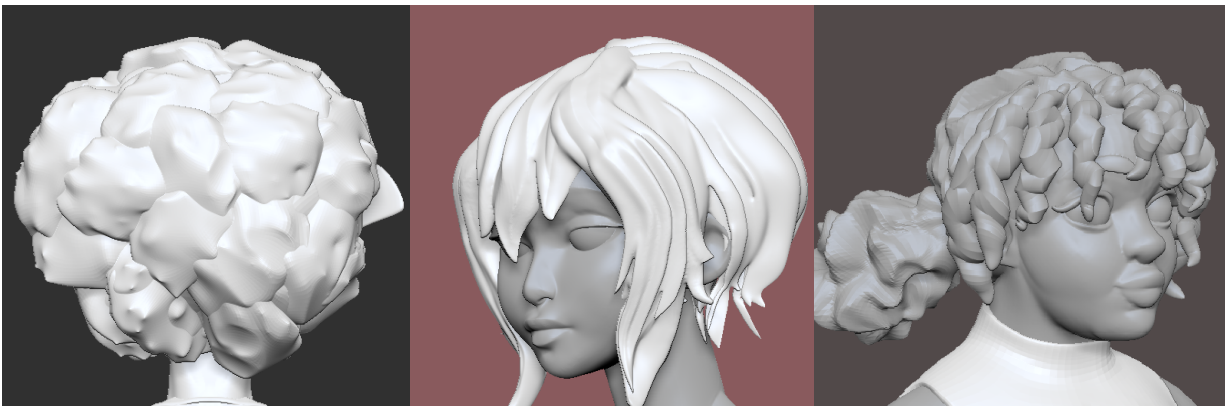


With a simple sphere acting as the scalp, rows of hair can be carved to convey a tight, tied-back style. The curly buns, also originally spheres, have swirls and spirals, giving a simple, stylized curly design.



# HAIR MODELING

The methods of creating stylized hair were used to develop all of the hairstyles within this project. Styling in different manners paired with these creation methods allowed for diverse hairstyles for each of the characters created.



To create Debra's afro, a sphere was shaped into a tapered tear-drop shape. Then, texture was added using the Snakehook tool, pulling and pushing small pieces of the mesh.

Miyu's hair is comprised of stretched spheres that were carved into and pulled using the Snakehook tool. The individual hair chunks are lined up along the part of her hair.

Valentina's hairstyle is a mixture. While her bangs are individual strands altered using the transpose tool, her buns and remaining hair are larger shapes with deeply-carved details.

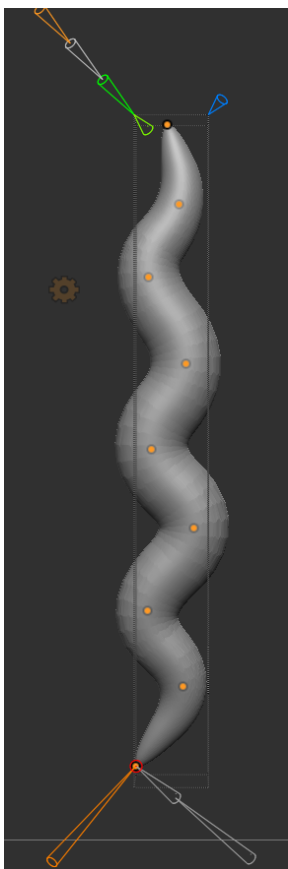
## CHOICES FOR BRUSHES

The grooming brushes within ZBrush specifically help with hair modeling, but there are many general brushes that were used. The team explored ZBrush's plethora of brushes to determine which ones were the most efficient.

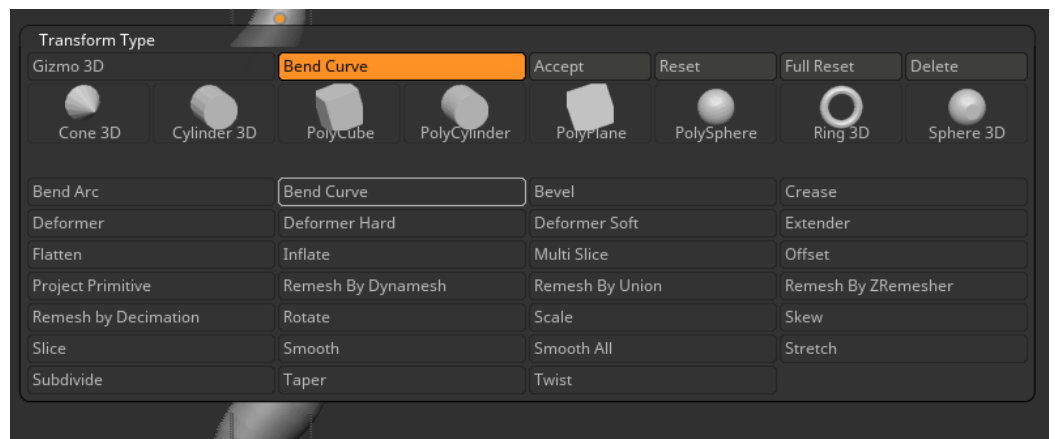
The transpose brush provided a variety of options for manipulating hair. Sometimes, it was easier to create chunks of hair that lined up along the scalp and then duplicate those chunks.

# HAIR MODELING

A hair chunk starts out as a sphere or other 3D shape that is stretched and bent using ZBrush's transpose brush. The transpose brush displays as a menu with commands the user can interact with. The most-used commands in hair-modeling are Bend Curve, Twist, Scale, and Taper. The transpose tool is also very forgiving; any changes can easily be undone with the "Reset" button in the menu.



Demonstration of the Bend Curve tool. By dragging points, the once-straight shape becomes curved. The orange cone-shaped controls affect various aspects such as the number of points and their orientations.



The transpose tool with various methods of deformation. Changes will only affect the shape if the user accepts them.

The Bend Curve transformation deformer bends and curves at user-specified points. By dragging these points, one can determine the size and tightness of a curve. The shape can be twisted and scaled at these points as well.

In a similar manner, Maya was used in creating tendrils of hair that were imported into ZBrush to achieve a similar shape. These tendrils curved in all directions and were blended into the hair models of characters.

# ACCESSORIZIZATION



Some character designs involved accessories that needed to be modeled. These were modeled and implemented after the hair and clothing modeling was nearly complete. Accessories make a character look more interesting and intricate. A lot of a character's personality and style comes out in the accessories they wear.



Jewelry, hats, gloves, and other items were the fun part of styling. The more accessories a character has, the more they are able to stand out and shine as a unique and detailed design. Accessories can be more simple to model as they take fewer shapes and they are often not the main focus of the design.

# TEXTURING AND UV MAPPING



The result of the skin being painted and blushed.

## POLYPAINING

Character models are commonly textured when they are being used for animation. Through the Polypainting feature in ZBrush, we were able to paint on models to give them color. Basic, solid colors were painted onto the skin, hair and clothes. Cheeks and joints were blushed to make the characters appear more life-like.

Throughout the project, more attention was put towards polypainting and planning out the colors for the characters. As a result, only a few characters were UV-unwrapped and textured using the ever-efficient UVMaster plugin from ZBrush.



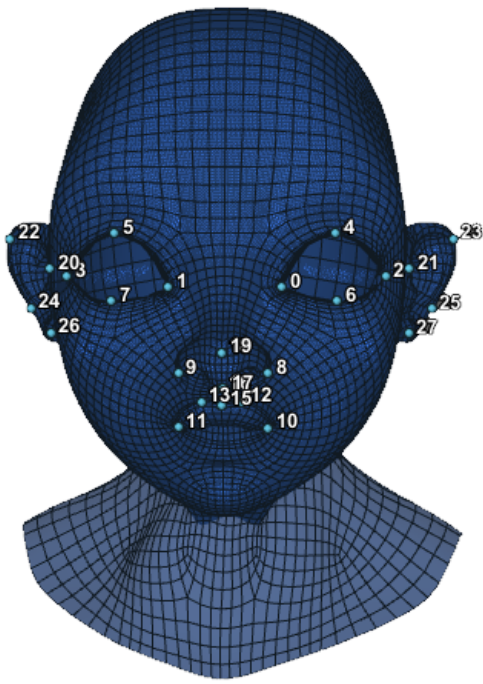
It was important to pay attention to color choice. Like with 2D art, color theory is referenced throughout the polypainting process.

## TEXTURING

The UV unwrapping and texture map creation process utilized the textures draw onto the high polygon models and the geometry to be discussed in the retopologization section to create seams along the geometry where a flattened map of the 3D texture lay. These maps are crucial to bringing the 3D model's textures into an engine as well as providing said engine with additional information about how the texture interacts with the world around it. Once unwrapped, textures were exported using Zbrush's UV Master plugin to export all necessary texture maps at once.



## CLEANING UP THE TOPOLOGY

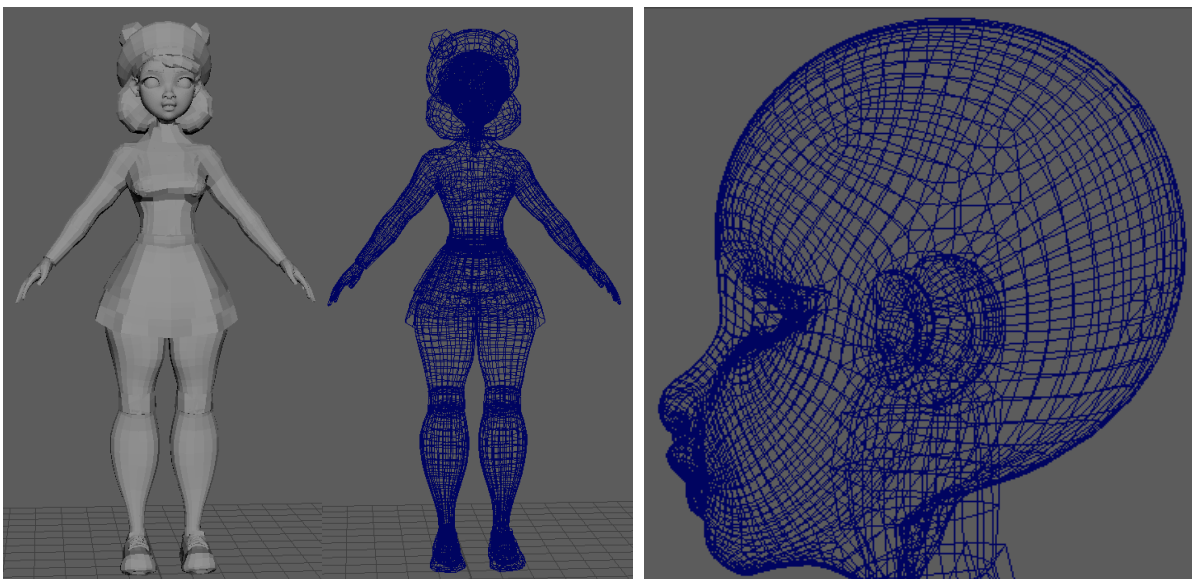


Marking points on the face in Russian 3D Scanner.

Retopologizing is a process in which a high polygon model has the amount of geometry within it lowered and organized in a movement-friendly manner to prevent visual oddities once the character is rigged and animated. The process includes creating a clean, straight geometry on the majority of the character model, with smoothed curves around points that will be stretched significantly, like the nose and mouth.

Another program used for retopology was Maya. A basic, low-poly body model was built in Maya and then imported into ZBrush. Then, the geometry of the high-poly Rigs of Color model was projected onto the low-poly Maya model.

To create game-friendly clothing, retopology can be carried out within the ZBrush program. Unfortunately, facial retopology in ZBrush is time-consuming and challenging. For this reason, Russian 3D Scanner was the optimal tool for facial retopology. Because the team prioritized other aspects of the Rigs of Color (2021) project, only one character received a retopology treatment.



# POST-MORTEM



## OUR DELIVERABLES

The Rigs of Color (2021) team produced 12 fully-modeled, outfitted, and painted character models. The biggest success of this project was the development of a clear and easy-to-follow pipeline for the creation of game-ready 3D rigs. The team's 3D art skills improved exponentially since the start of Rigs of Color (2021) in A term.

## WHAT COULD GO SMOOTHER?

The Rigs of Color (2021) project was slightly over-scoped; the original planned deliverable was 18 character models. A large portion of this project was spent defining style as well as working on the block-out process. There was little time to dedicate to the more technical sides of the project like retopology and UV mapping. In the future, establishing a clear timeline and more concrete goals early-on would ensure that the process goes as smoothly as possible and all areas of development are achieved.



## THE FUTURE OF RIGS OF COLOR

The Rigs of Color project has a future as a WPI capstone project for students taking a depth in art. A Humanities & Arts seminar for Rigs of Color was taught by Farley Chery in D-Term 2022. During the seminar, the Rigs of Color team used their newfound experience and knowledge of modeling to critique students' work.

Images from Canva Elements feature. (Canva, n.d.)

# POST-MORTEM

## Personal Developments

### **CARRIE GRELLA**

It was difficult to work on this project amid the uncertainty of the future and the COVID-19 pandemic. In all of the confusion, many students have lost motivation and hope. Mental health is an extremely important aspect of wellness. Throughout the project, I struggled to stay hopeful. But being honest about my mental state and motivation is what allowed me to continue working on the project. Being open about how you're feeling is extremely important, as others can offer support and compassion.

I had very little experience with 3D modeling going into this project. I only felt comfortable with 2D artwork, which is what I have practiced since childhood. Through this project, I was able to foster a love for character modeling that resulted in significantly-improved 2D art skills. Modeling so many bodies and different body types has improved my understanding of anatomy. Now, it is easier to not see a 2D drawing as flat. My shape language and poses have also developed and strengthened from studying 3D artists' styles and practicing stylized 3D artwork.

Before the project, I also lacked knowledge on how to properly represent other cultures and ethnicities. Because I'm white, I have a different perspective than those who are underrepresented. It's important to do research to complete a project of this nature. I really wanted to make sure that my perspective didn't influence the goal of the project, which was commitment to accuracy and representation.

# POST-MORTEM

## Personal Developments

### HANNAH BELAN

Throughout this past academic year, WPI students have experienced several tragedies and, for many students, it has been difficult to power through and keep working. As a member of the WPI community as well as having personal complications, I was not exempt from having a difficult senior year experience. Regardless, I powered through and kept creating works for this project and the other classes I took part in.

While I had experience working with 3D modeling before this project, it was very general knowledge and did not include a viable pipeline for this style of work. The characters I created aired on the side of semi-realism rather than cartoony, stylized characters, and my modeling pipeline made wobbly unpolished-looking stylized characters. This project helped develop a clean block-out stage for my work that can not only be kept smooth and cartoony for stylized characters but also used to create the base for a realistic character.

Both my 2D and 3D art have benefitted from the critiquing process experienced in this project; my characters were made stronger through the use of an outside eye and reference to human anatomy. Overall, this project has allowed me to grow in many ways as an artist and I am thankful for the knowledge I have gained. I am also thankful for the knowledge I have gained about drawing and modeling characters of differing diversities; without this project, my character's visual diversity would remain flat, and, even when drawing characters of various ethnic origins, the face would be similar for all of my characters.

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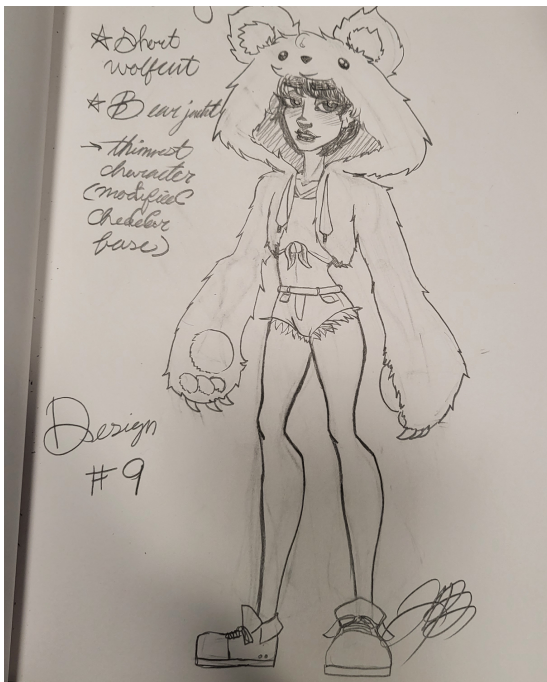
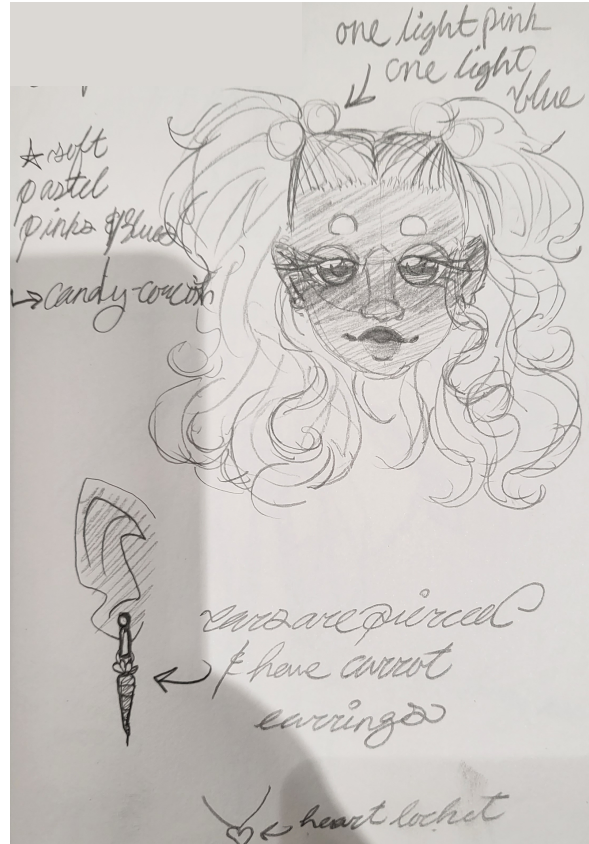
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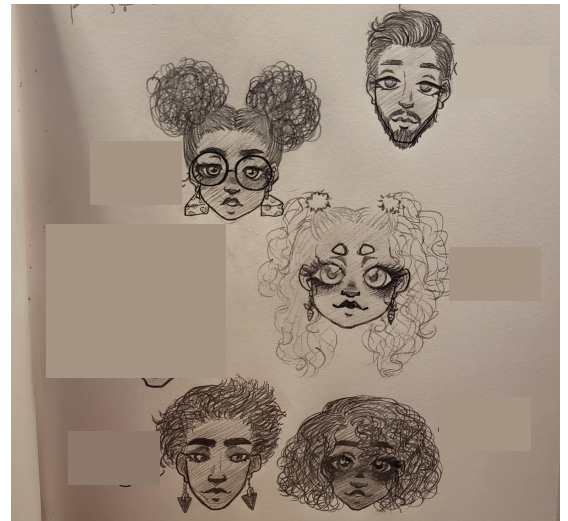
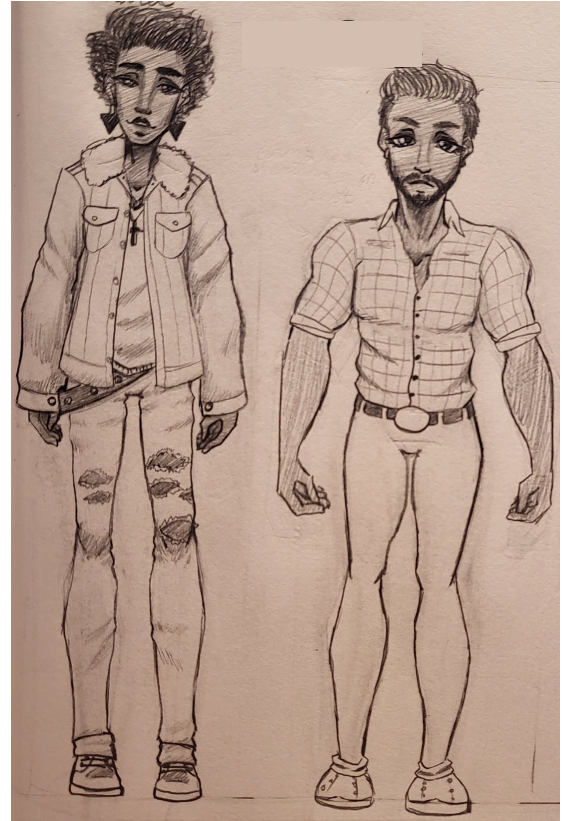
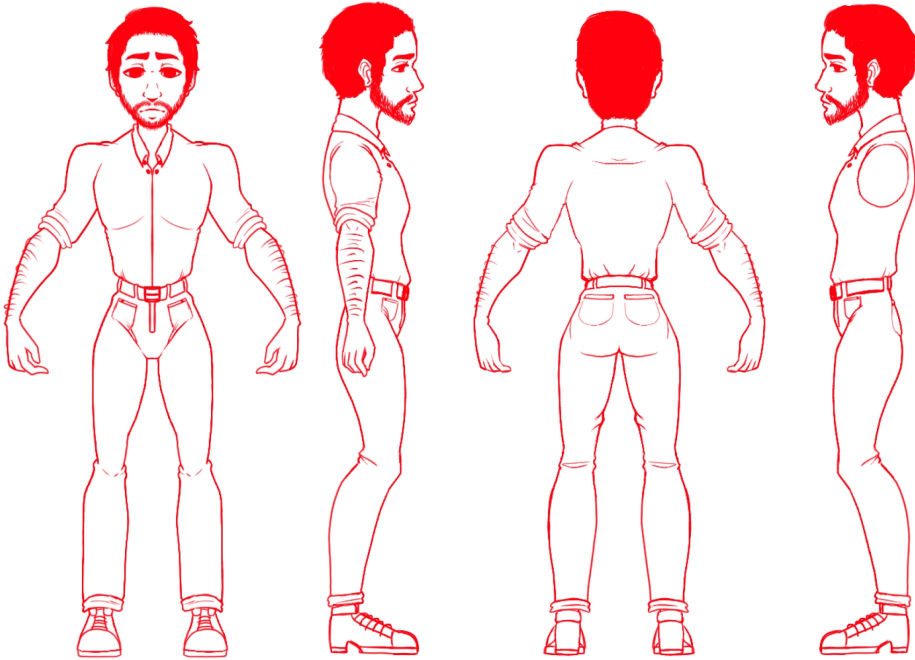


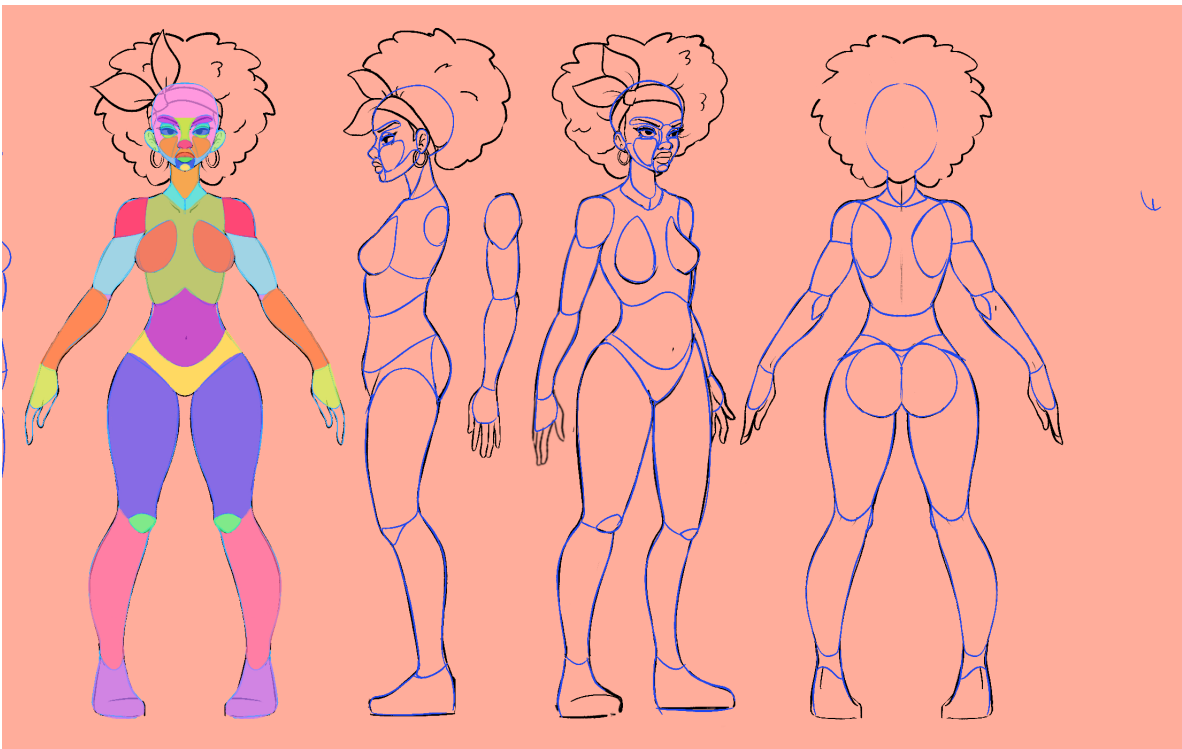
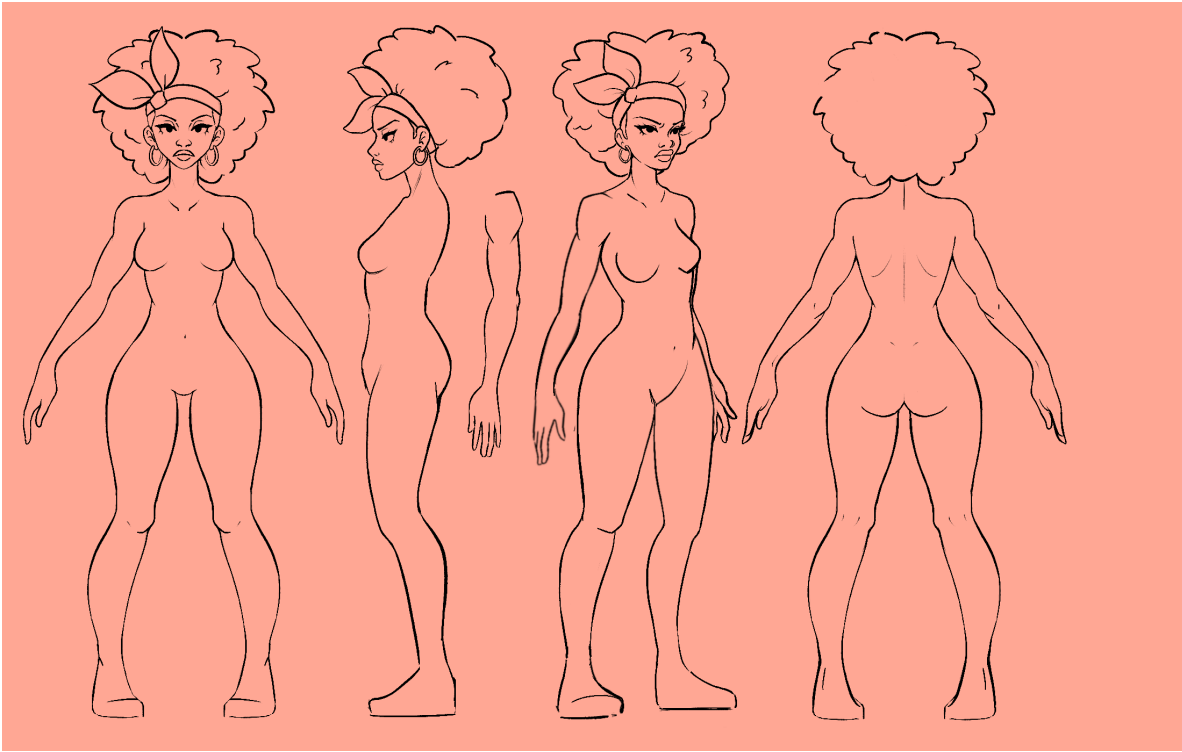
# APPENDIX I

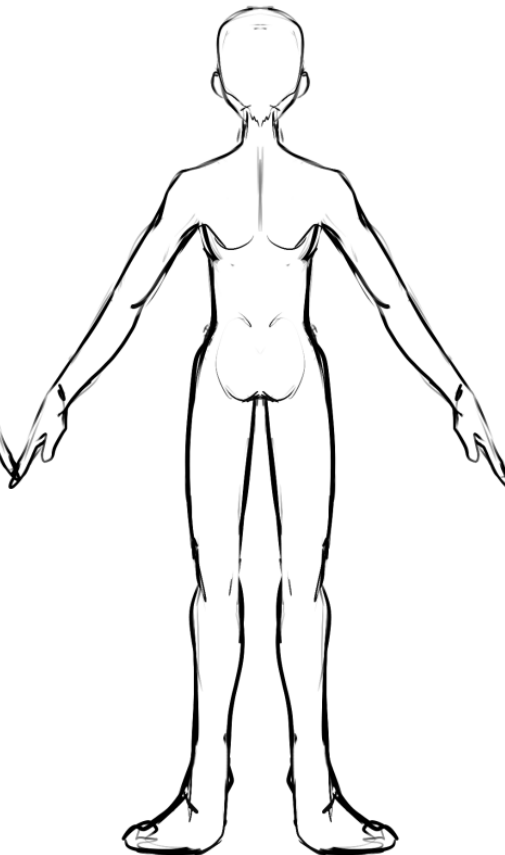
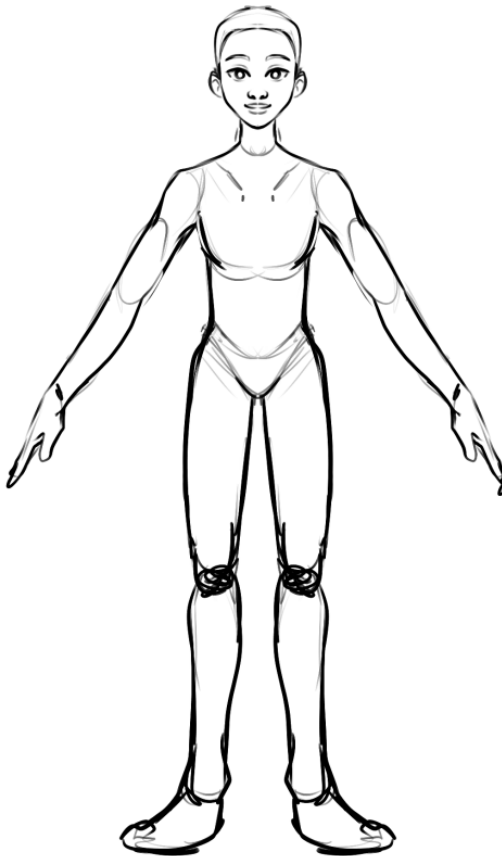
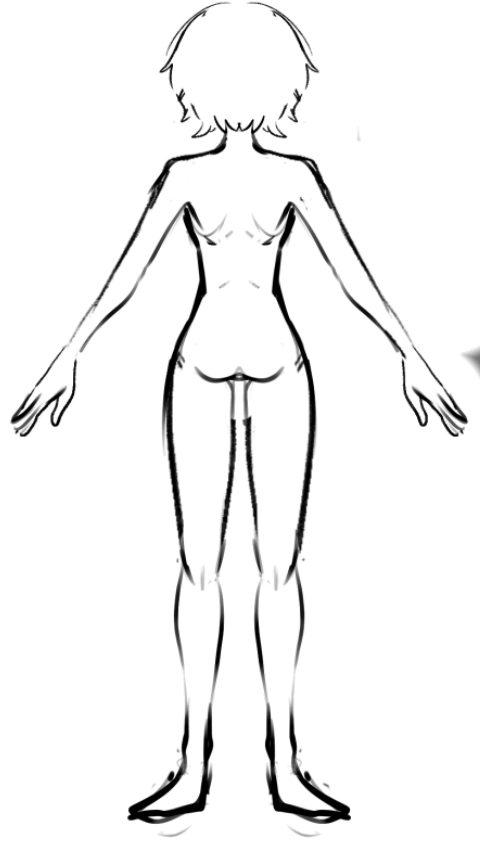
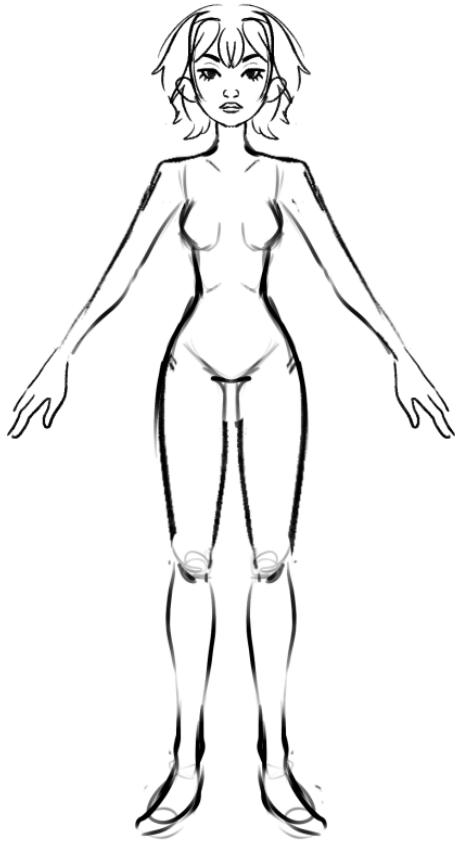
## References and Concept Art



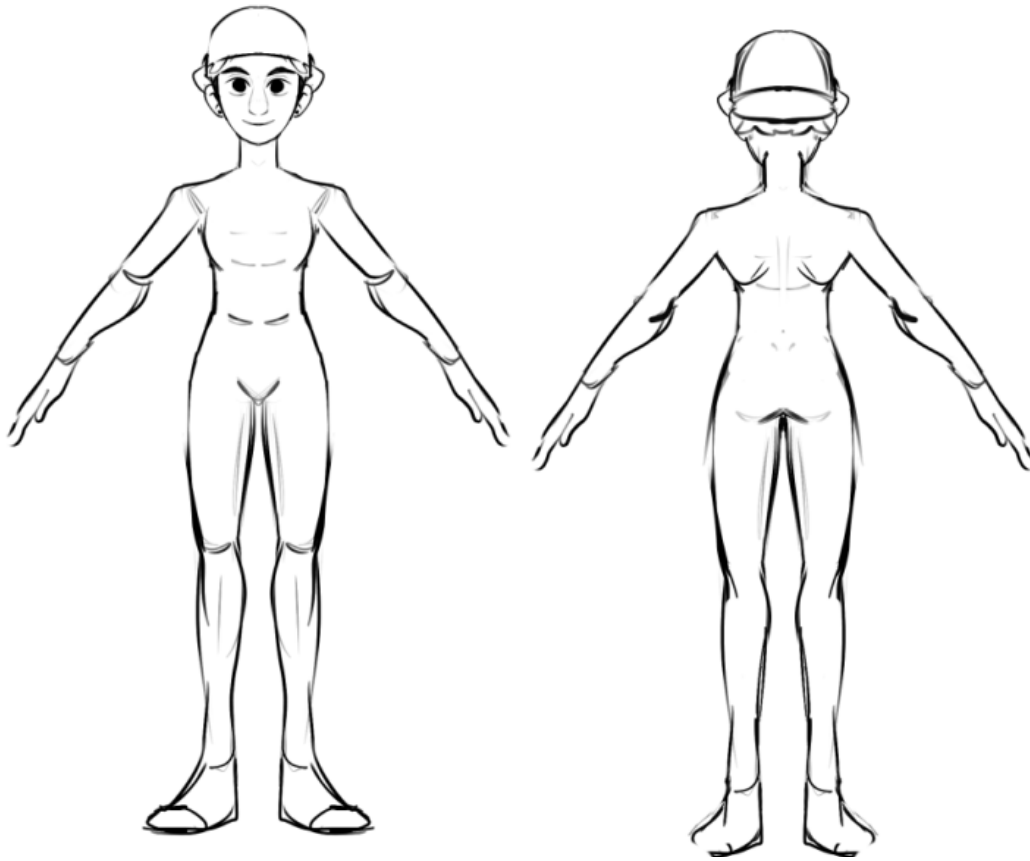




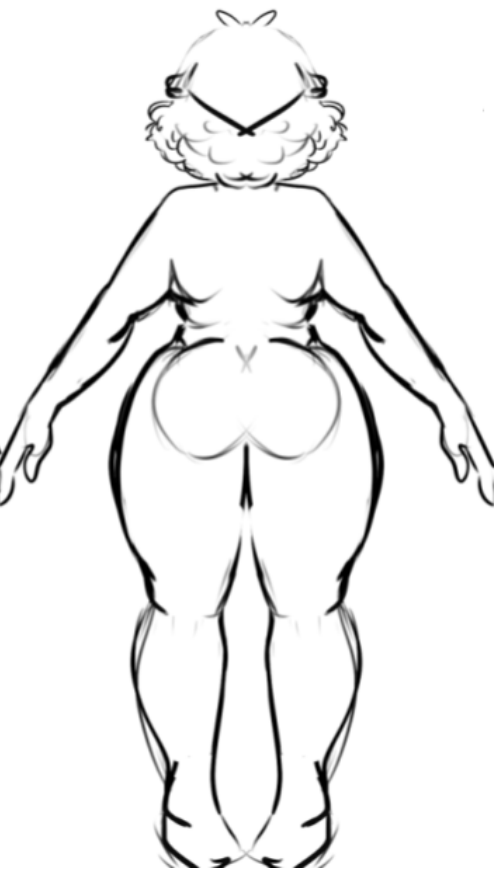
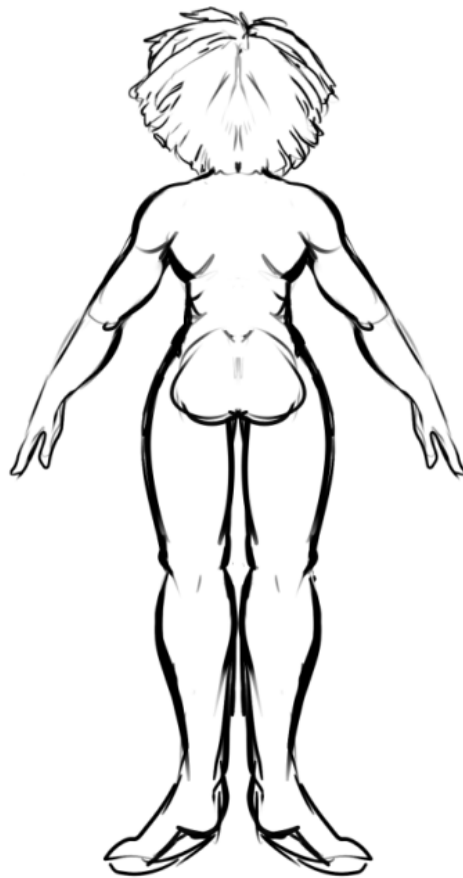
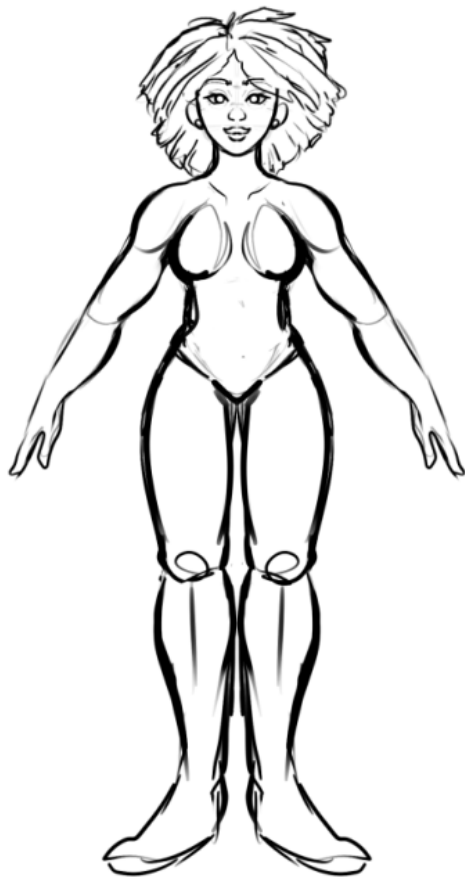


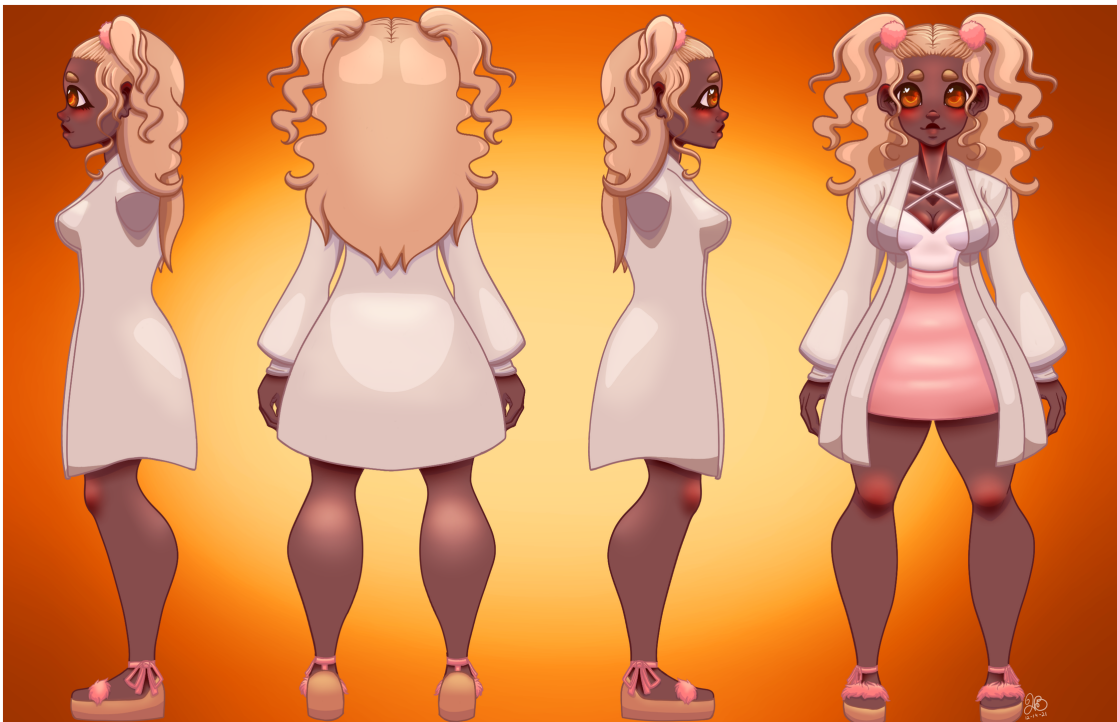






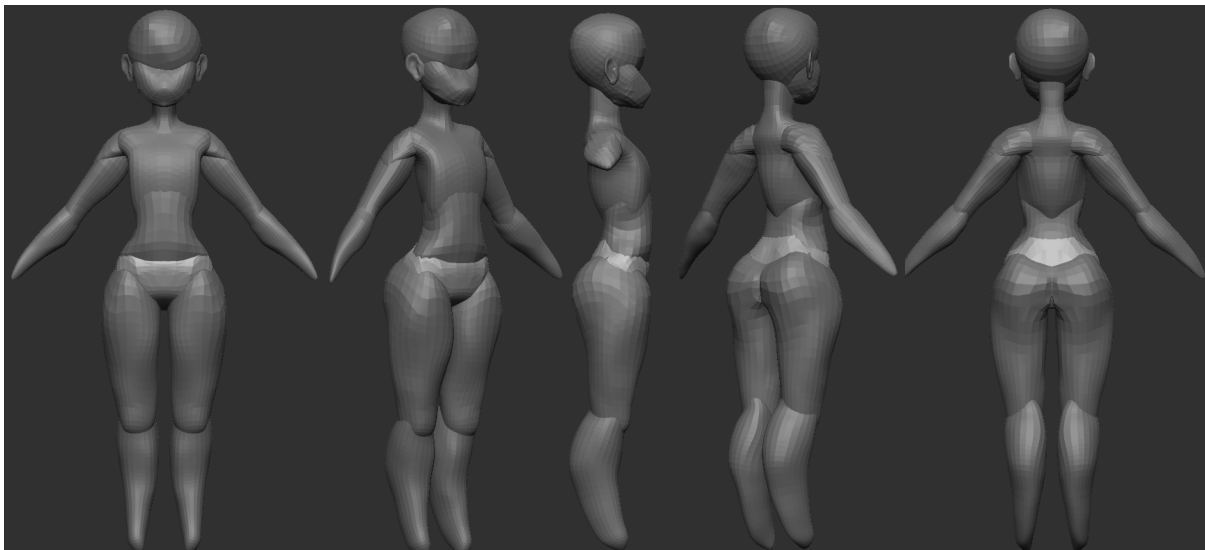




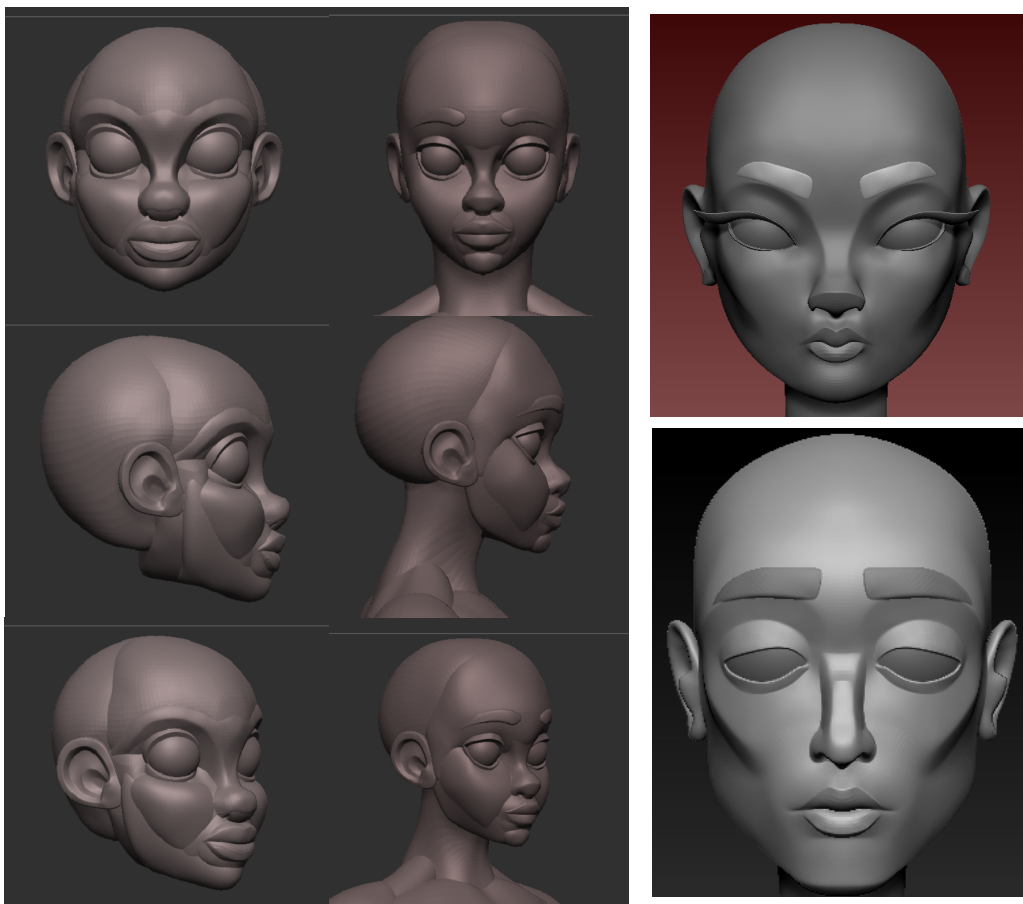


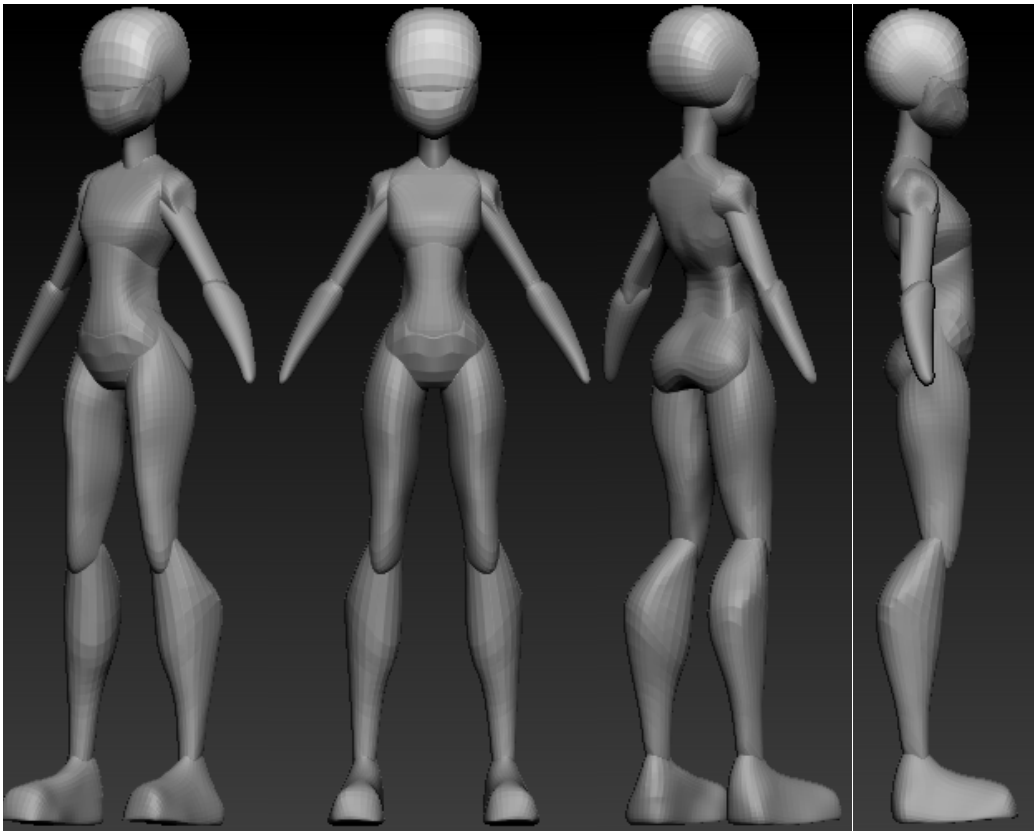
# APPENDIX II

## Block-Outs

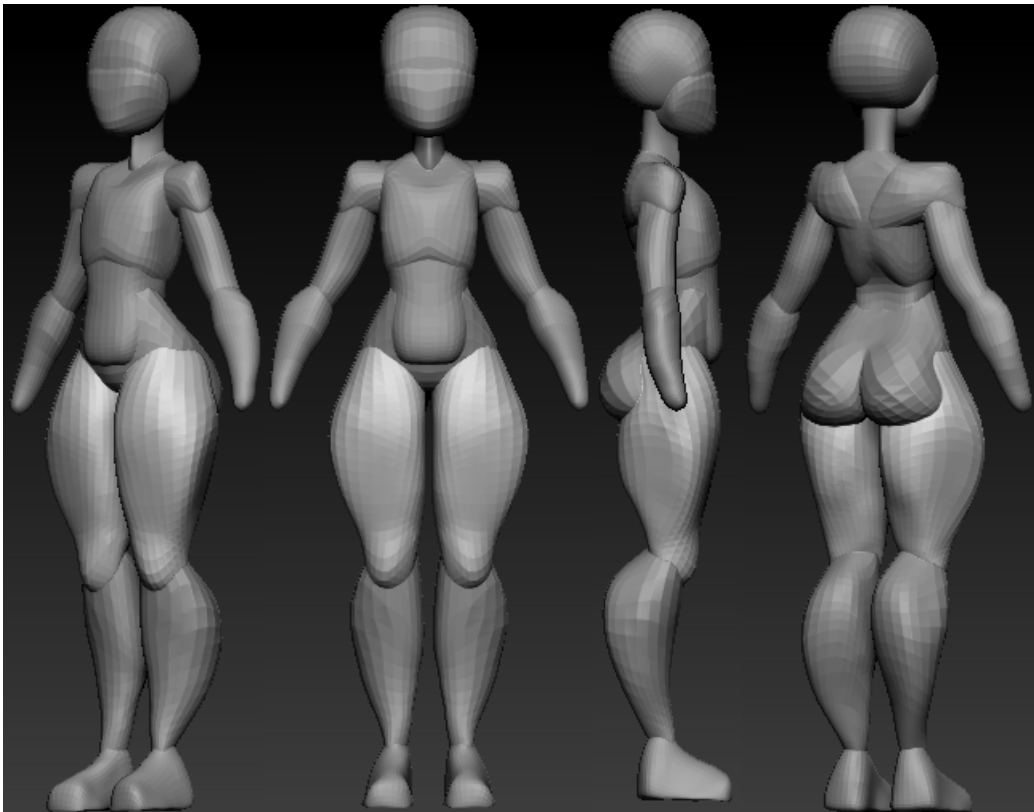


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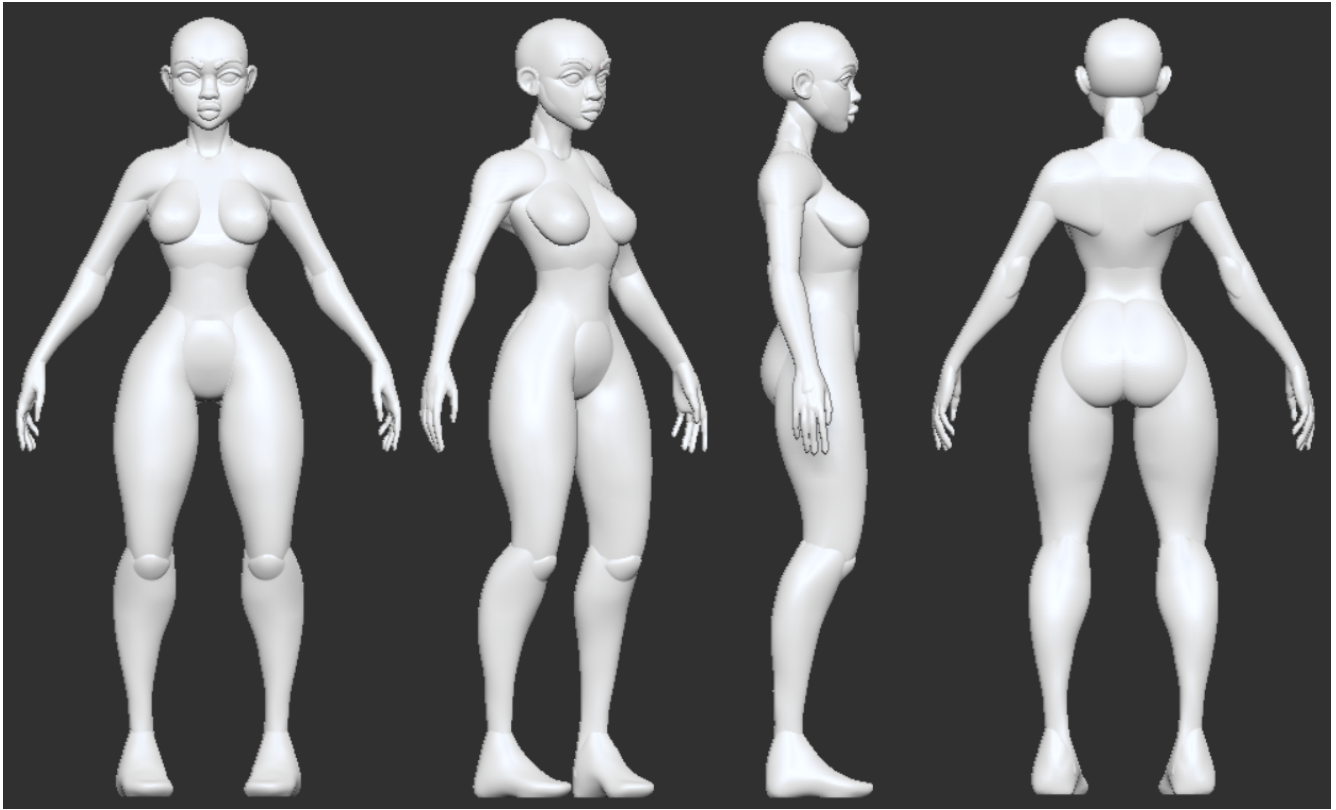




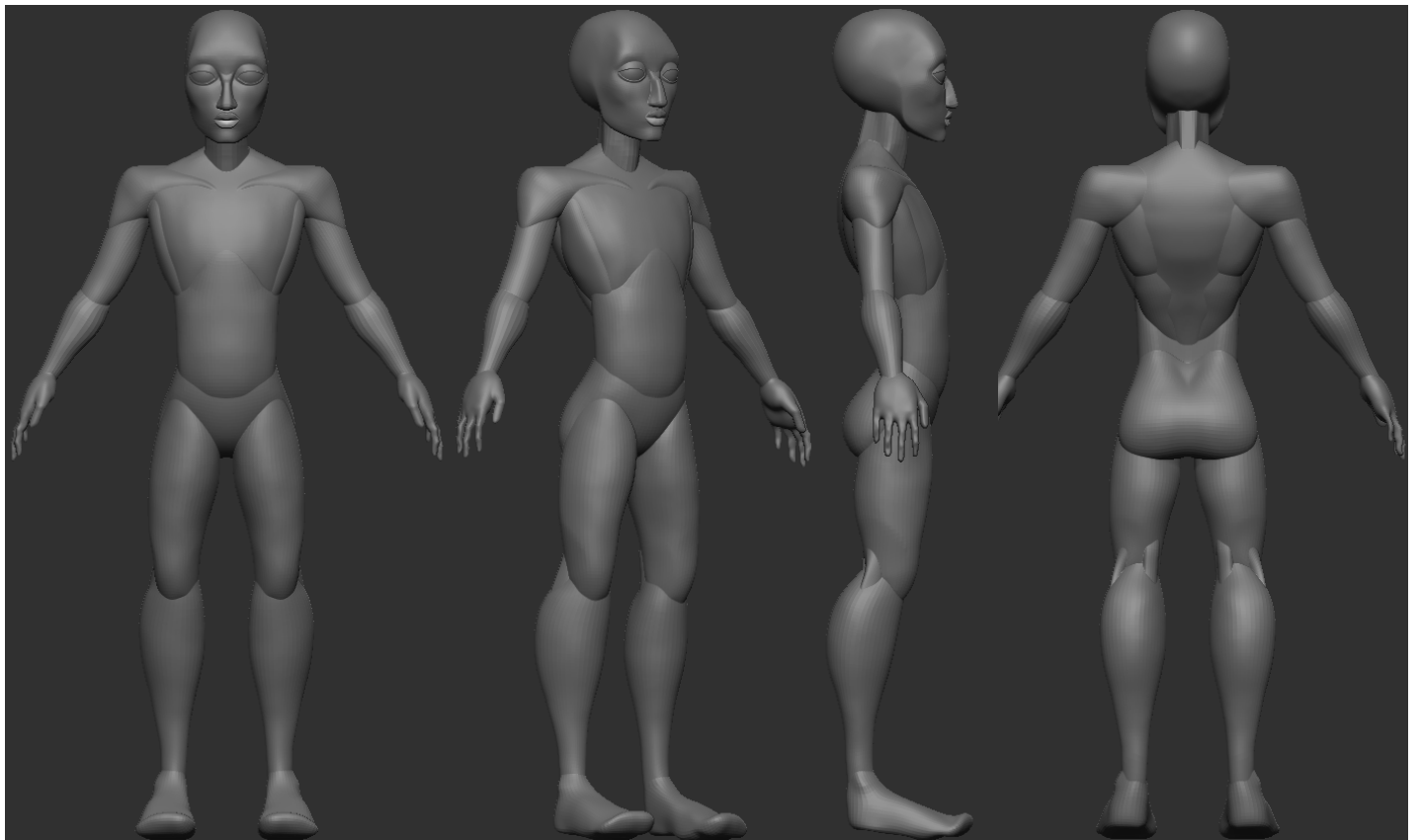
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**LEILAH BLOCK-OUT**

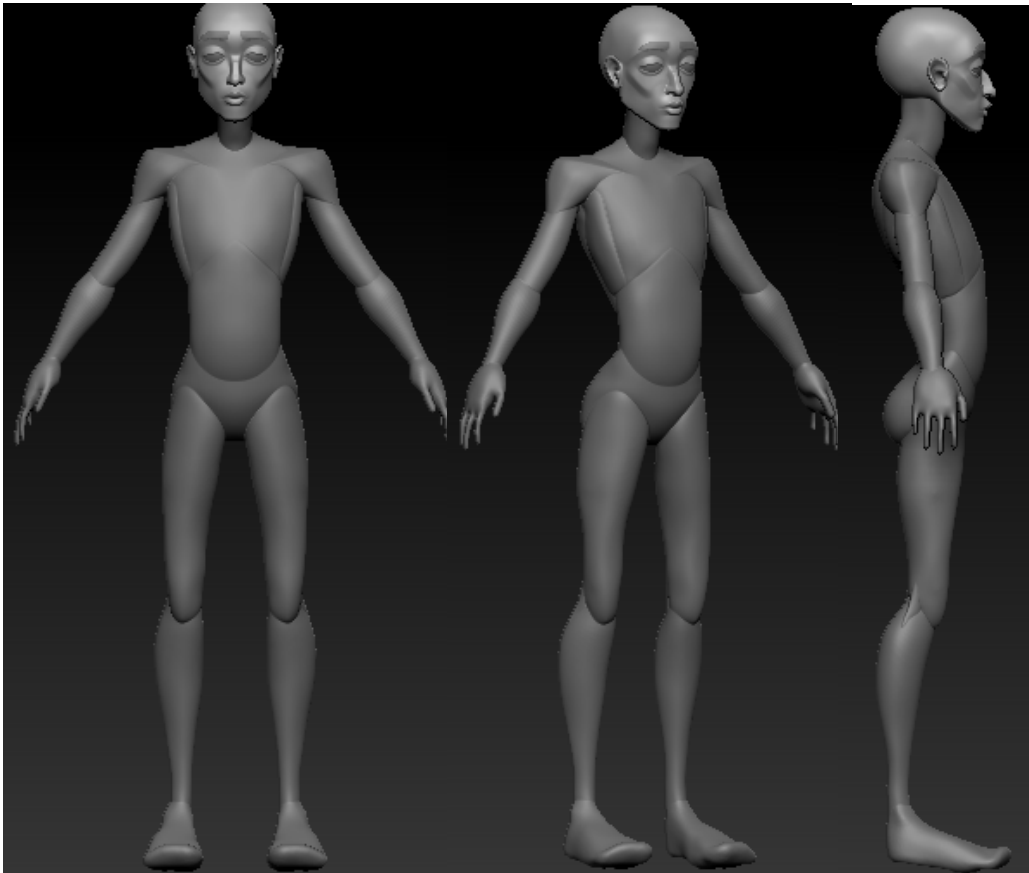


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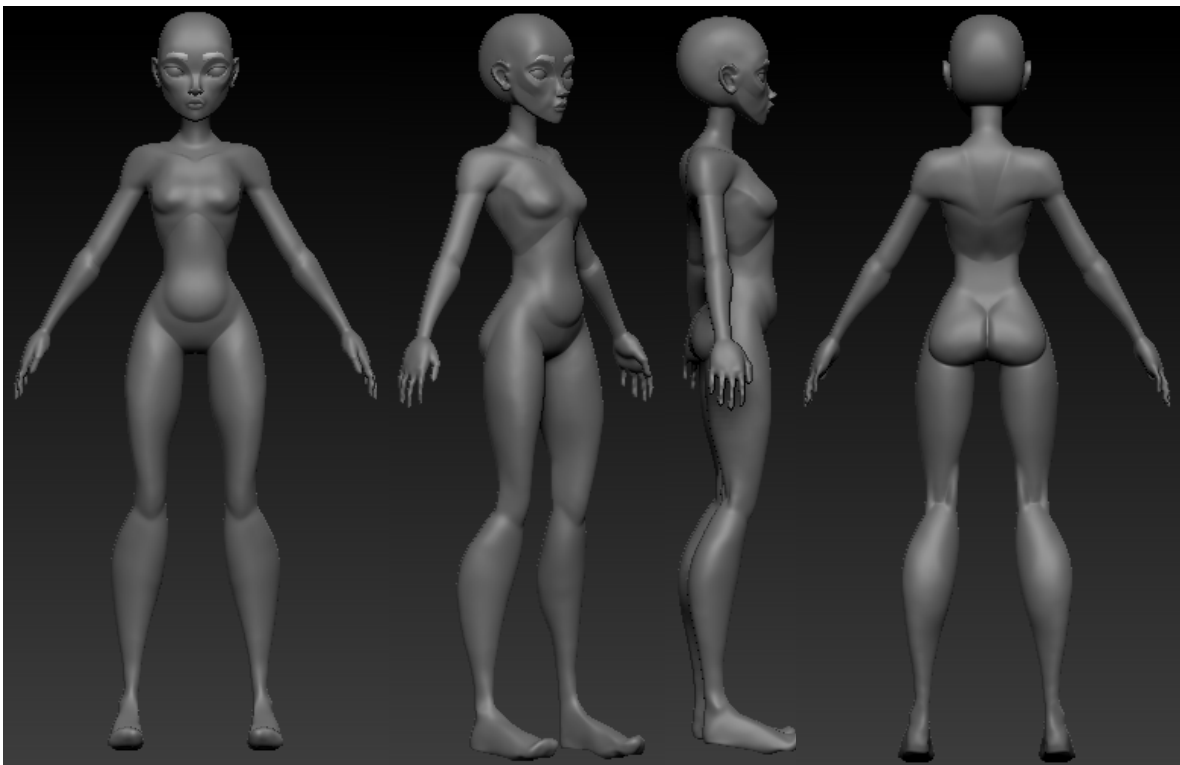


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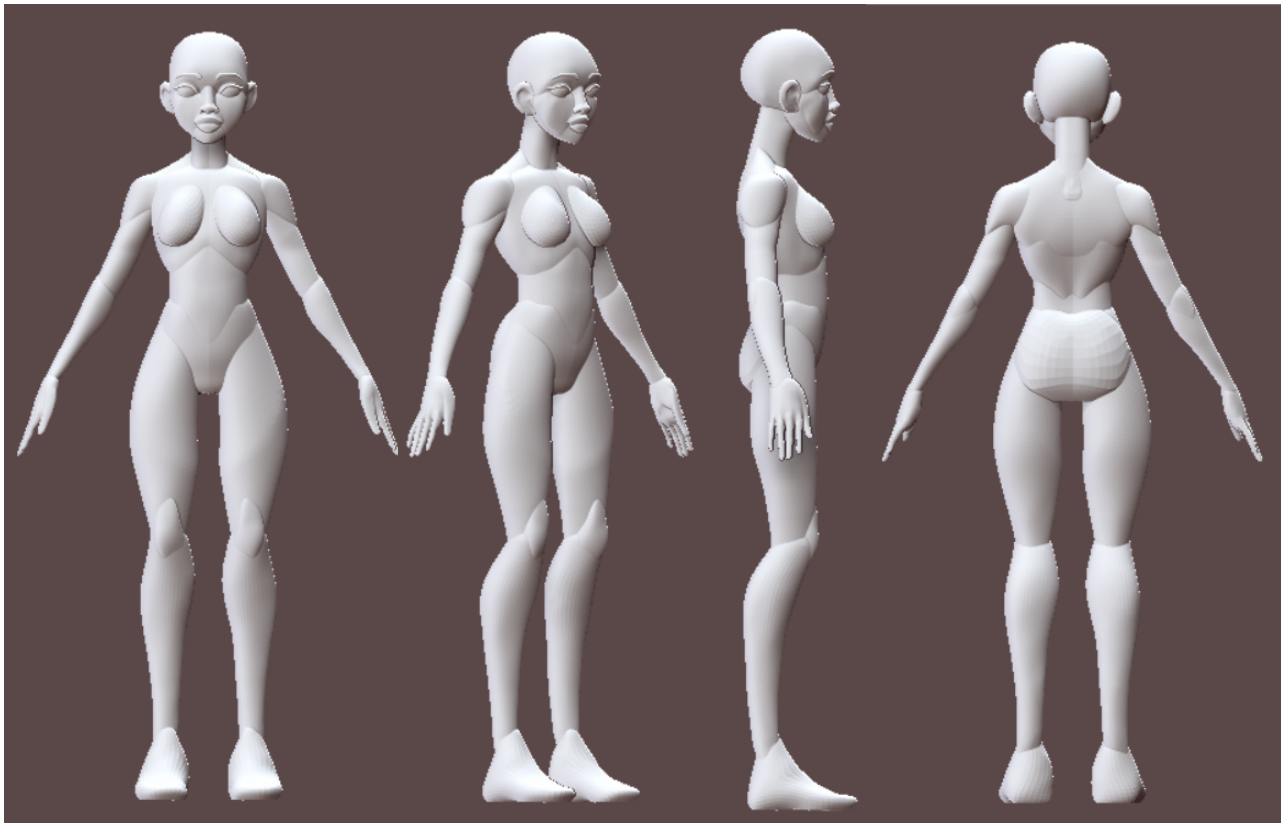




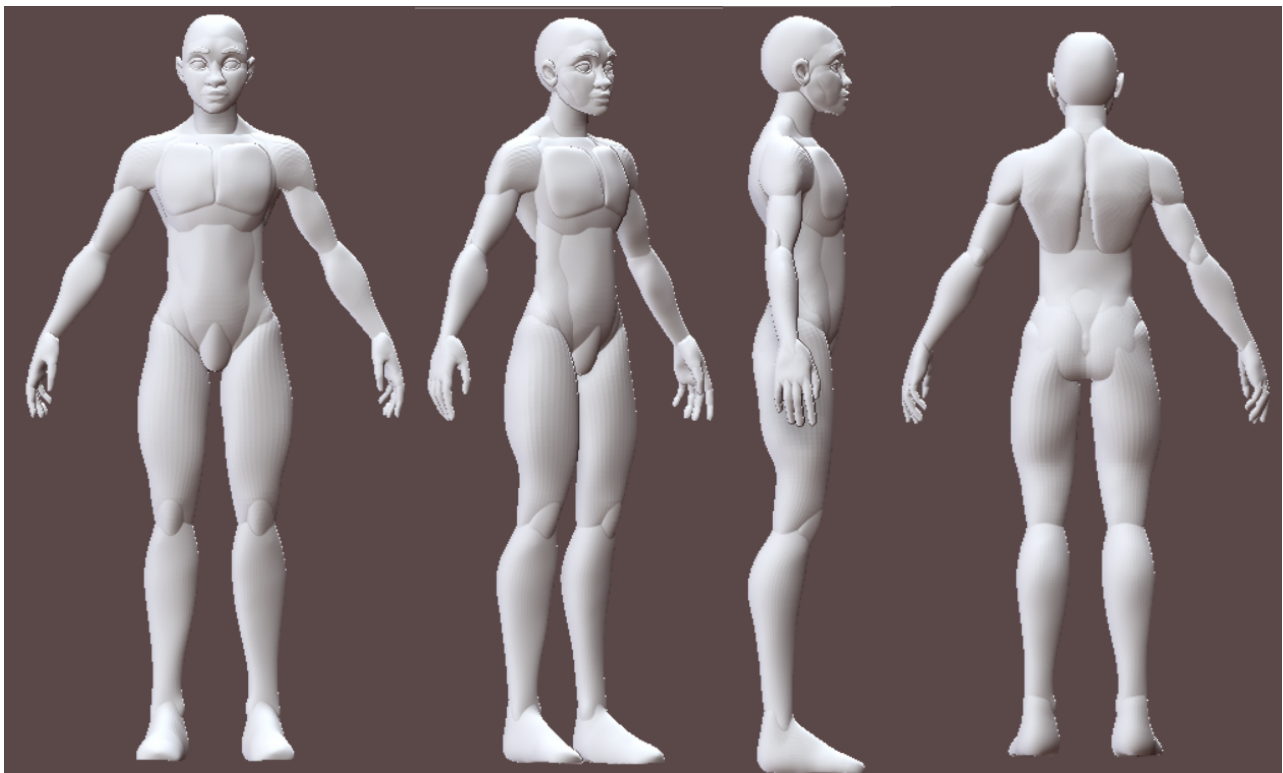
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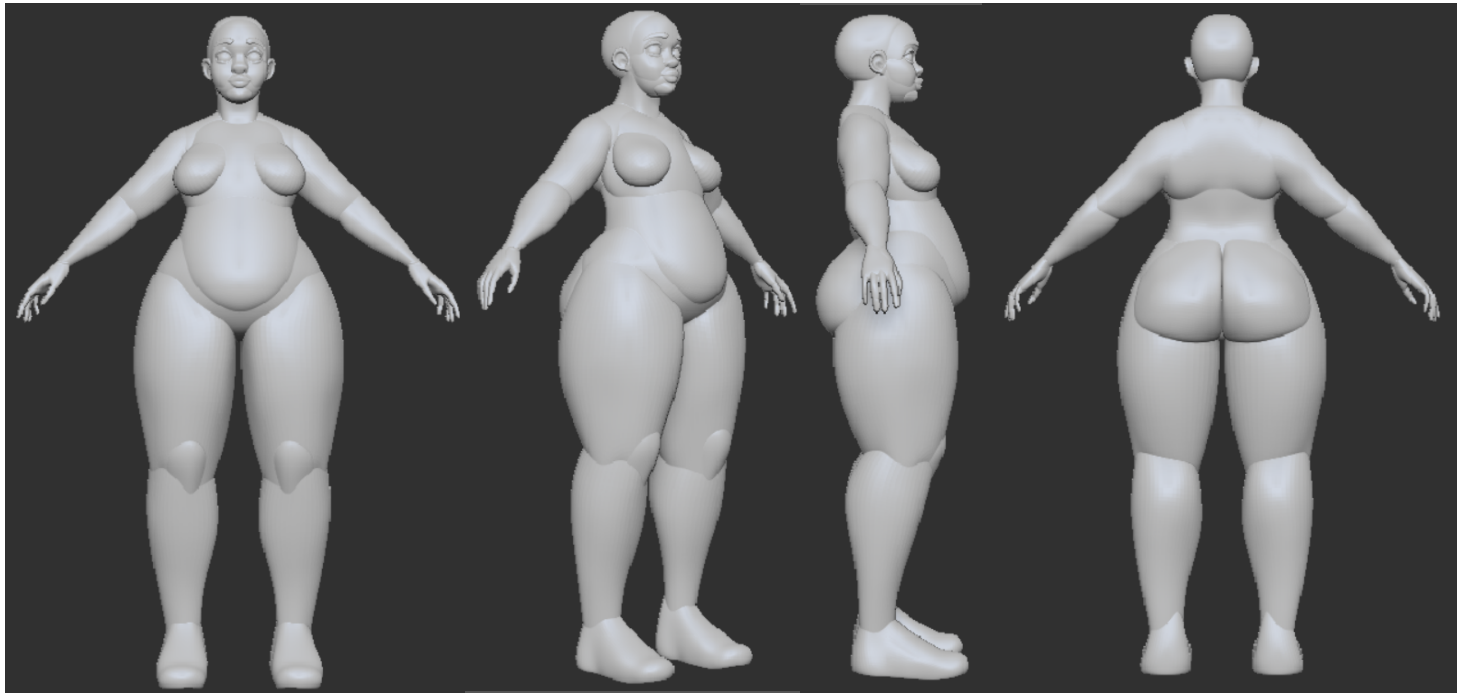
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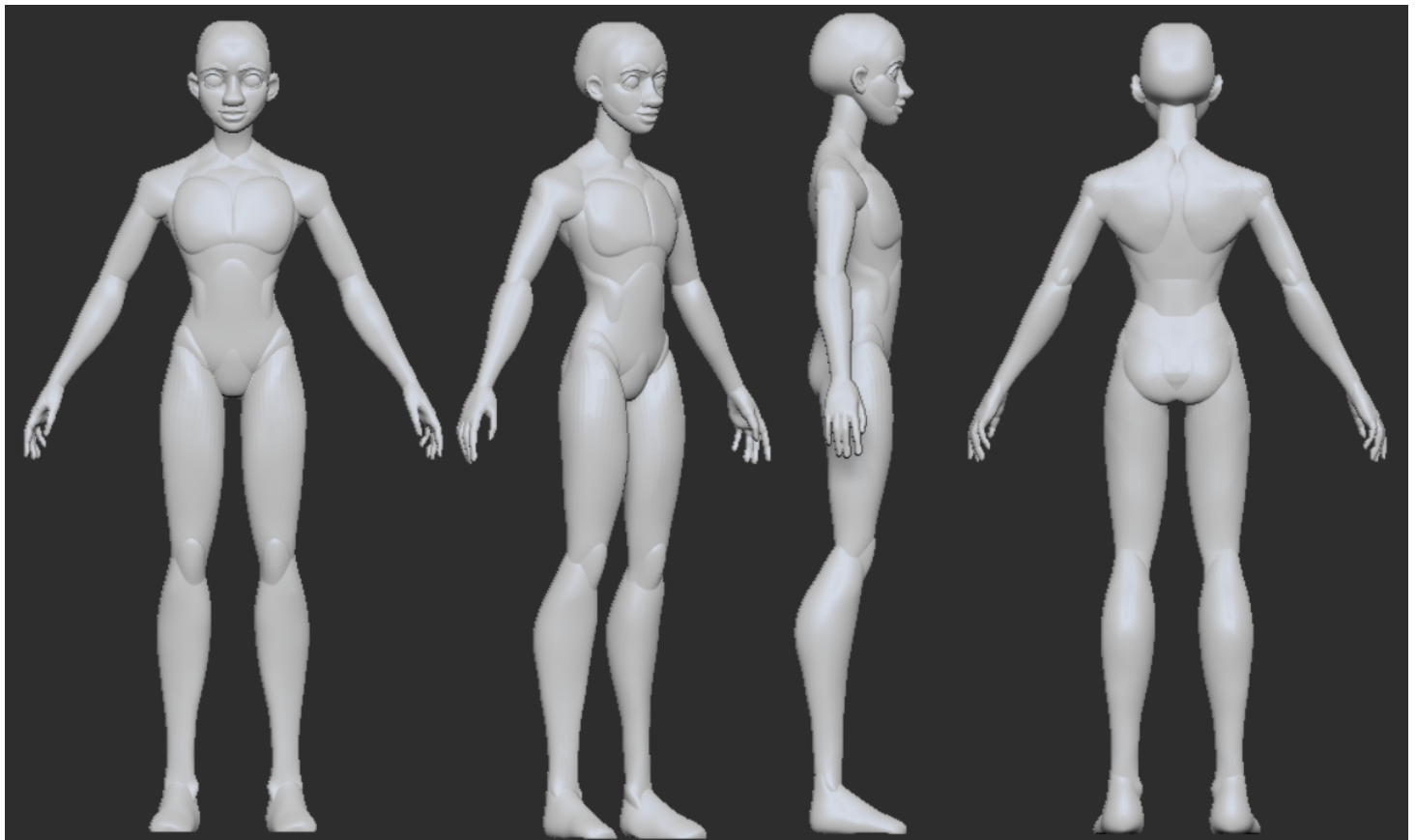
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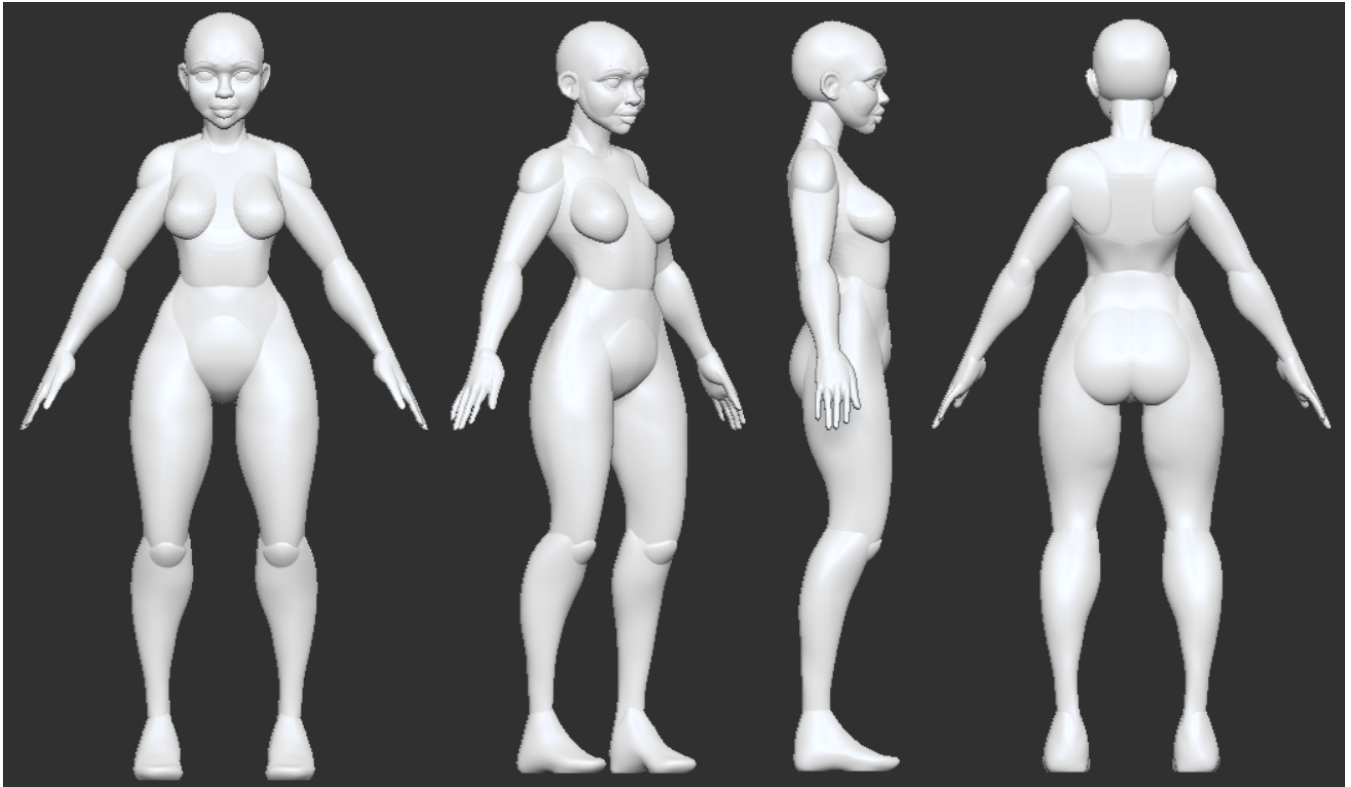
**DEATH BLOCK-OUT**



**VALENTINA BLOCK-OUT**



**ALEX BLOCK-OUT**



**RAE BLOCK-OUT**

# APPENDIX III

Character Models

**EFE**

BY HANNAH BELAN



# AMMA

BY HANNAH BELAN





# SAITOU MIYU

BY CARRIE GRELLA



# RAYAAN

BY HANNAH BELAN



# RAE

BY CARRIE GRELLA



# JEY

BY HANNAH BELAN



# VALENTINA

BY CARRIE GRELLA



# LEILAH

BY HANNAH BELAN





# ALEX

BY CARRIE GRELLA



# IZZY

BY HANNAH BELAN



# DEBRA

BY CARRIE GRELLA



# DEATH

BY CARRIE GRELLA

