CreateAccess

Learning Guide

Animate Photogrammetry Models of People

Introduction

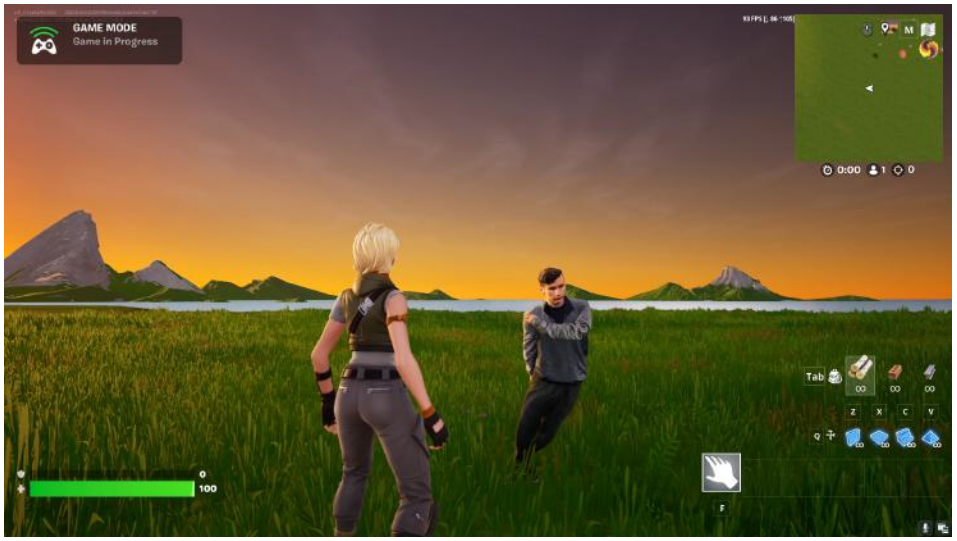
Photogrammetry is a technique that allows a creator to take multiple overlapping photos of a subject and turn the photos into a realistic 3D model. This technique can also be used to scan people and create 3D models of them. You can then animate these photogrammetry models and add them to a 3D experience. Combined with other animation techniques, animated photogrammetry models will bring your island in Unreal Editor for Fortnite (UEFN) to another level!

This Guide will show you how to take a photogrammetry scan of a person using the Polycam mobile app, clean up the resulting 3D model using Blender, apply animations in Mixamo, and bring the animated model into your own Fortnite island using UEFN.

To achieve the outcomes outlined in this Guide, it is very important that you keep close track of multiple files and use the correct one at each step. We have provided recommended naming conventions to help you keep track of your files.

Video Learning Guide for this Lesson:
https://www.youtube.com/watch?v=iyWDNp1jLss

Contents



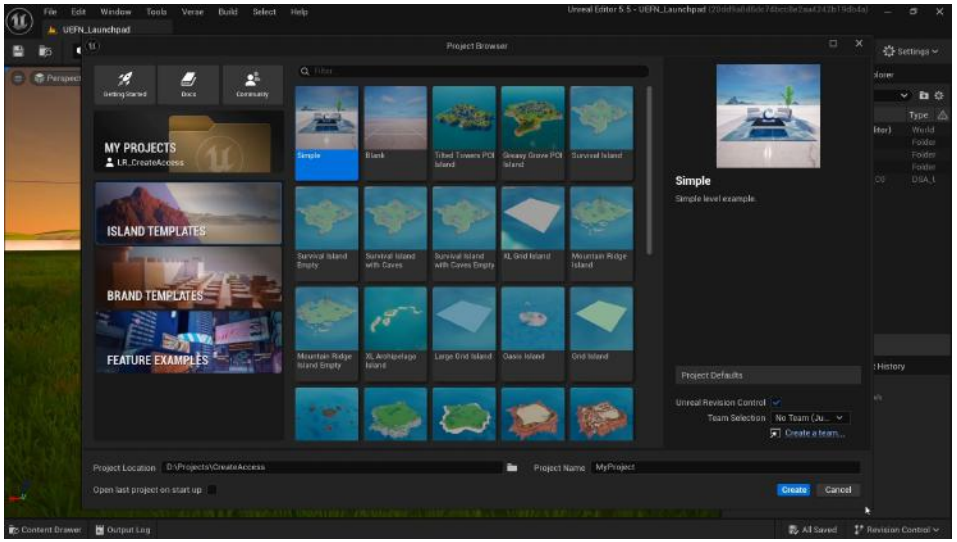
Prior Knowledge Check

To successfully complete this lesson, you should be familiar with the basics of the UEFN User Interface and be comfortable navigating in UEFN. Take a look at the Unreal Editor for Fortnite User Interface Basics to familiarize yourself with the interface.

You can also use the Epic Games Documentation for more detailed information on the UEFN User Interface.

Getting Started

Make sure you have Blender and UEFN installed on your computer. Create a new project in UEFN and have an island ready to import your animations into.



Step 1: Understand 3D character components

Preview

Using your own character can do a lot to make your 3D experience more unique and engaging. However, 3D characters, by design, have a lot of components that the creator needs to keep track of. In this section, you will briefly learn about different parts that make up a 3D character and how they work.

Experiment

CHARACTER MODEL

A 3D model is the 3D representation of your character on screen. You can think of the model as the "sculpted body" of your character. The model can include detailed facial features, clothes, hair, etc. But it cannot be animated to move like a human without a skeleton, and will look plain gray without any textures added.

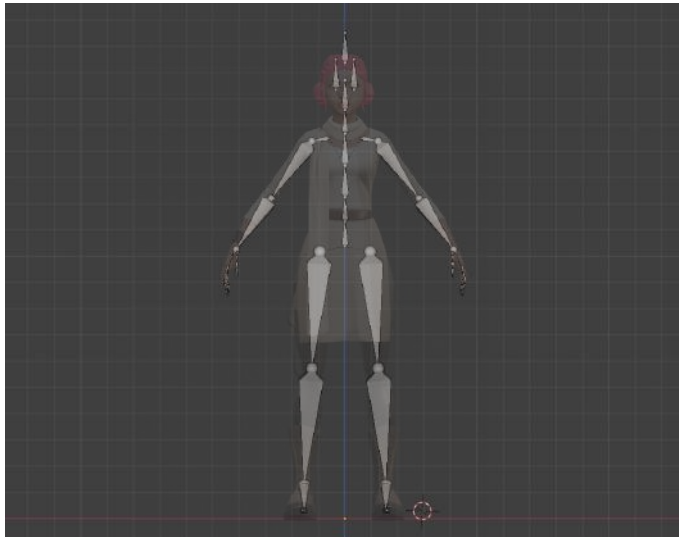
TEXTURES

Textures are image files that define color, detail, or other surface information of a 3D model. A texture can also define how the surface of a model reacts to light (shiny, dull, metallic, etc.). By adding textures to your character, you can visualize the color and details of the hair, skin, clothing, etc. When you do a photogrammetry scan of a person, the textures will be created along with the model.

SKELETON AND BONES

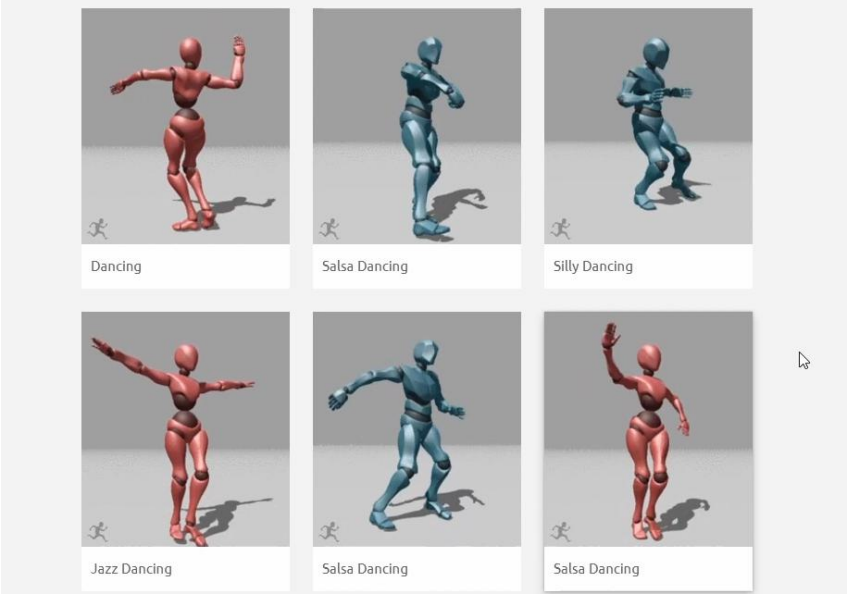
Just like the human body, 3D characters have a collection of bones and joints inside them that form a skeleton. As mentioned above, 3D character models cannot be animated to move their limbs like humans until they have skeletons.

With the skeleton, each joint can be animated to move the corresponding parts of the body. Creators can animate their 3D characters by animating every single joint by hand, or they can use 3D animation libraries like Mixamo that will create a skeleton for a character automatically and allow the creator to decide how to animate it by providing a library of options.



ANIMATION FILES

It is important to keep in mind that animations and skeletons are closely linked together. When you download an animation file online or create your own animation for “Character A”, that animation will be dependent on the skeleton of “Character A.” This means that the same animation file cannot be used on a different character – for example, “Character B”.



Step 2: Create a photogrammetry model with Polycam

Preview

The first step in animating your own realistic character is to scan yourself or someone else to create a photogrammetry model. Download the Polycam app on your phone and follow the instructions to create your own 3D model of a person.

Experiment

SCAN A PERSON

Pick a well-lit environment without any harsh lighting or shadows. If you would like to create a model of yourself, you will need the help of another person to scan you.

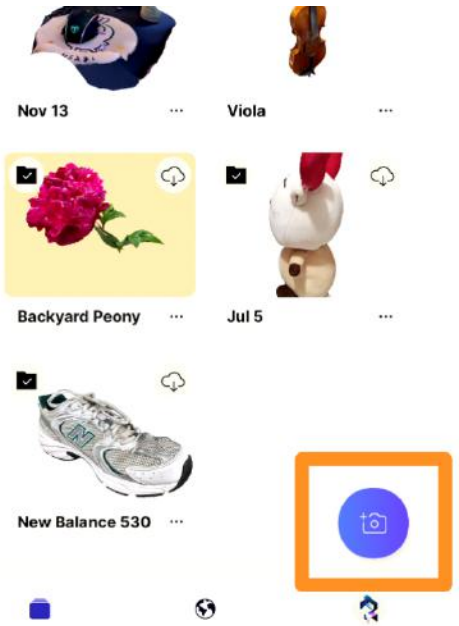
The subject of the scan should stand in **A-pose**, feet shoulder width apart and arms down at a 45 degree angle.

While scanning, make sure the subject stands as still as possible throughout.

For best results, the person being scanned should wear clothing with different details and textures, instead of plain colors. If the subject has long hair, it's suggested that they tie it because long and loose hair is harder to scan accurately.

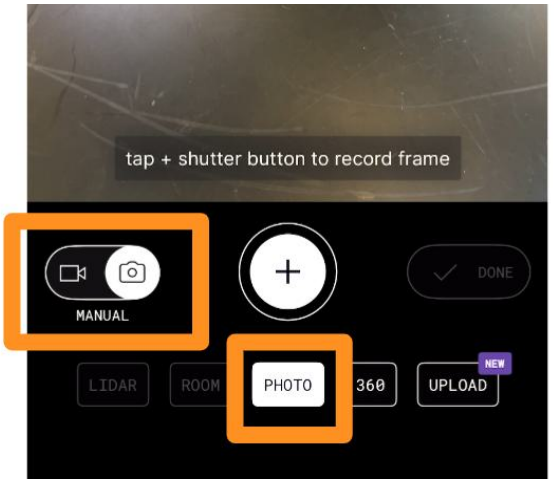
Open the Polycam app on your device and click on the camera icon in the bottom right corner to start a new scan.

Keep in mind that the app interface might look different depending on the device being used. However, the process is generally the same. This Guide will be showing examples from an iOS device.



If you're using Polycam for the first time, switch to **Manual Mode** to ensure you can take photos at your own pace.

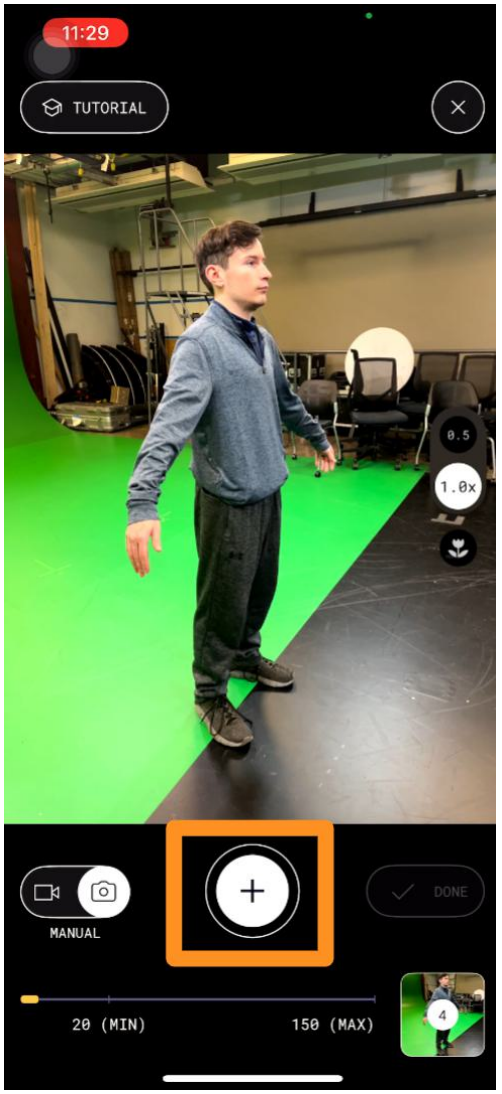
Before starting the capture, make sure the app is in **Photo Mode**.



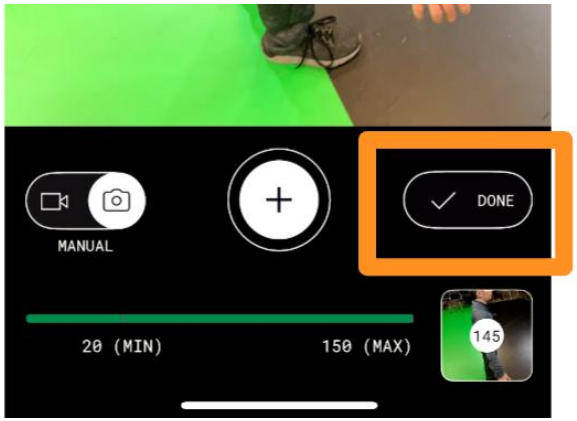
Use the **plus icon** in the middle of the screen to start taking pictures of your subject.

Start with a full view of the person you're scanning and walk around them while taking pictures in small increments. Each picture should **overlap about 50%** with the one before it.

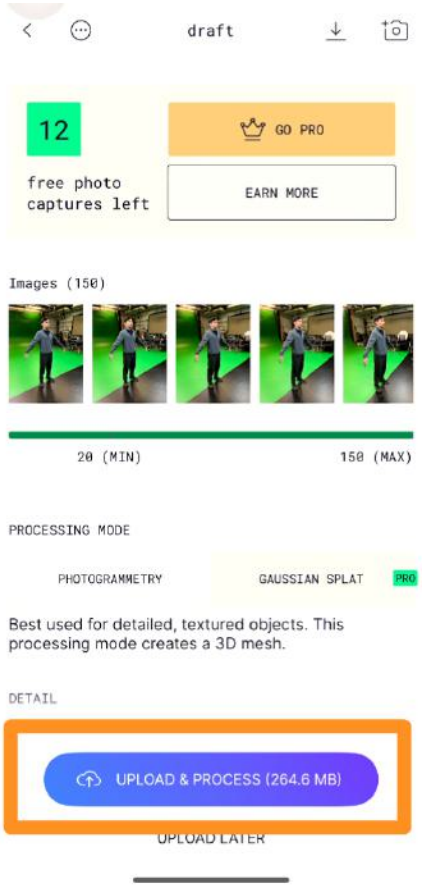
After doing one full turn, take more pictures from different angles, including the top and bottom. When you cover all angles, make sure to do some close-ups. The more pictures you take, the more accurate and detailed the final 3D model will be.



Take anywhere between 20-150 pictures. When done, click on **Done** in the Polycam app.

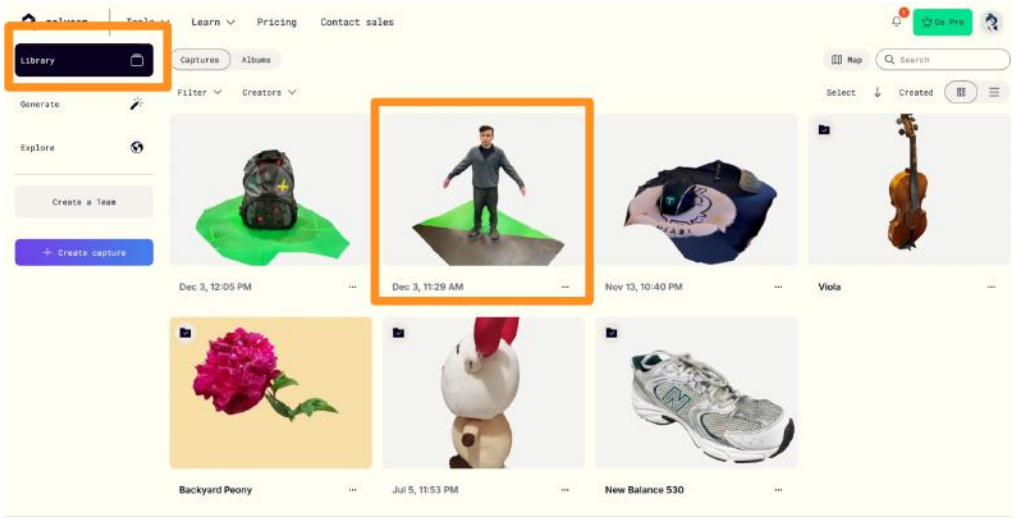


Select **Upload & Process** at the bottom of the screen and wait for your model to be processed, which might take a few minutes. Keep the app open while processing.



When the process is complete, you can download the 3D model to your computer from the poly.cam website.

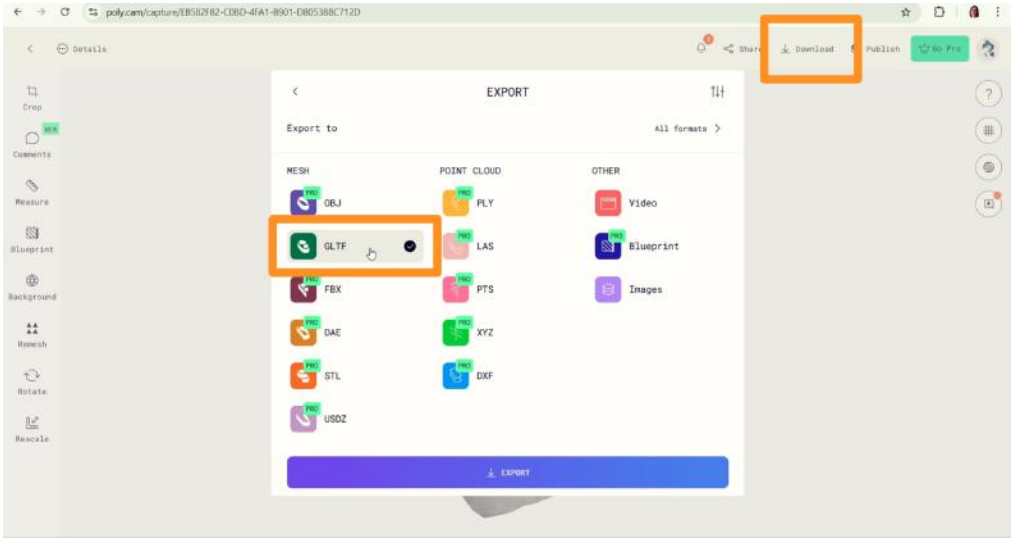
Log into your account and go to your **Library**. Click on your scanned person model to view and download it.



Click on the **download icon** at the top of the screen.

Select the **GLTF** file format option and click on **Export** to download your model. It will be automatically downloaded to the “Downloads” folder on your computer.

We recommend locating the file and naming it
“[file-name]_preBlender”
(for example: MyAvatar_preBlender.gltf)



Self Check

Were you able to successfully scan a person and view the 3D model you created on the Polycam website?

Step 3: Edit your model in Blender

Preview

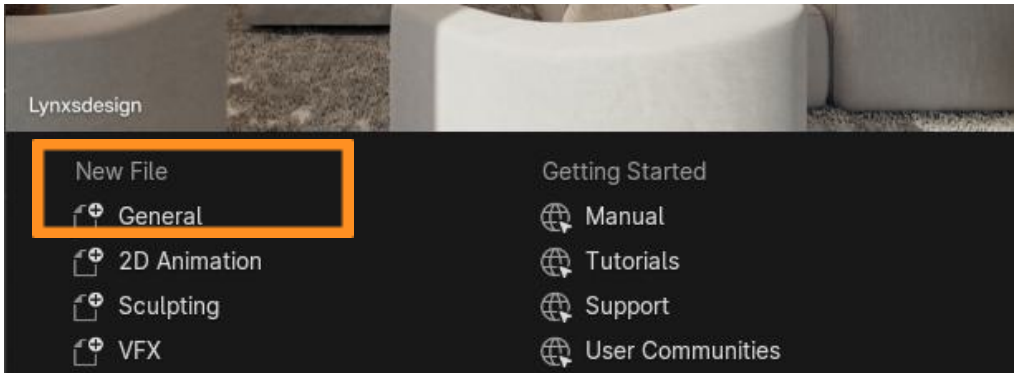
More often than not, the 3D models from a photogrammetry scan are not immediately ready to use. By doing some “clean-up” in Blender, you can delete any floorground or surrounding area captured during the scan.

Experiment

OPEN YOUR MODEL IN BLENDER

Blender is a free 3D creation suite that is commonly used in industry. Blender is a versatile tool that can be used in many areas of 3D creation, but for this lesson, you will need it briefly to clean up your model and change its file format.

Download Blender and follow the prompts to install it on your computer. Once installed, launch Blender and select **General** from the New File options.

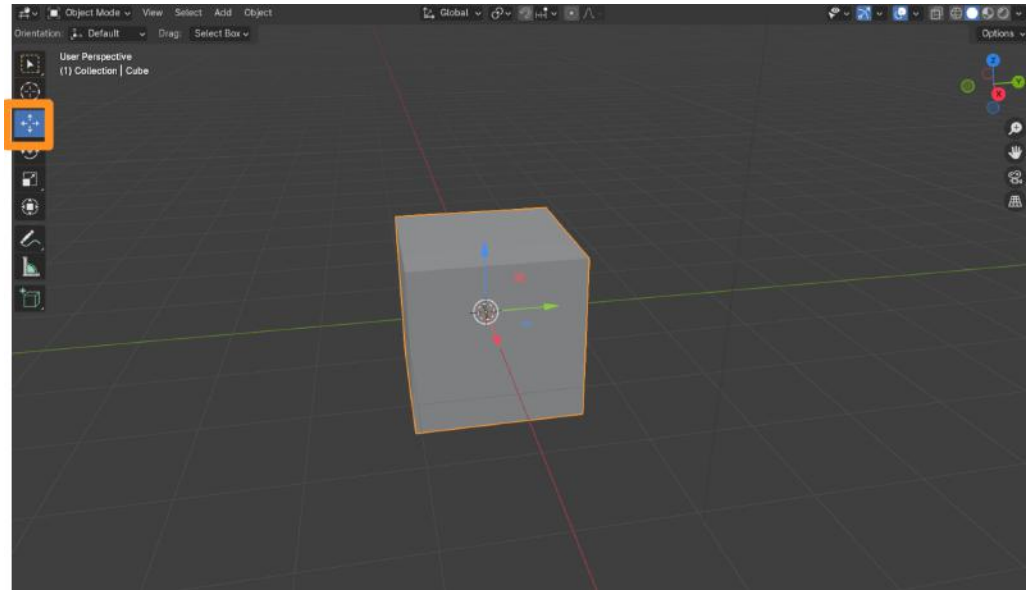


To navigate in the Blender viewport, hold down the **SHIFT key** and **Middle Mouse Button** together and move your mouse.

To rotate around an object, hold down **Middle Mouse Button** and move your mouse in the viewport.

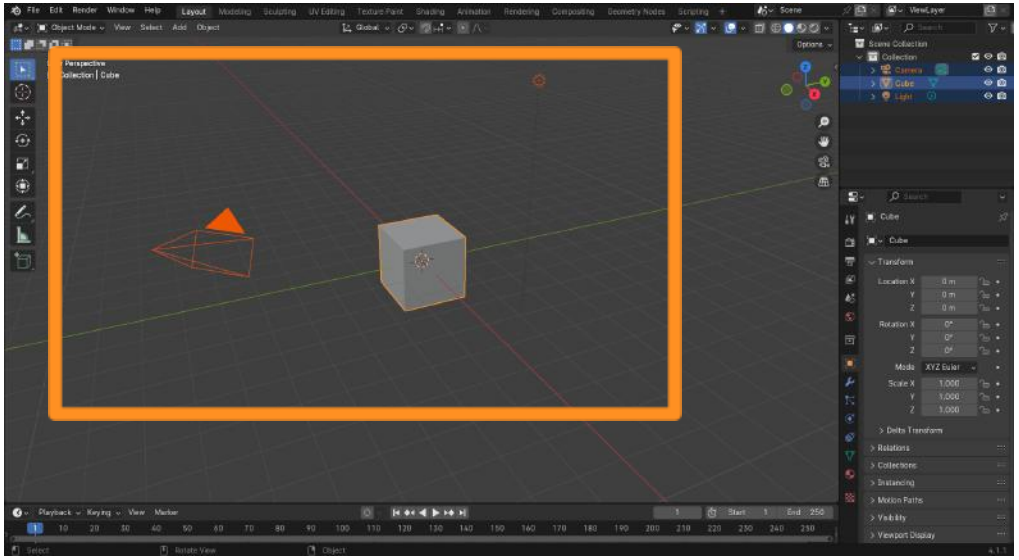
To zoom in or out, use the **scroll wheel** on your mouse or hold down **CTRL** and use the **Middle Mouse Button**.

To move an object in the scene, you can enable the arrow gizmos by selecting the **“Move”** icon from the left panel.



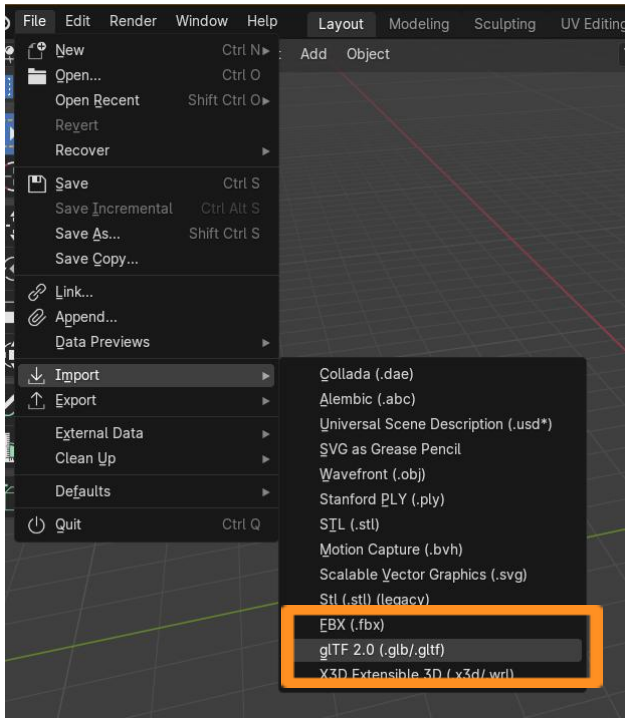
You will see some default objects (cube, camera, light) in the Blender scene that opens. You can delete these objects since they’re not needed.

Click on the **“A” key** to select everything in your scene and press **Delete** (or the **“X” key**) to clear the scene.

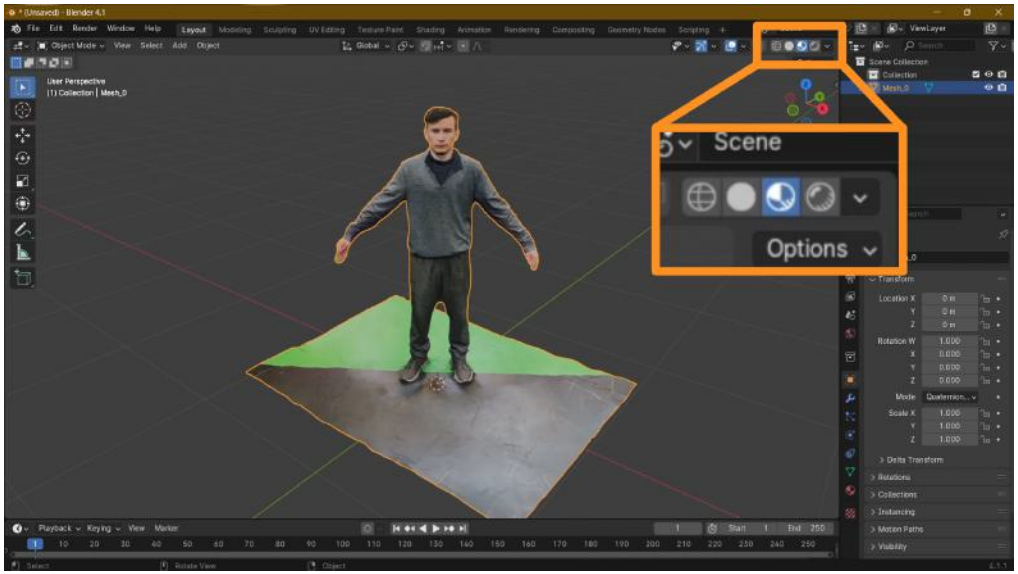


Import your photogrammetry model into Blender by selecting **File > Import > .glb/gltf**, and then navigate to the folder where the model was downloaded to your computer from the Polycam website.

The file should have been named **“[file-name]_preBlender”**.

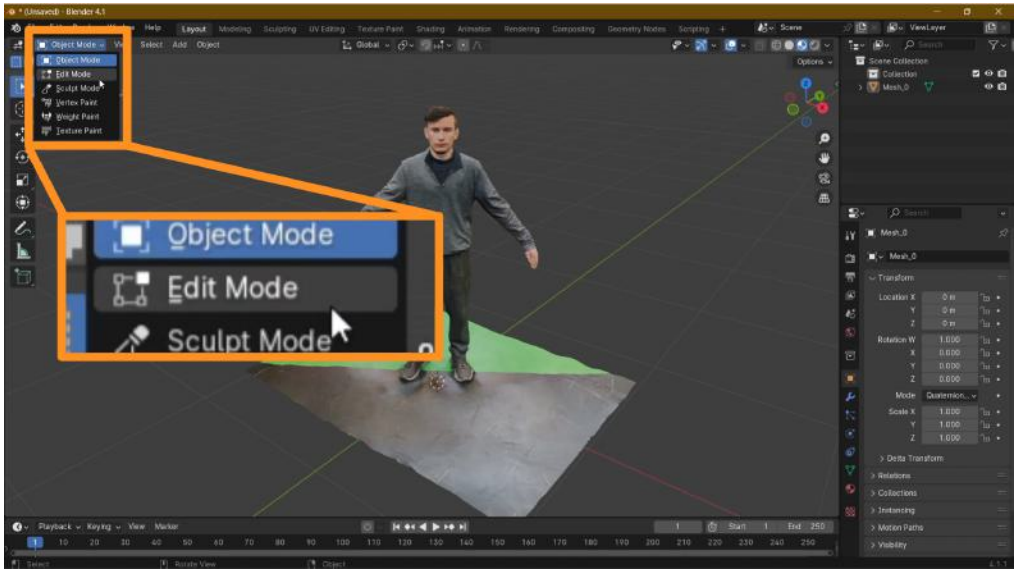


Your character model will appear in the Viewport. If the model appears gray, you can enable the textures and colors on the viewport by clicking the **Viewport Shading** icon on the top-right corner.



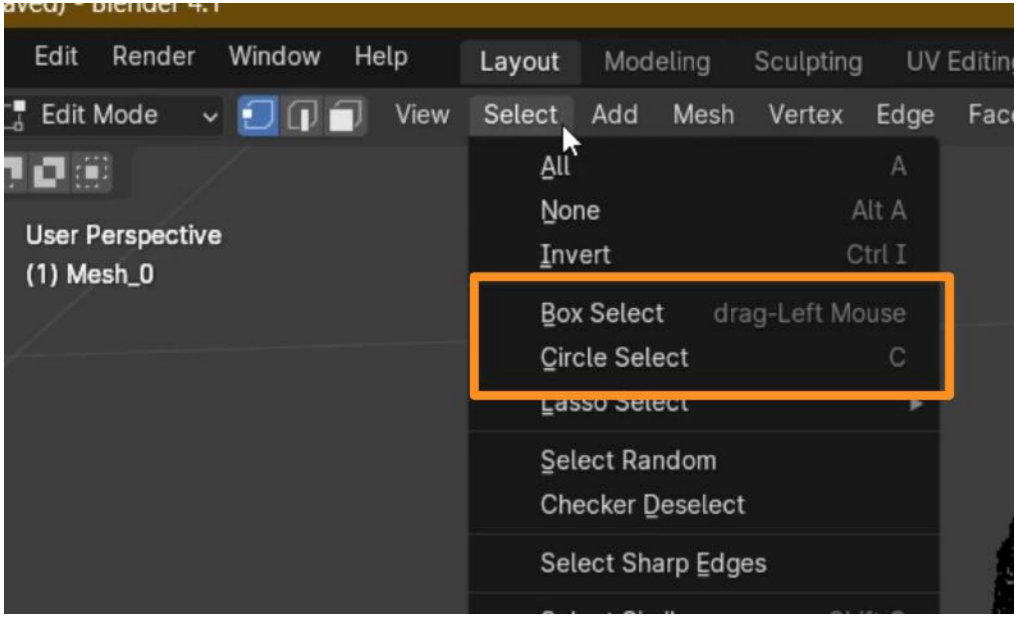
Deselect everything by clicking an empty space in the Viewport away from your model.

Enter **Edit Mode** from the “Object Mode” dropdown in the top menu bar to start cleaning up your model.

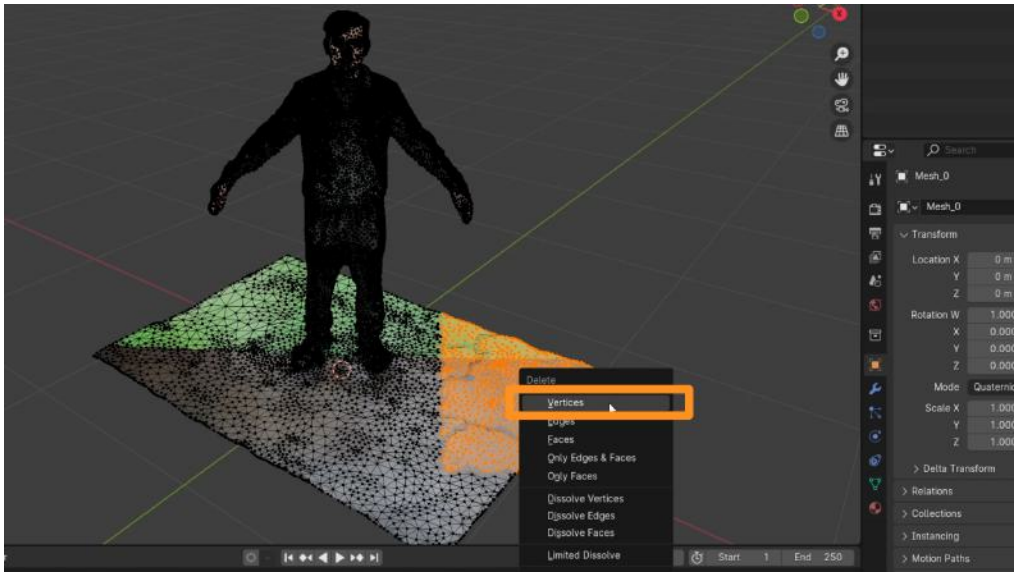


There are a few different tools you can use to select the larger areas on your model to delete them. From under the **Select** menu option, try using the **Box Select** or **Circle Select** tools on your model.

Click and drag the box or circle on your model to select the area you want to delete.



Press the **Delete** or **“X” key** on your keyboard to delete the area. From the pop-up, choose **Vertices**.



Repeat this process as much as you need to get rid of the unwanted areas surrounding your model.

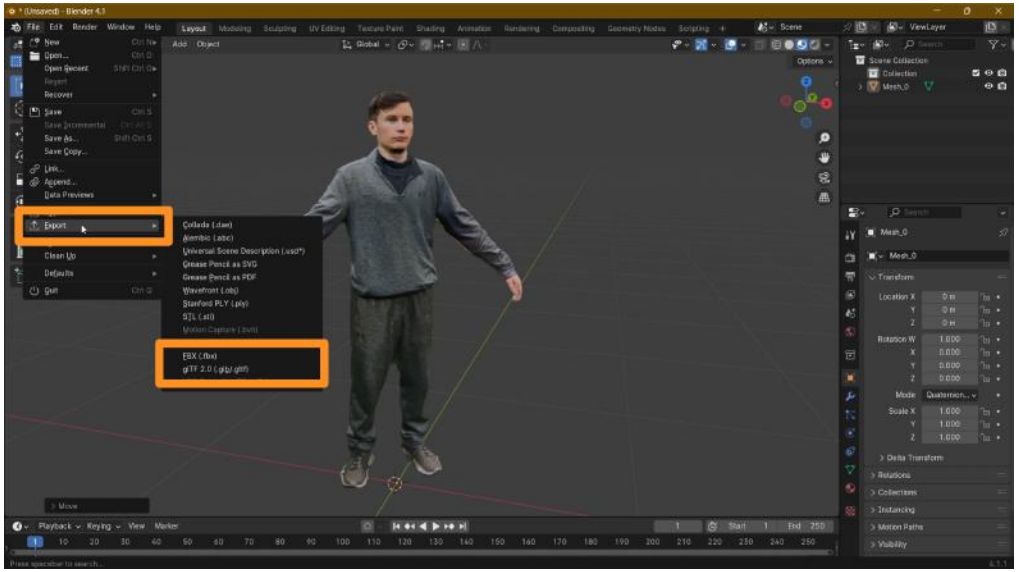
When you're done, export your character model from Blender. We will be exporting twice with different file formats.

First, go to **File > Export** and select the **FBX** option. Select the location you want to export on your computer and name this file **"[file-name]_preMixamo"** (for example: MyAvatar_preMixamo.fbx).

This file is the clean version of your character that we will use in the next step to add bones to, in order to animate it in Mixamo.

Second, select the **GLB/GLTF** option. Select export location, and name this file **"[file-name]_texturesOnly"** (for example: MyAvatar_texturesOnly.glb)

This file will be used later in UEFN to apply textures and colors to your character on your island.



Self Check

Could you clean up your model as you wish? Were you able to export it from Blender in different file formats?

Step 4: Select animations in Mixamo

Preview

After creating and cleaning a photogrammetry model, you now have a 3D model with textures. There are a few more steps to complete before animating your model and making it move. This section will help you select an animation to apply to your character in Mixamo and get it ready for import into UEFN.

Please carefully note all the different file types and suggested naming conventions in this section.

Experiment

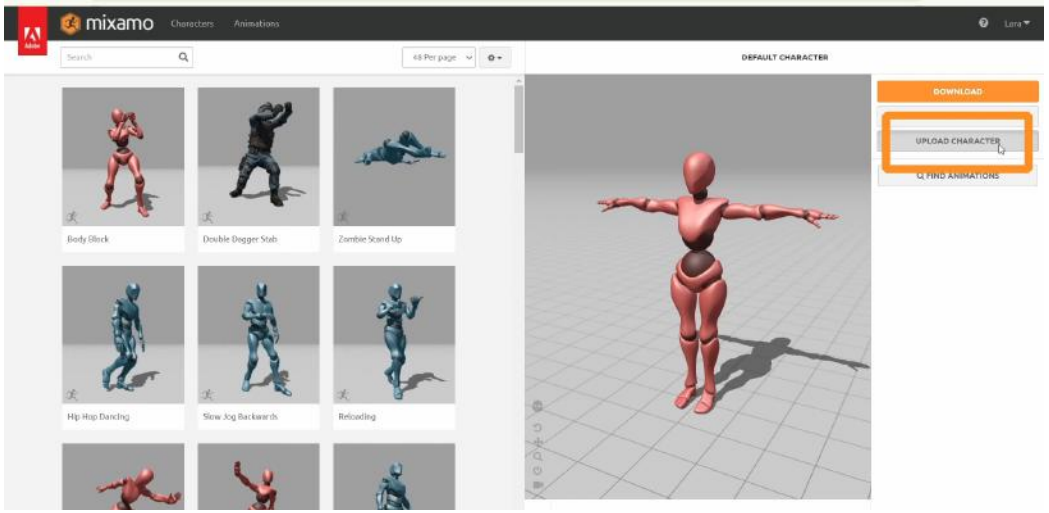
UPLOAD TO MIXAMO

Go to mixamo.com and sign up for free using your email.

You will see an avatar on the right and animation thumbnails on the left. We need to upload our photogrammetry character to the viewport on the right.

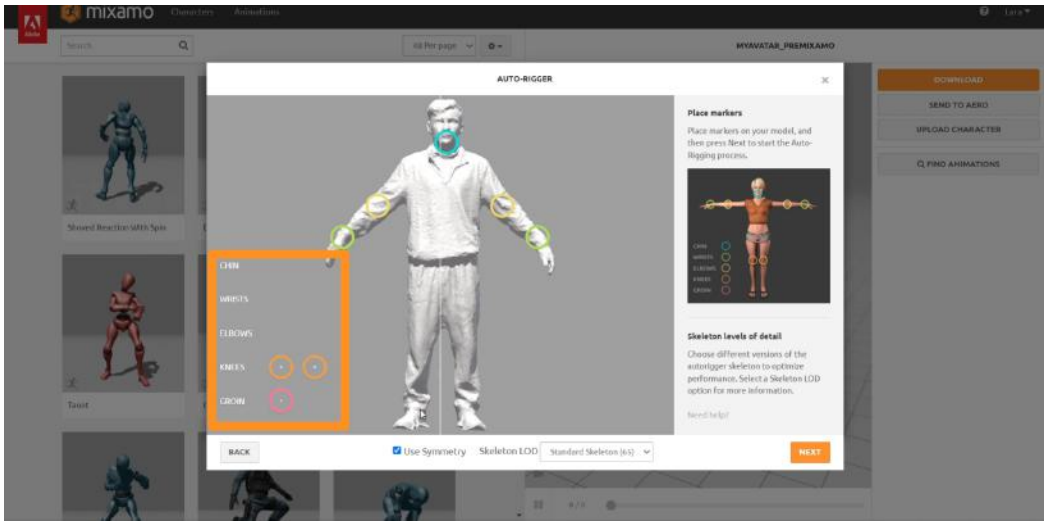
Click the **Upload Character** button on the top-right, and select your “[file-name]_preMixamo.fbx” file exported from Blender.

Once it’s uploaded, hit **Next**.



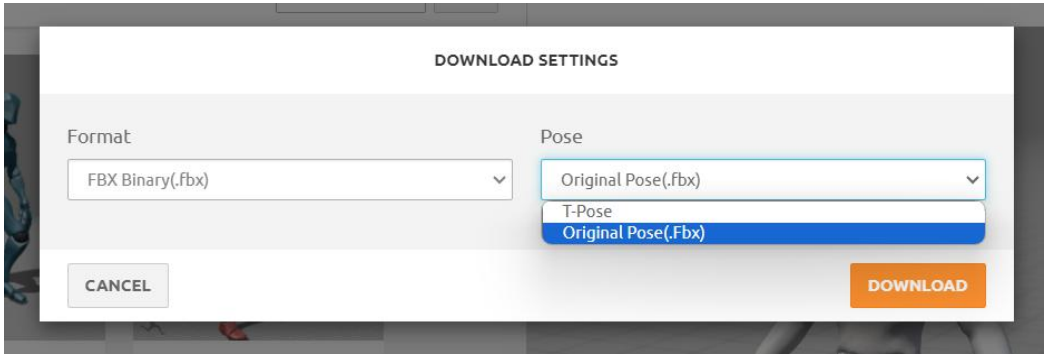
RIGGING THE MODEL

After uploading your model, position the colorful circles onto your character to represent the locations of joints by clicking and dragging them to the appropriate locations. You will see an example on the right side of your screen that shows where to place each marker.



Click **Next** to have Mixamo rig the model. This process might take a few minutes. When done, click **Next** again.

Before selecting any animations from the left menu, click the **Download** button on top-right. Keep the default format at **“FBX Binary”** and select **“Original Pose”**.

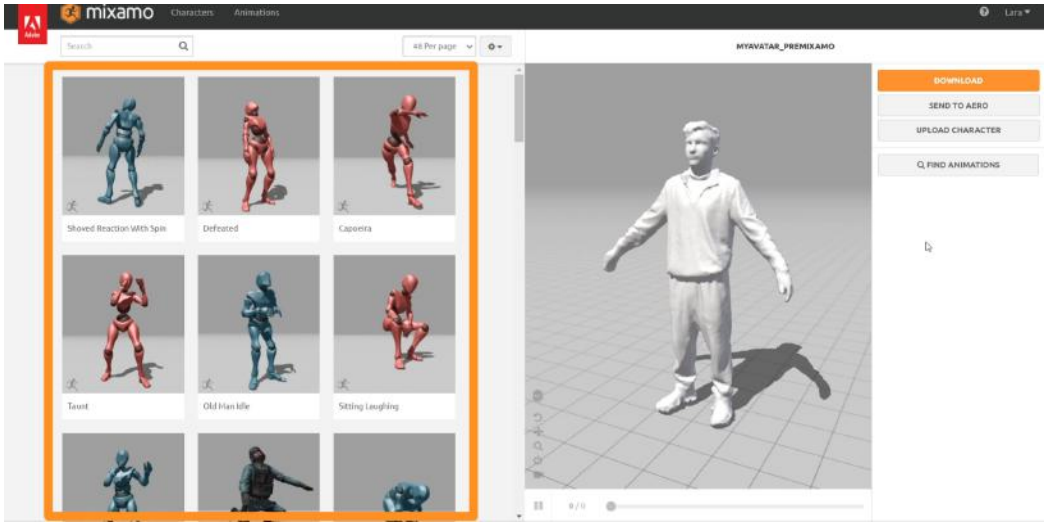


Click **Download** again and the character model will download *automatically* to your “Downloads” folder. Find the file on your computer and **rename** it.

We recommend naming the file **“[file-name]_Bones”**. (for example: MyAvatar_Bones.fbx)

Explore the animations in Mixamo's library by clicking on the thumbnails on the left window. You will see the animation play on your character on the right screen.

When you're happy with your animation choice, click on the **Download** button on the top-right of your screen.

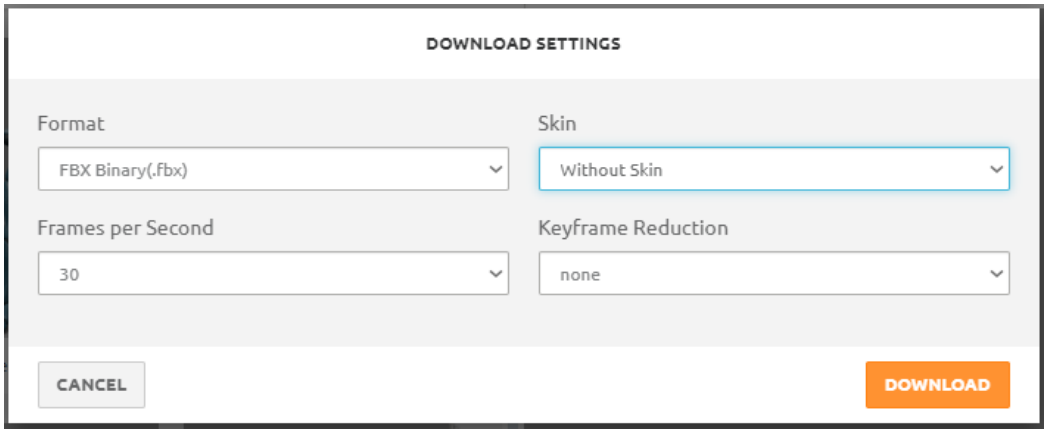


Keep most settings on default. For the "Skin" option, select "**Without Skin"**. This will download an animation data file without including the character model.

The file will download automatically to your computer. Find the file in your "Downloads" folder and **rename** it.

We recommend naming this file **"[file-name]_[animation-name]"**.
(for example: MyAvatar_Walking.fbx)

Even if you follow your own naming conventions, make sure to name your files to be able to differentiate between them.



Self Check

Were you able to download all the files from Mixamo and rename them as suggested? Which animation did you pick for your character?

Step 5: Combine in UEFN

Preview

The final step of animating your avatar is compiling all the files in UEFN and bringing your avatar to life! Make sure all of your files are ready to go and are named appropriately. It is very important to use the correct files while compiling your animation in this step.

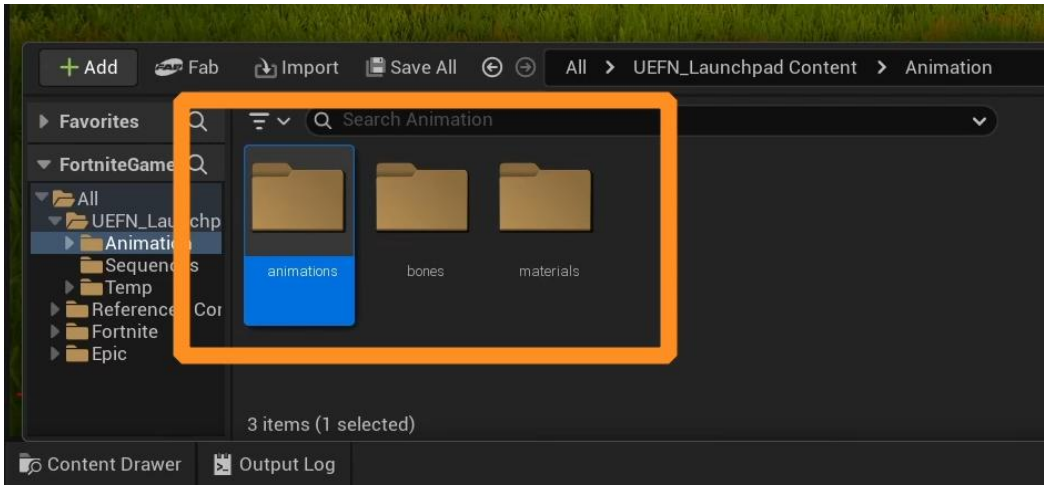
Experiment

IMPORT ALL FILES

Open UEFN and create or open a project.

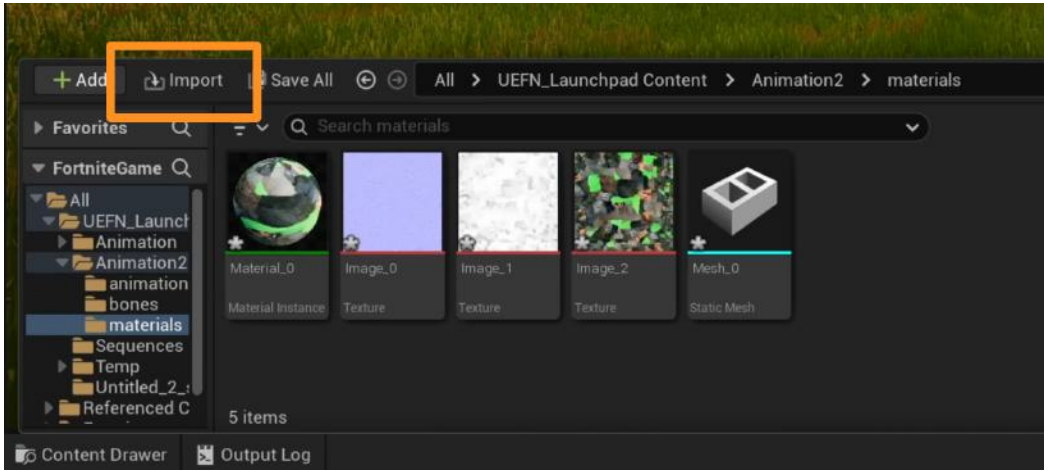
To begin, create three folders in your **Content Drawer** by right clicking on an empty area. These will help you keep track of the files you import. Name them:

- Animations
- Bones
- Materials



Open the “Materials” folder and **import** the .glb file named **“[filename]_TexturesOnly”**. This file will be used exclusively for the materials (colors and textures) of your character.

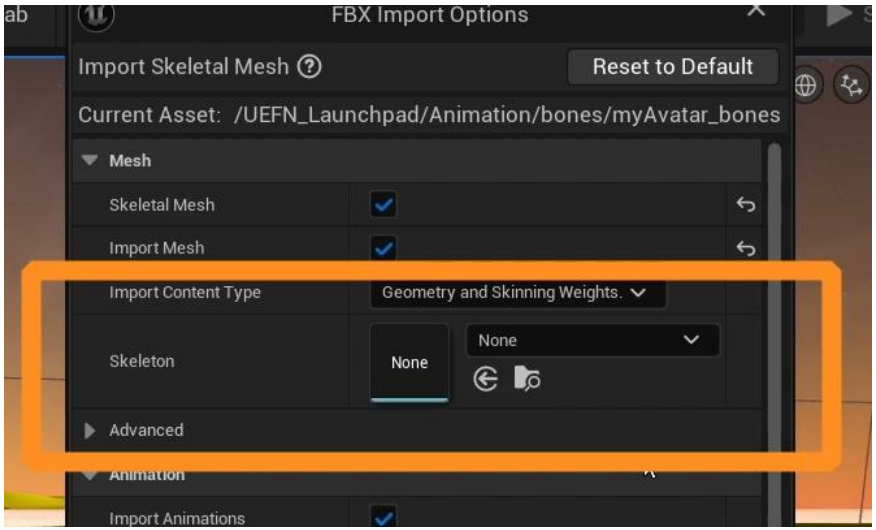
You will not be using the “Mesh” or “Skeletal Mesh” files in this folder, because you have another file for the “body” of the character.



Open the “Bones” folder and import the **“[file-name]_Bones”** .fbx file from Mixamo.

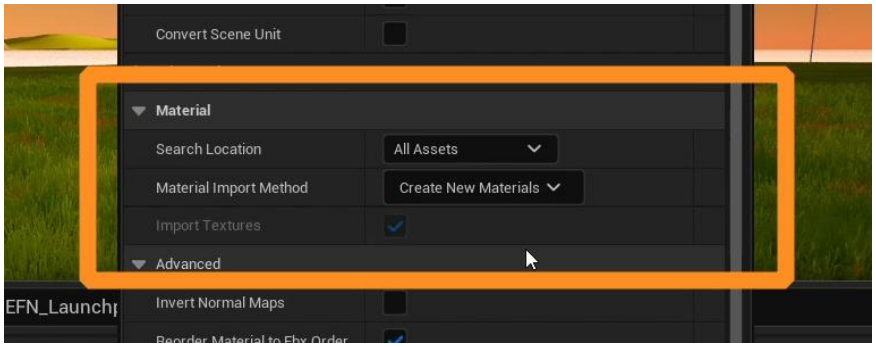
On the import screen, *make sure no skeleton is selected*. Under the **Mesh** section, the **Skeleton** option should say “None”.

If this option is pre-populated with a skeleton, you can deselect it by clicking the small return arrow next to the dropdown.



Scroll down to the **Material** section and make sure you select “All Assets” under **Search Location**. With this, the model will be able to find the materials you imported previously to the “Materials” folder.

When done, click on **Import All**.

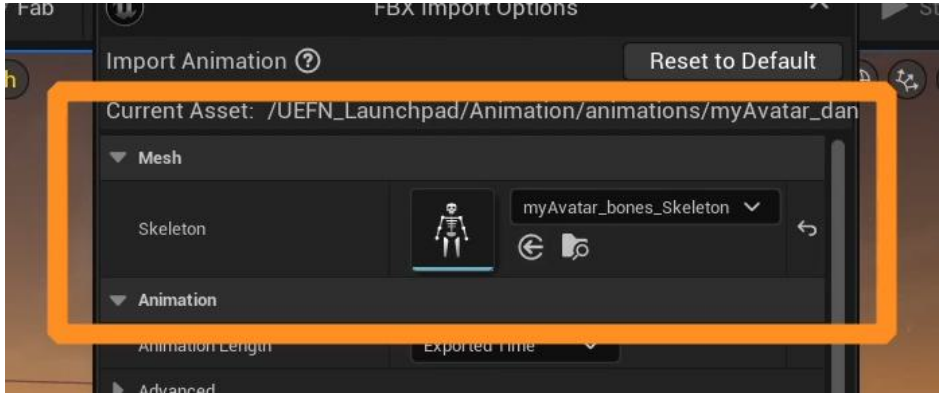


Next, open the “Animations” folder. This is where the animation files will be imported.

Click on “Import” and select your animated FBX files from Mixamo named **“[file-name]_[animation-name].”**

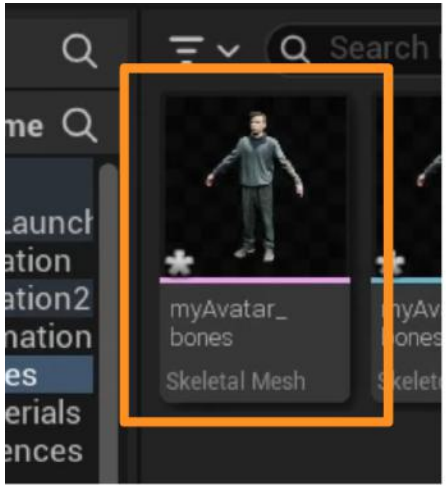
In the **Mesh** tab, next to the **Skeleton** option, make sure to select the skeleton that you’ve downloaded from Mixamo with the **“[file-name]_Bones”** name. The name of the file should automatically match the name of the skeleton.

Select **Import All** when done.



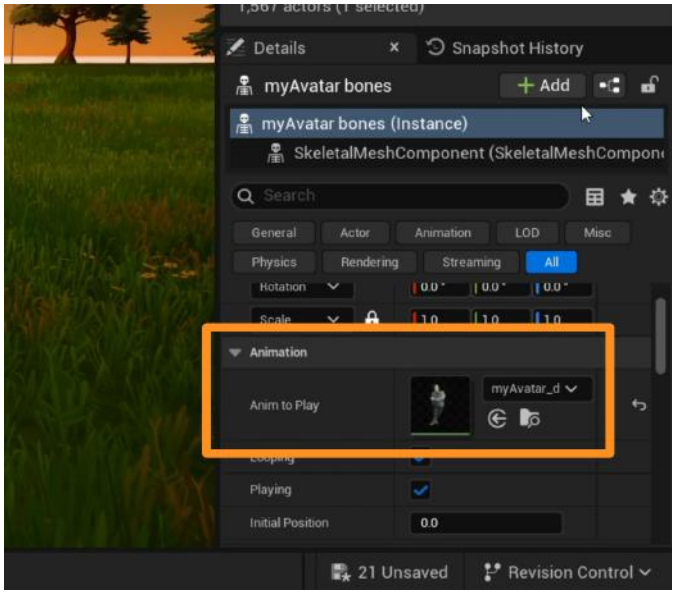
In the “Bones” folder, drag the **Skeletal Mesh** asset onto your island. This asset will be underlined in **pink** in the thumbnail.

This asset is just the skin and bones of your character and does not have animations yet.



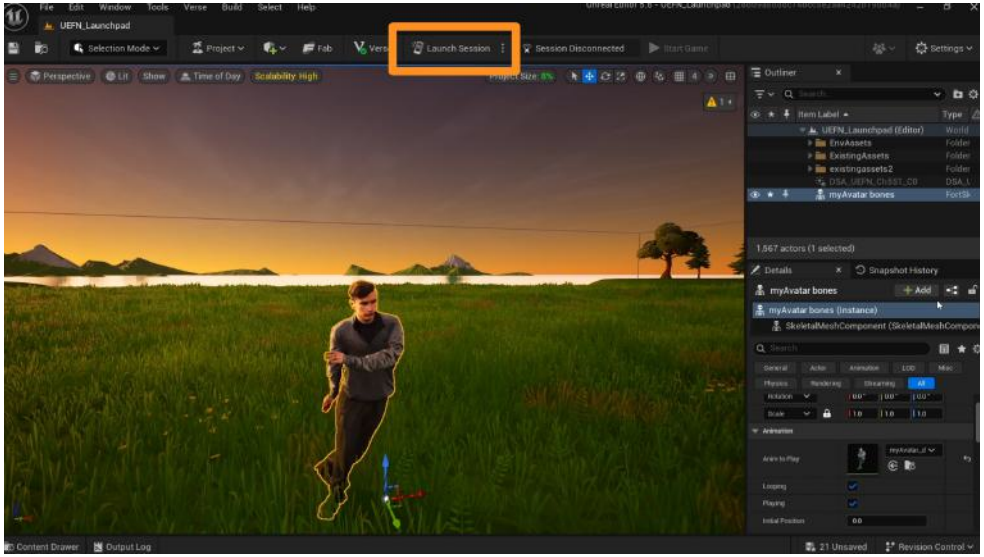
Select your skeletal mesh in the Viewport and go to the **Details Panel**.

Under the **Animation** tab, find “Anim to Play.” Open the dropdown and select the animation you want to apply to your character.



Your avatar skeletal mesh will be positioned to the first frame of the animation but will not move in the Viewport.

To see the animation play in realtime, **Launch Session** and open your island in Fortnite.



Self Check

Could you animate your avatar in UEFN as you wanted?

Lesson Closure

Demonstration of Learning

You've learned how to scan a person with the Polycam app and create a photorealistic model with photogrammetry. You've cleaned up your model in Blender, found animations in Mixamo, and compiled all the files in UEFN. Paying attention to different file types and names, you animated your photogrammetry character on your own Fortnite island.

Exploration Opportunities

Learning how to animate characters can open a whole new world of 3D creation for you. After understanding the basics of character animation, you can apply the skills you've learned into animating any kind of character you want to have in your 3D experiences.

Take a look at the following Learning Guides to learn how to animate stylized 3D avatars of people or other types of inanimate objects and cameras in UEFN:

- Animate 3D Avatars in UEFN Learning Guide
- Animate Assets and Cameras in UEFN Learning Guide