

Guidebook

# MODELLING AND ANIMATION USING SCANNING TECHNOLOGIES IN UNREAL ENGINE 5.2

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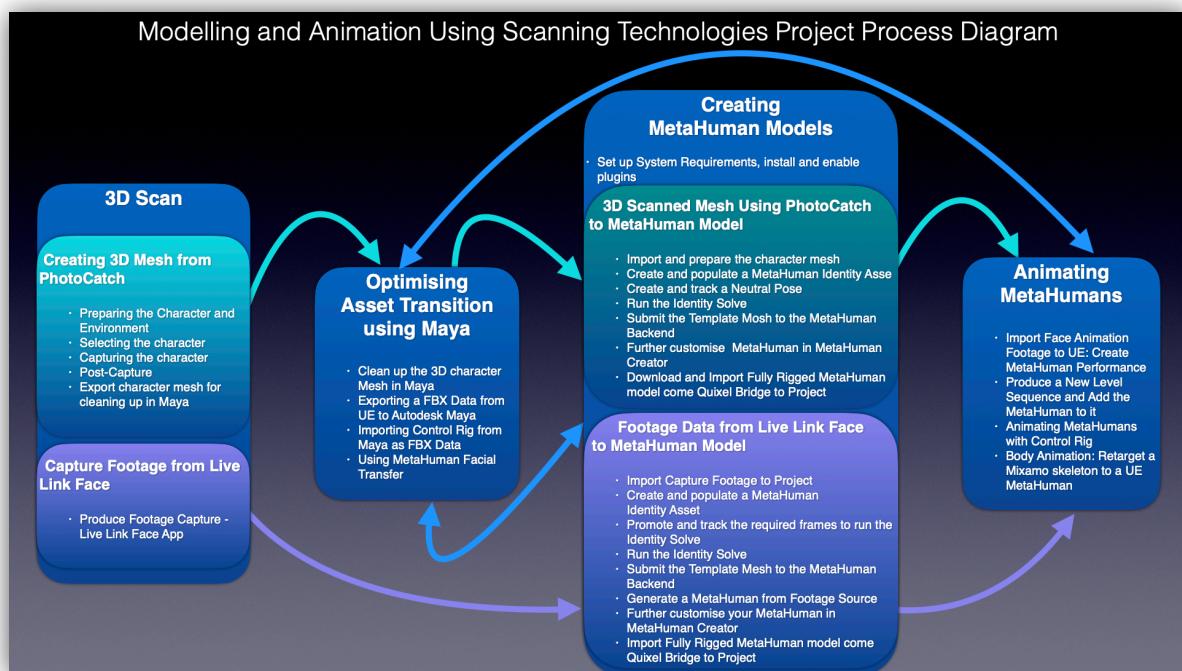
# Modelling and Animation Using Scanning Technologies in Unreal Engine 5.2 Guidebook

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On March 23, 2023, Epic Games formally published the most recent iteration of the new [MetaHuman Animator](#) functionality, initially unveiled at GDC 2023. The purpose of producing high-fidelity realistic character animations for MetaHuman is that this UE 5.2 version has a quicker and simpler process.

With the help of the comprehensive MetaHuman framework, anybody can design, animate, and utilise very lifelike digital human characters in any way they can think of.

This Guidebook will walk the user through correctly setting up a 3D scan to the MetaHuman Animator for the Unreal modelling and animation project and using it. Epic strongly recommends robust Windows PC [systems requirements](#).



The main processes of the "Modelling and Animation Using Scanning Technologies" project are shown in this diagram

# 3D Scan

## Instructions for Successful 3D Scanning Using PhotoCatch and Apple's 3D Scanning API

Achieving high-quality 3D scans with [PhotoCatch](#) of Apple's 3D Scanning API requires attention to detail and careful execution. Follow these guidelines for optimal results:

### Preparing the Object and Environment:

1. **Use a Clean Background:** Ensure the area behind the object is clutter-free and has a plain background. This helps the object stand out clearly in the scan.
2. **Object Visibility:** Make sure the object is well-lit and easily distinguishable from the background. Use a contrasting background if possible.
3. **Clear the Frame:** Remove any other items that might appear in the frame, distracting from the main object.
4. **Soft, Even Lighting:** Utilize diffused and even lighting to minimize harsh shadows and highlights. Natural daylight or soft studio lighting can help achieve this.
5. **Avoid Shadows:** Position the lighting sources to minimize shadows that could obscure details in the scan.

### Selecting the Character:

1. **Ideal Body:** Face is excellent part to 3D scan due to its detailed skin textures and surface.
2. **Transparency and Clarity:** Avoid scanning transparent or clear items, as they might not capture well in the scan.
3. **Shiny or Metallic Items:** Avoid scanning character with highly reflective or metallic surfaces, as these can cause unwanted glare and inaccuracies in the scan.

### Capturing the Object:

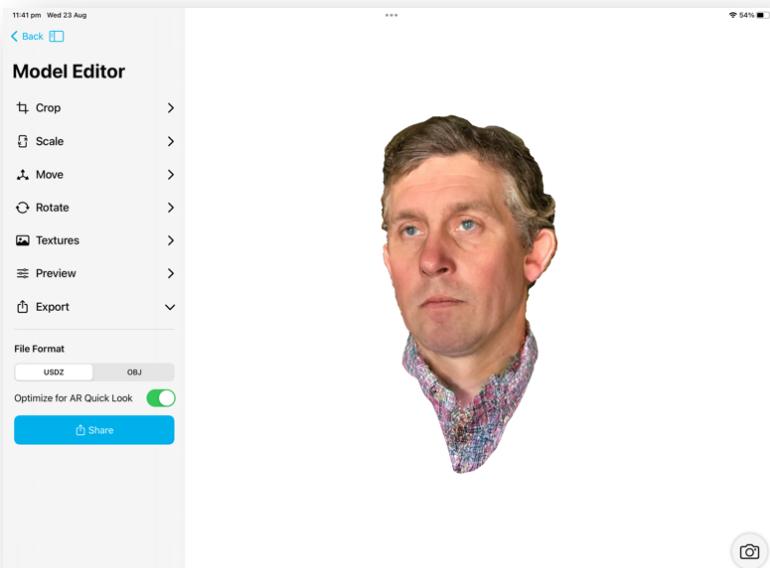
1. **Multiple Angles:** Capture the head from various angles as instructed by the app. Include front, back, sides, top, and bottom views to ensure a complete scan.
2. **Rotation and Steadiness:** Gently rotate the object as you capture each angle. Keep your device steady to prevent blurriness or misalignment.
3. **Overlap Shots:** When capturing angles, ensure each shot has some overlap with the previous one. Overlapping shots aid in the accurate merging of angles.
4. **Pay Attention to the Head:** If the object has distinct features, like the head of a sneaker, ensure you capture it from all angles. This ensures comprehensive coverage.



*Capture the face from very angles*

Post-Capture:

1. **Review Captures:** After capturing all angles, review the shots to ensure they are clear, properly aligned, and cover the necessary perspectives.
2. **Edit and Refine:** Utilize the editing tools within PhotoCatch to refine the scans. Adjust lighting, textures, and colour to enhance the 3D model.
3. **Preview and Share:** Once satisfied with the edits, preview the 3D model within the app. Share it with friends, export it for various applications, or enjoy viewing it in augmented or virtual reality.



*Generated 3D character from capture*

By following these guidelines, you can maximize the potential of PhotoCatch of Apple's 3D Scanning API to create impressive and accurate 3D character model. Remember that practice

makes perfect, and experimenting with different arrangements and objects can lead to even better results over time. Finally export the 3D character as OBJ file from PhotoCartch.

### Clean up the 3D character in Maya

Import saved OBJ file to [Maya 2023](#), using face tool delete back side of the head. Only keep the front side of face to export all as FBX.

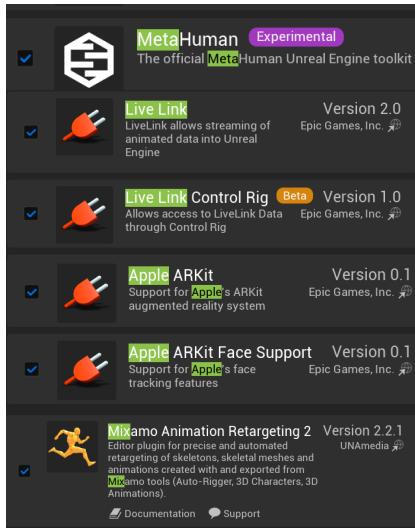


## Creating Metahuman Models

Generate a MetaHuman by using the MetaHuman plugin in UE.

### Setup:

- Install [Unreal Engine 5.2](#).
- Create a new Unreal Engine 5.2 project.
- Install and enable the MetaHumans plugin.



\*Refer to the [Working with Plugins](#)

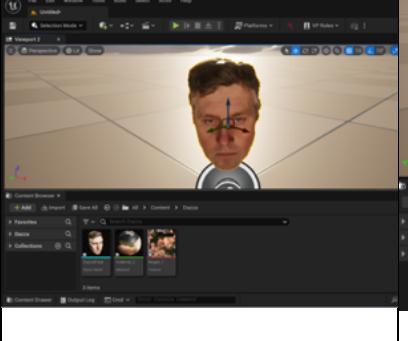
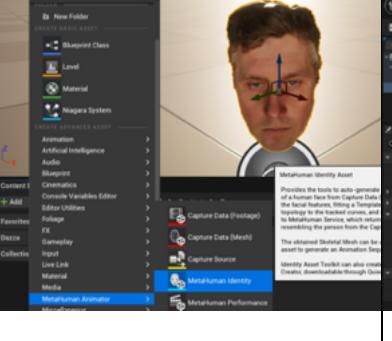
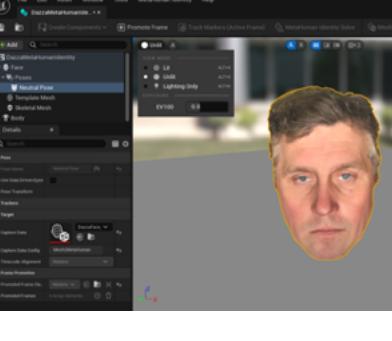
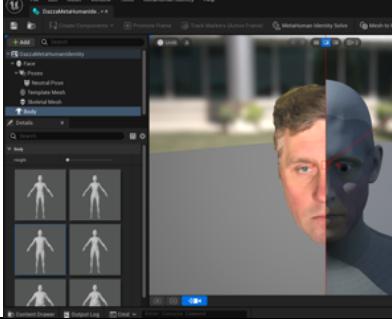
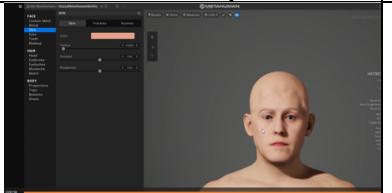
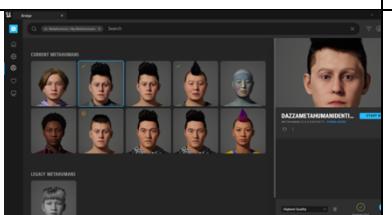
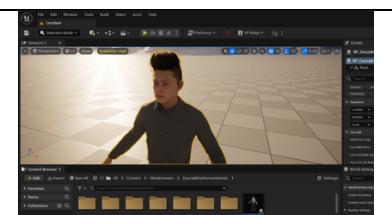
- Enable Plugin for UE5.2 Mixamo Animation Retargeting 2.
  - Mixamo Assets are integrated into Unreal Engine 5.2.
  - It enables user to utilise any Mixamo animation with any UE5 character and any UE 5.2 animation with any Mixamo character with only a few clicks.
- Login Cloud-streamed Metahuman Creator.
- Quixel Bridge in Unreal Engine 5.2.
- Install [Live Link Face App](#) on iPhone or iPad from Apple store.
  - With powerful facial recognition and motion tracking features, Apple's iPhone and iPad can recognise a user's facial muscles' position, topology, and motions.
  - Live Link Face App captures facial performances for MetaHuman Animator.

- It records unprocessed video and depth information, imported into Unreal Engine from an iOS device for usage with the Live Link MetaHuman plugin.

## 3D Scanned Mesh Using PhotoCatch to MetaHuman Model

Create a Metahuman form 3D Scanned Mesh

Workflow: 3D Scanned Mesh to MetaHuman in UE Project

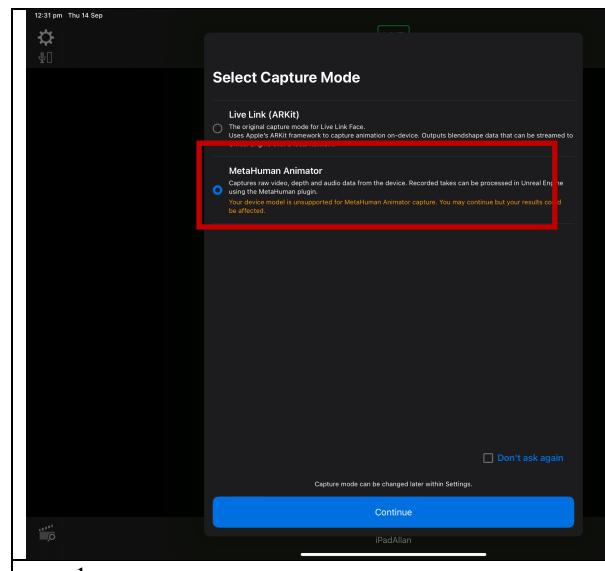
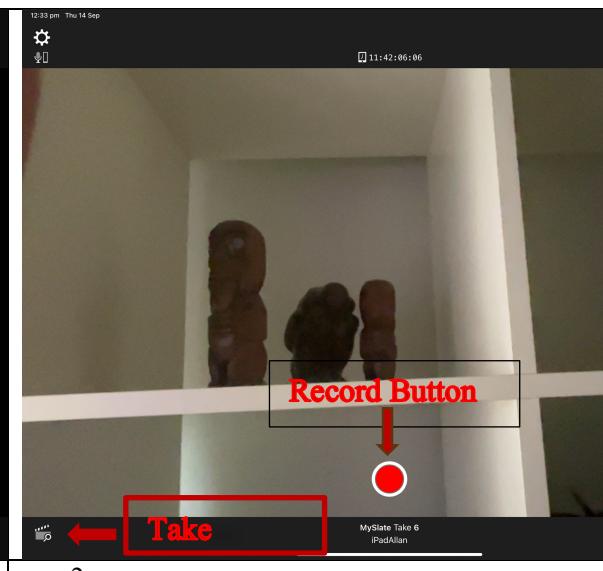
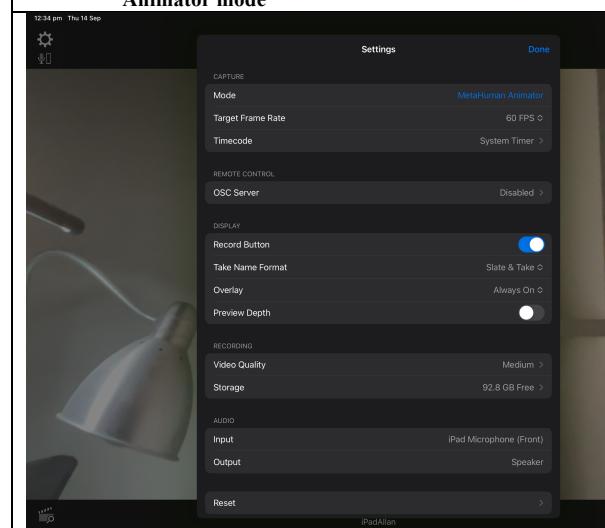
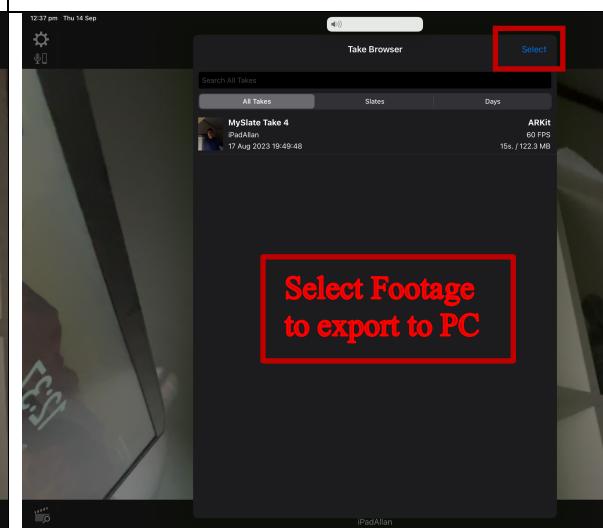
		
1. Import FBX file into Unreal Engine 5.2	2. Create Metahuman Identity Click Add → Metahuman Animator ---> Metahuman Identity	3. Set the viewport to be Unlit → Set FOV to 20 → Promote Frame
		
4. Click Tracking Makers (Autotracking On)	5. Creates facial markers on the mesh → Select Metahuman Identity Solve	6. Select Body Type → Submit Mesh to Metahuman
		
7. Access your MetaHuman created through Mesh to MetaHumna in MetaHuman Creator	8. Customise the MetaHuman	9. Finalise MetaHuman Style
		
10. Open Quixel Bridge	11. Download and Import the MetaHuman into UE Project	12. Access the MetaHuman in UE Project

When running facial markers on the mesh, Unreal Engine 5.2 will automatically reduce the polygons for the front face and create a perfect topology for the mesh. The MetaHuman generated with the MetaHuman Creator in this example is completely rigged and prepared for usage in Unreal Engine. It involves the face and complete body rigging.

## Footage Data to Metahuman Model

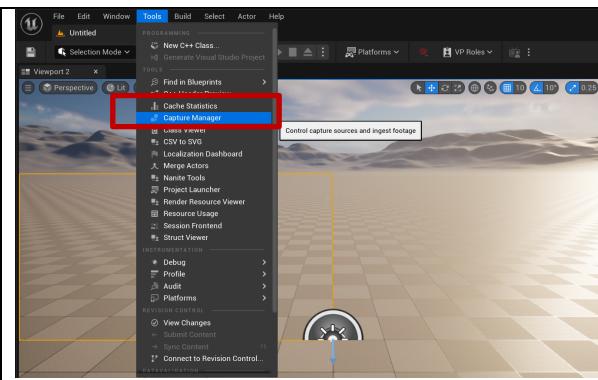
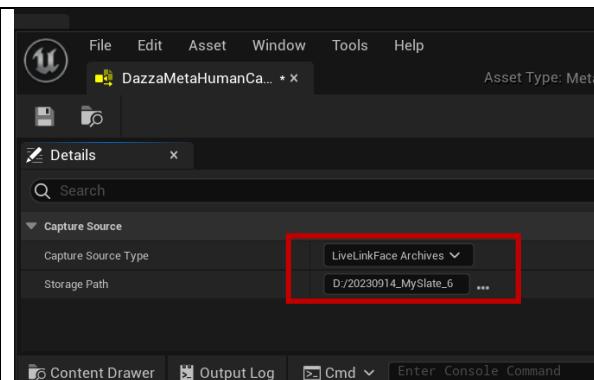
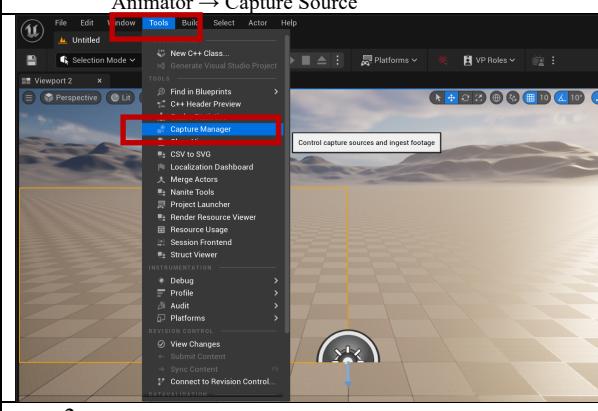
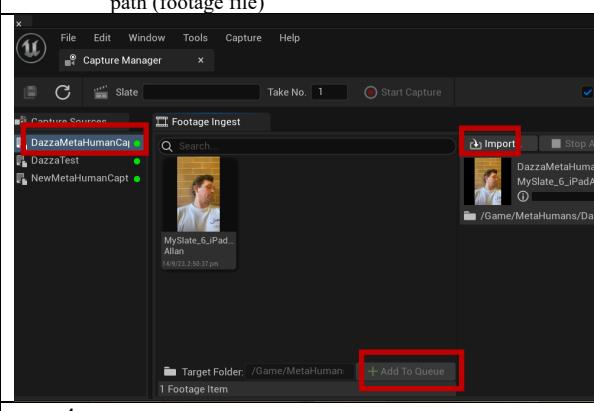
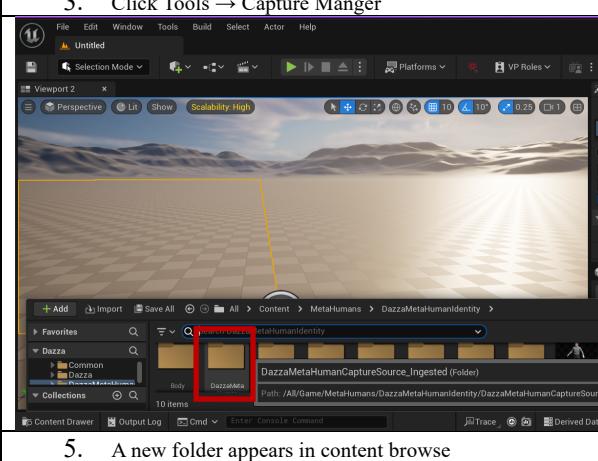
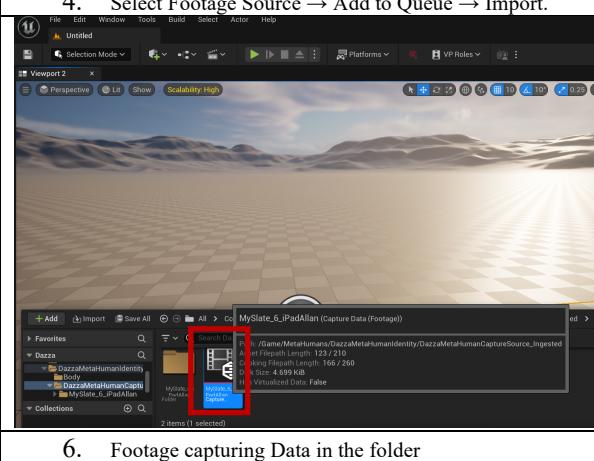
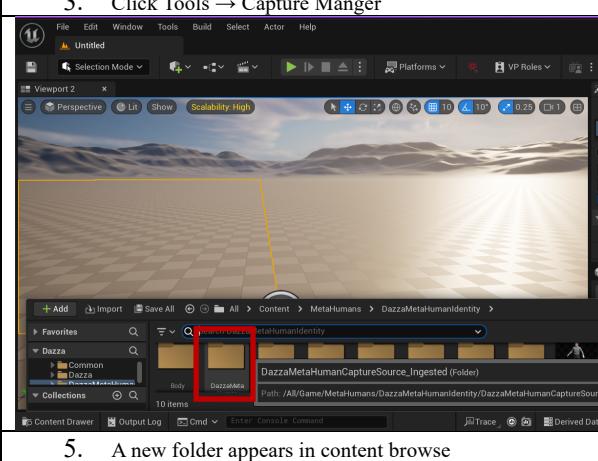
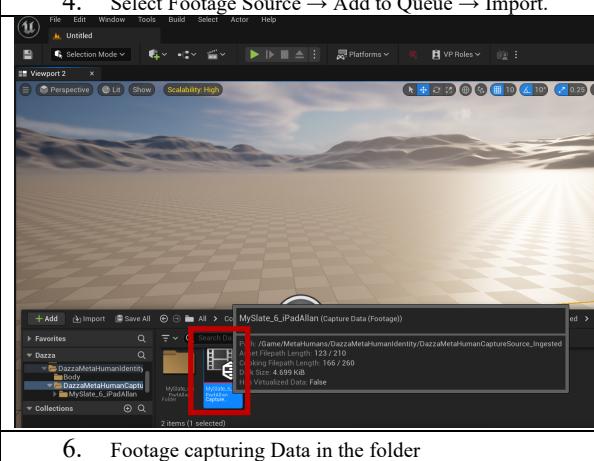
Generate a Metahuman from footage data using Live Link Face App

### Workflow: Produce Footage Capture - Live Link Face App

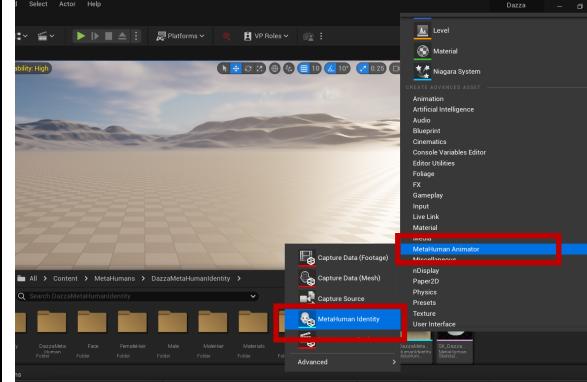
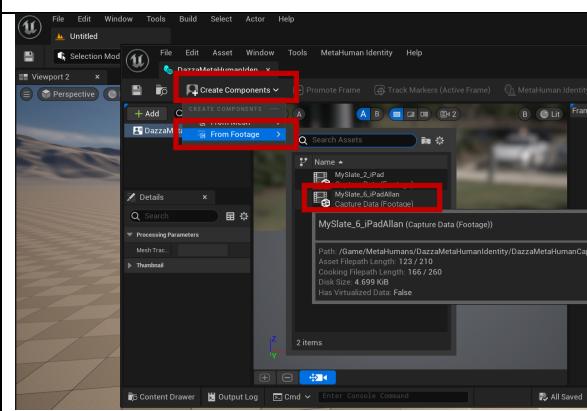
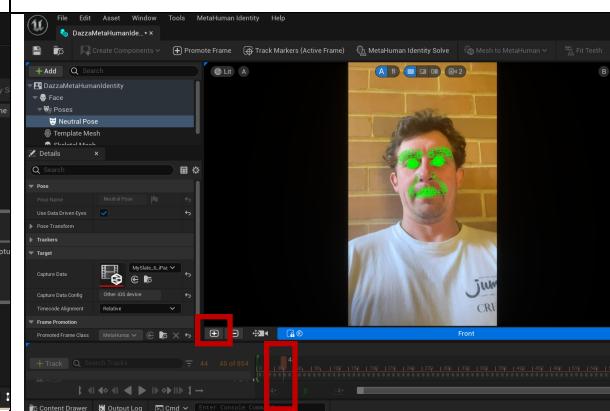
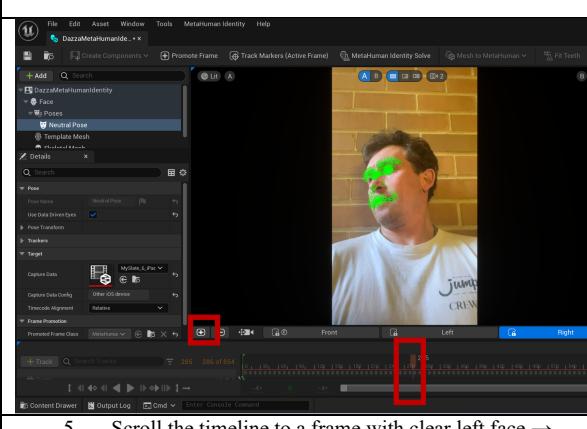
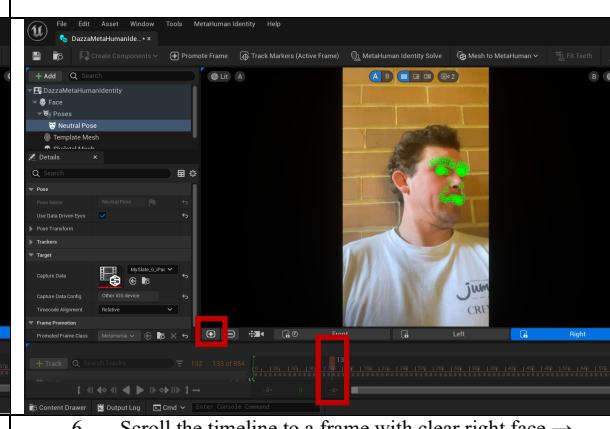
	
<p>1. Open Live Link Face App -&gt; Choose <b>MetaHuman Animator</b> mode</p> 	<p>2. Record the footage:</p>  <p>Select Footage to export to PC</p>
<p>3. App Setting</p>	<p>4. The video includes a frontal face, left and right view of the face and facial expressions for the generated MetaHuman performance/</p>

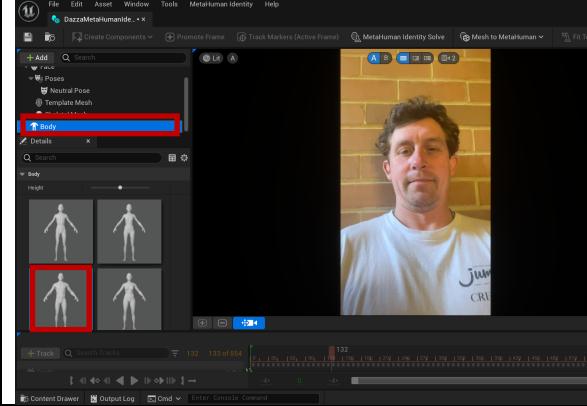
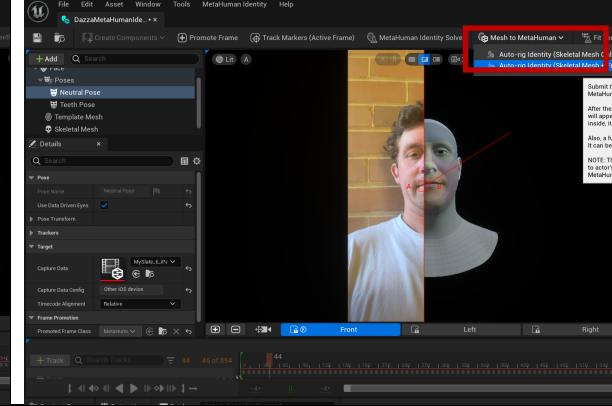
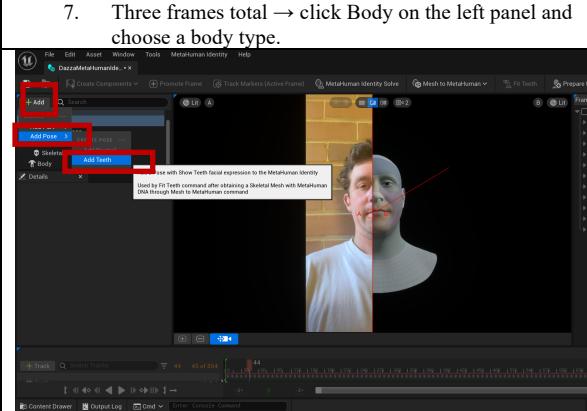
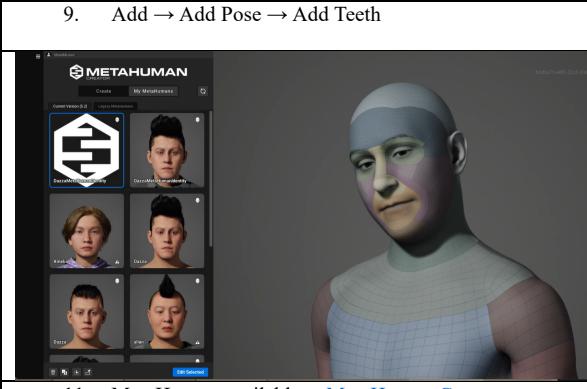
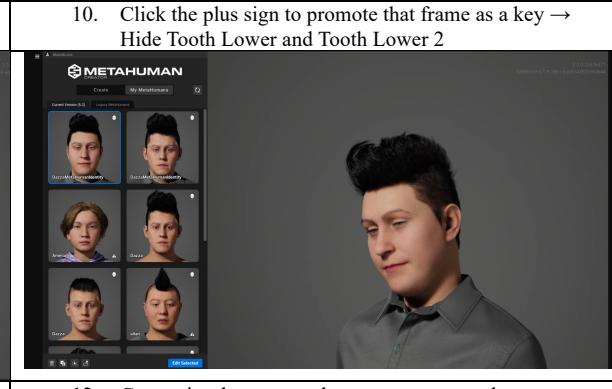
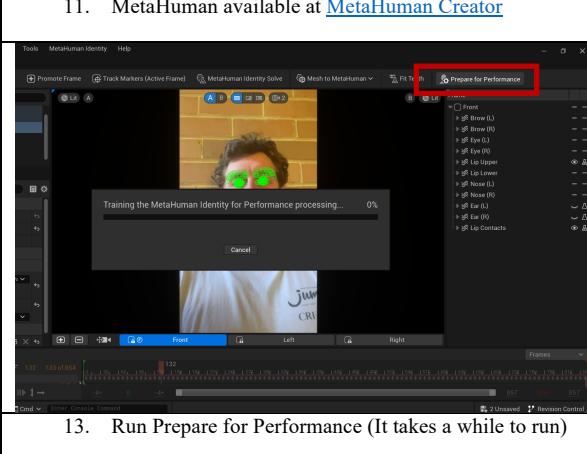
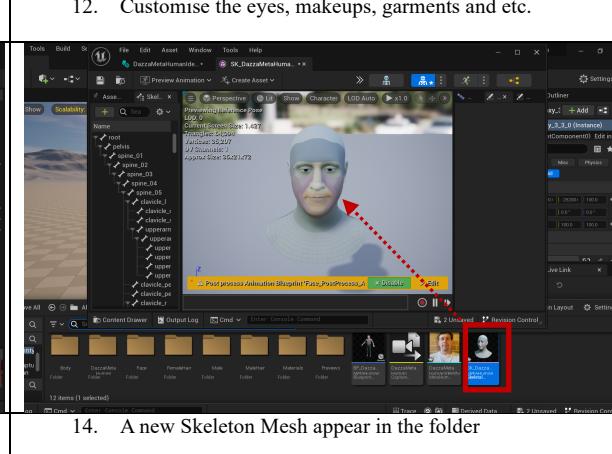
\* The exported files are zipped, unzip it on PC.

## Workflow: Import Capture Footage to UE Project

	
<p>1. Right click content browser → MetaHuman Animator → Capture Source</p> 	<p>2. Livelink Archives → Choose the video file path (footage file)</p> 
<p>3. Click Tools → Capture Manger</p> 	<p>4. Select Footage Source → Add to Queue → Import.</p> 
<p>5. A new folder appears in content browse</p> 	<p>6. Footage capturing Data in the folder</p> 

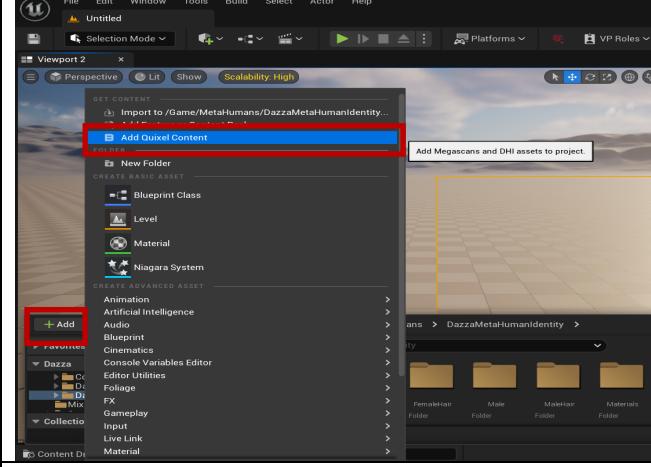
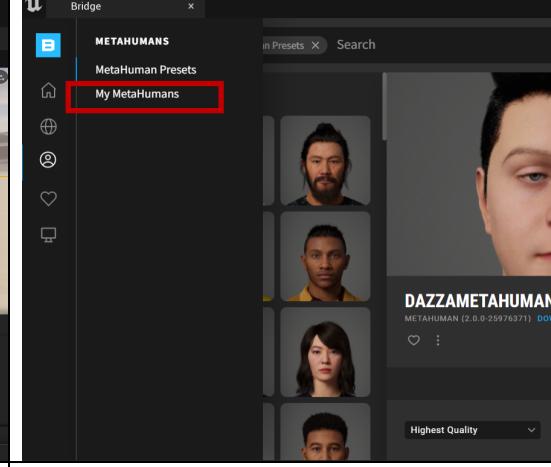
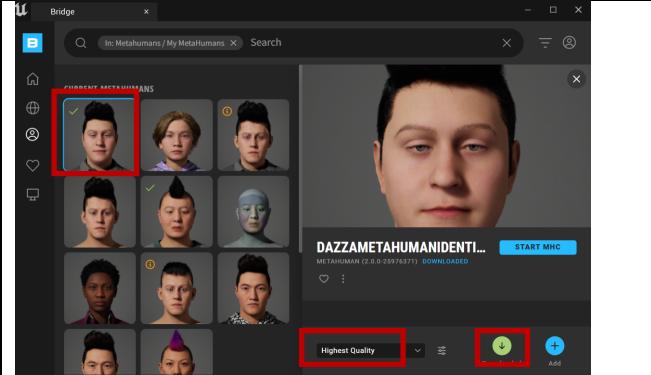
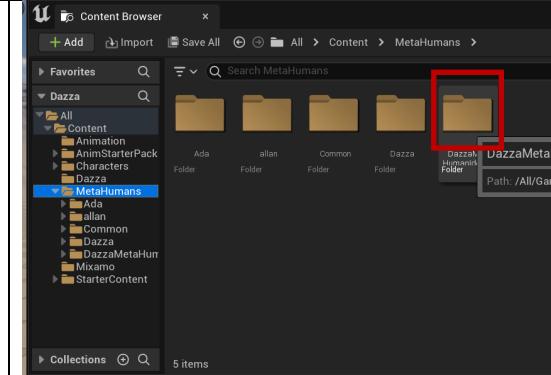
## Workflow: Generate a MetaHuman Model from Footage Source

 <p>1. Right Click → MetaHuman Animator → MetaHuman Identity</p>	 <p>2. A MetaHuman Identity file appears in content browse</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> MetaHuman Creator login page appears and log into your account ,so that the created MetaHuman automatically upload to Creator, and you could modify your MetaHuman on a website</li> </ul>
 <p>3. After log in, click Create Components → From Footage → Choose Footage.</p>	 <p>4. Scroll the timeline to a frame with clear frontal face → click the plus sign to promote that frame as a key</p>
 <p>5. Scroll the timeline to a frame with clear left face → click the plus sign to promote frame</p>	 <p>6. Scroll the timeline to a frame with clear right face → click the plus sign to promote frame</p>

 <p>7. Three frames total → click Body on the left panel and choose a body type.</p>	 <p>8. Mesh to MetaHuman (Skeletal Mesh + Full MetaHuman)</p>
 <p>9. Add → Add Pose → Add Teeth</p>	 <p>10. Click the plus sign to promote that frame as a key → Hide Tooth Lower and Tooth Lower 2</p>
 <p>11. MetaHuman available at <a href="#">MetaHuman Creator</a></p>	 <p>12. Customise the eyes, makeups, garments and etc.</p>
 <p>13. Run Prepare for Performance (It takes a while to run)</p>	 <p>14. A new Skeleton Mesh appear in the folder</p>

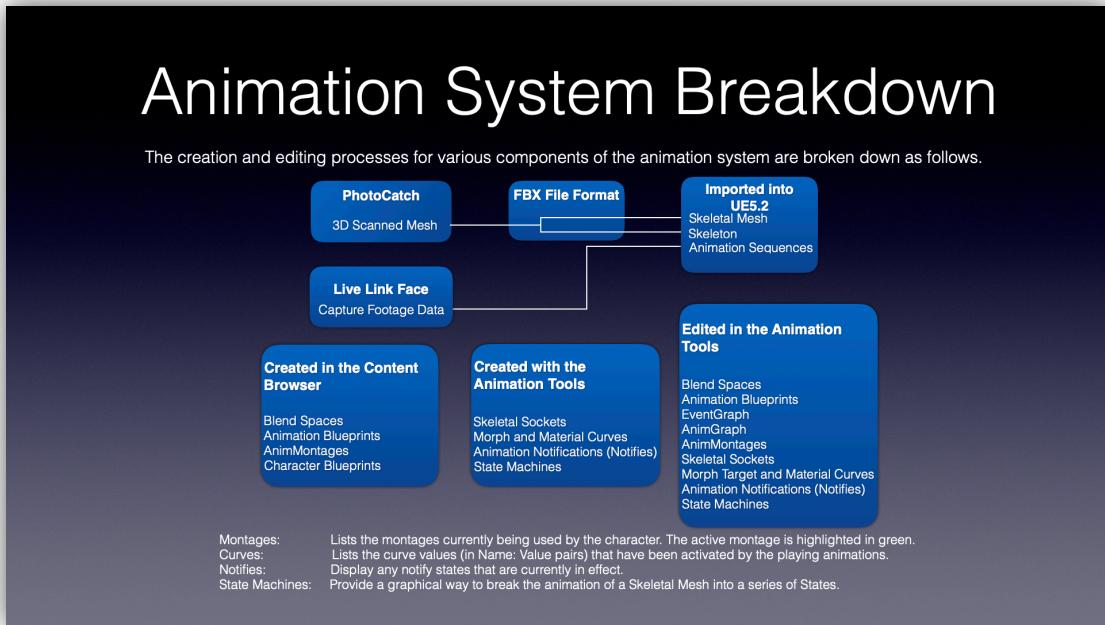
## Workflow: Import MetaHuman to Project

- Fully rigged MetaHuman model currently available in the project.
- Import the MetaHuman from Quixel Bridge to UE project to perform the animation.

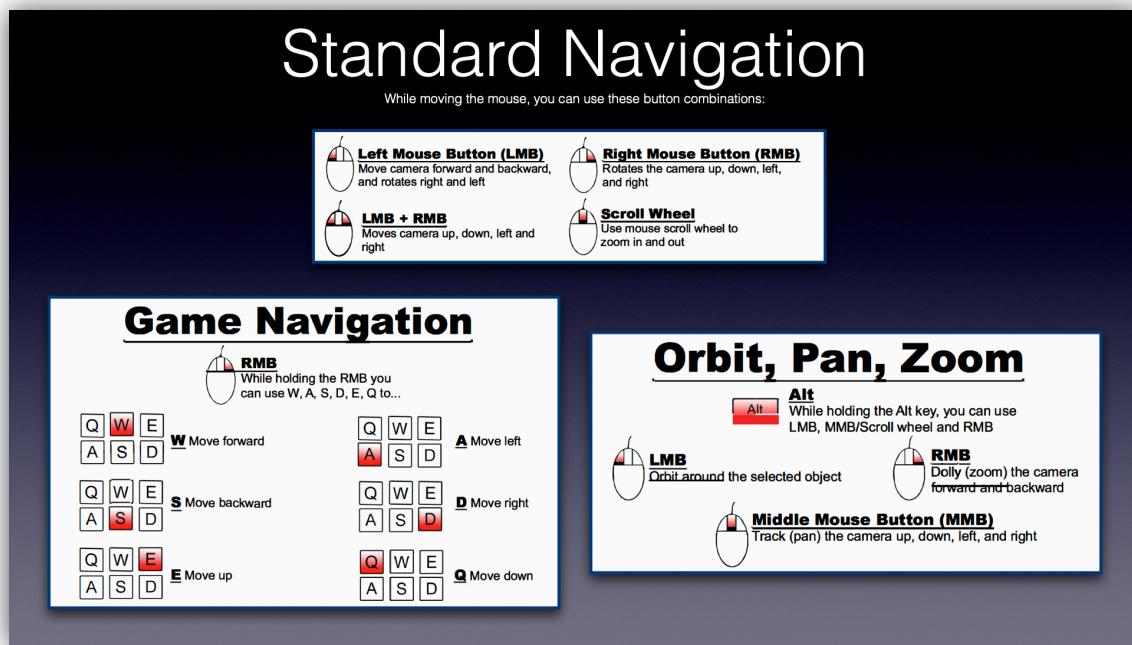
	
1. Click Add → Add Quixel Content.	2. Log into your account → In My MetaHuman, select the created MetaHuman
	
3. Choose a quality level → Download and Add to the project	4. MetaHuman folder papers in content browser

## Animating MetaHumans

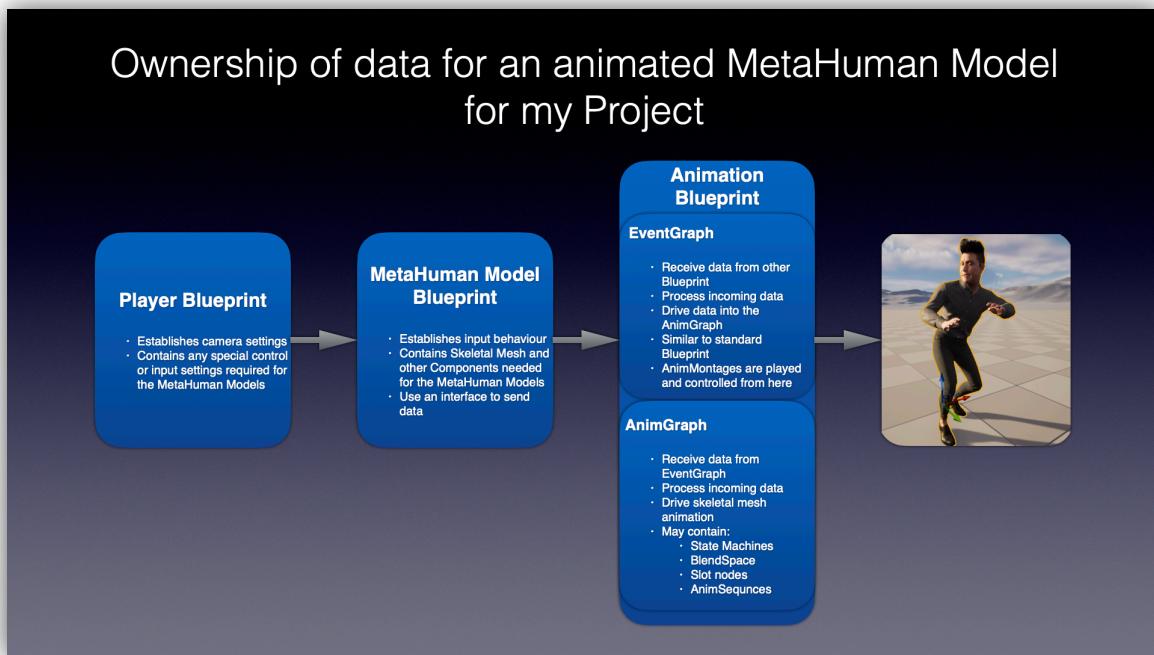
Create animate MetaHumans in UE 5.2 with Control Rig and IK Rig



This diagram was adapted from another source (*Unreal Engine 4 Documentation, 2021*) and illustrates the "Modelling and Animation Using Scanning Technologies" Animation System Breakdown

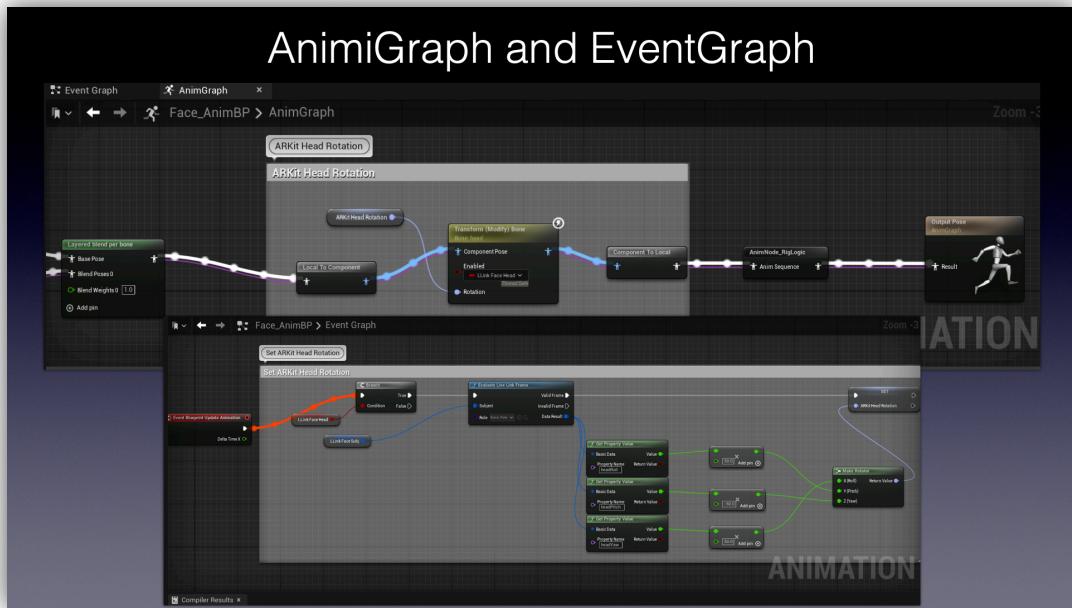


Standard Navigation Keyboard Shortcuts in UE 5.2



The ownership and flow of data for my project's animated MetaHuman Model are shown in this diagram that is shared in another source (Unreal Engine 4 Documentation, 2021)

- The AnimGraph is used to sample, blend, and manipulate poses to be applied to Skeletal Meshes by the Animation Blueprint.
- EventGraph used to update the Animation Blueprint and calculate values for use in the AnimGraph.

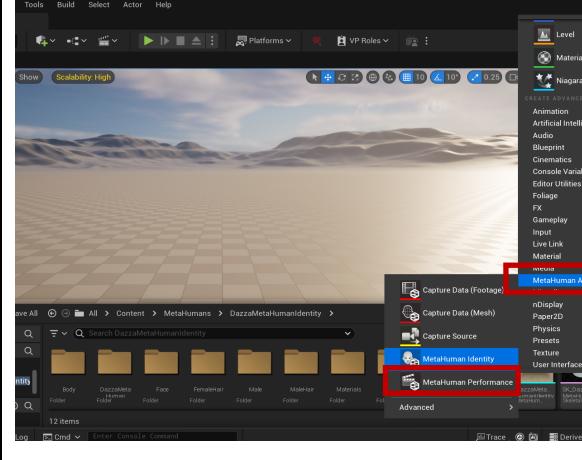
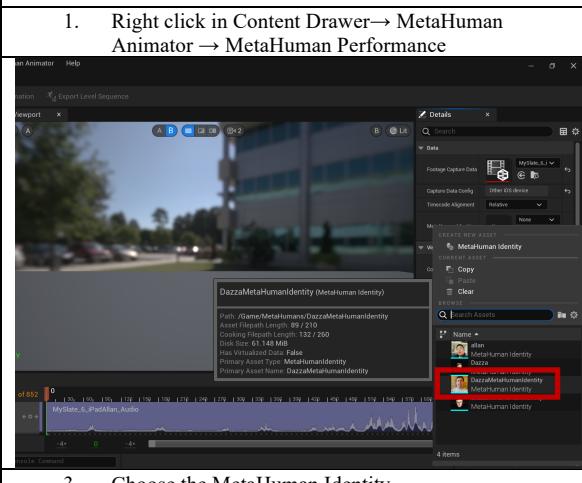


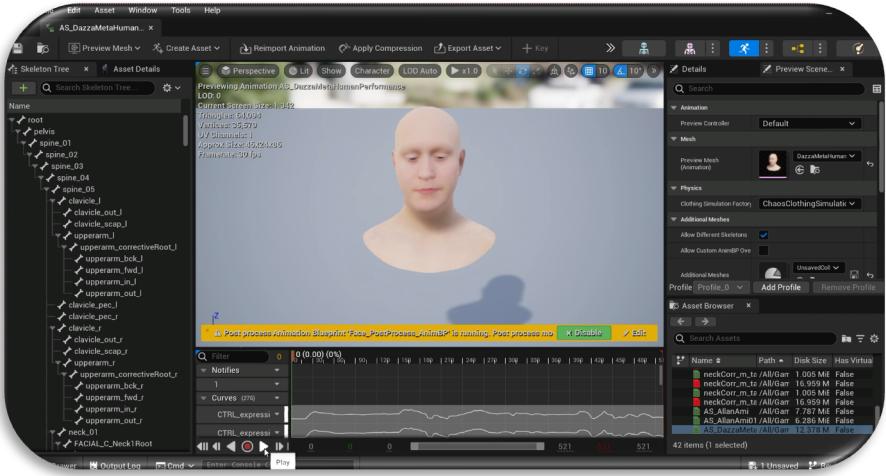
This diagram shows AnimGraph and EventGraph Data for an animated MetaHuman model in my project

### Facial Animation

- Strongly recommended importing MetaHuman from Quixel Bridge to Project first. (See Import MetaHuman to Project steps 1 to 4).
- The MetaHuman performance depends on the imported footage source.
- The same as before, right-click MetaHuman Animator and select Capture Source.

## Workflow: Import Face Animation Footage to UE

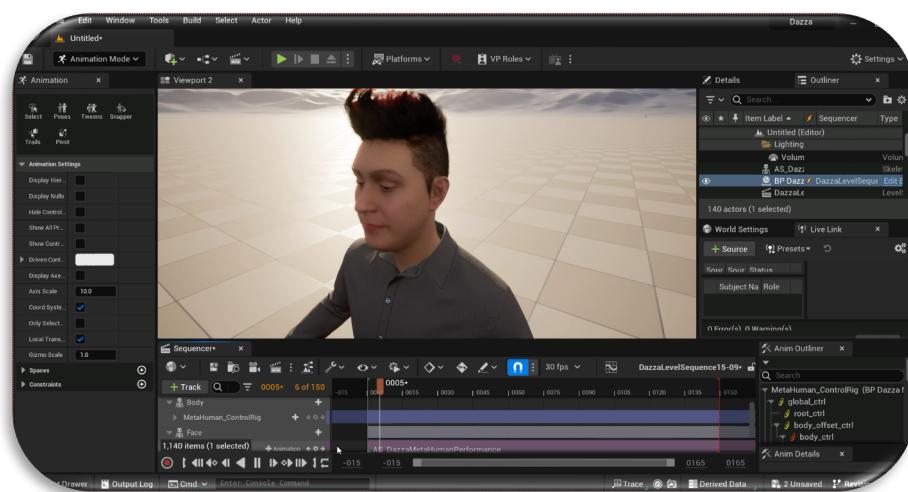
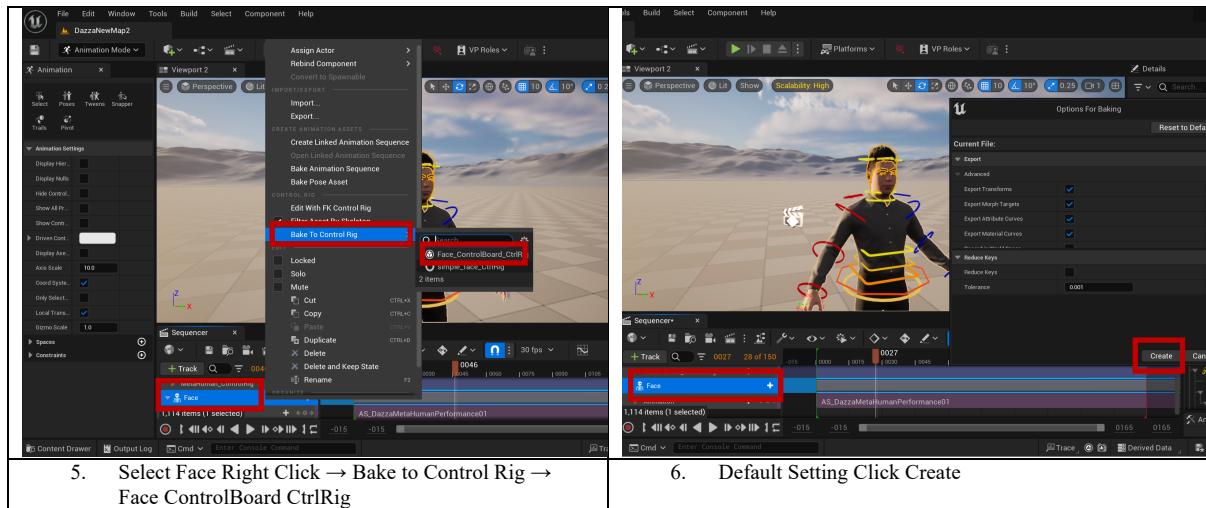
	<p>1. Right click in Content Drawer → MetaHuman Animator → MetaHuman Performance</p>
	<p>2. Choose the imported footage</p>
	
	<p>3. Choose the MetaHuman Identity</p>
<p>5. Export Animation → Choose Target Skeleton Mesh → Select the FaceMesh imported from Quixel Bridge (See Import MetaHuman to Project steps 1 to 4)</p>	<p>4. Set start and end frame → Process</p> <p>6. Animation file appears in the folder</p>



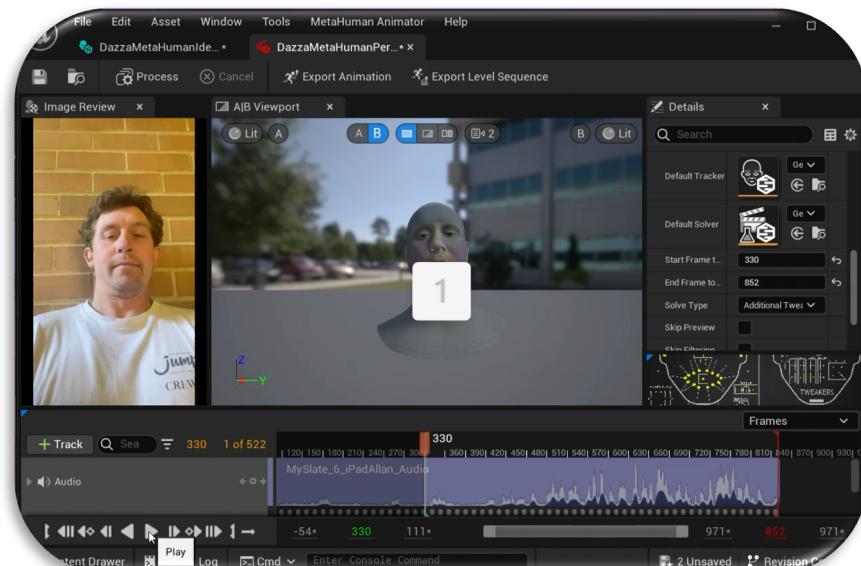
*Exported Animation Sequence*

## Workflow: Produce a New Level Sequence and Add the MetaHuman

<p>1. Drag the MetaHuman blueprint to the level</p>	<p>2. Add a new Level Sequencer</p>
<p>3. Drag the MetaHuman BP to the sequencer → Add Animation Track → Animation → Select exported animation sequence</p>	<p>4. Delete the face control rig</p>



*Result of Metahuman Facial Performance*

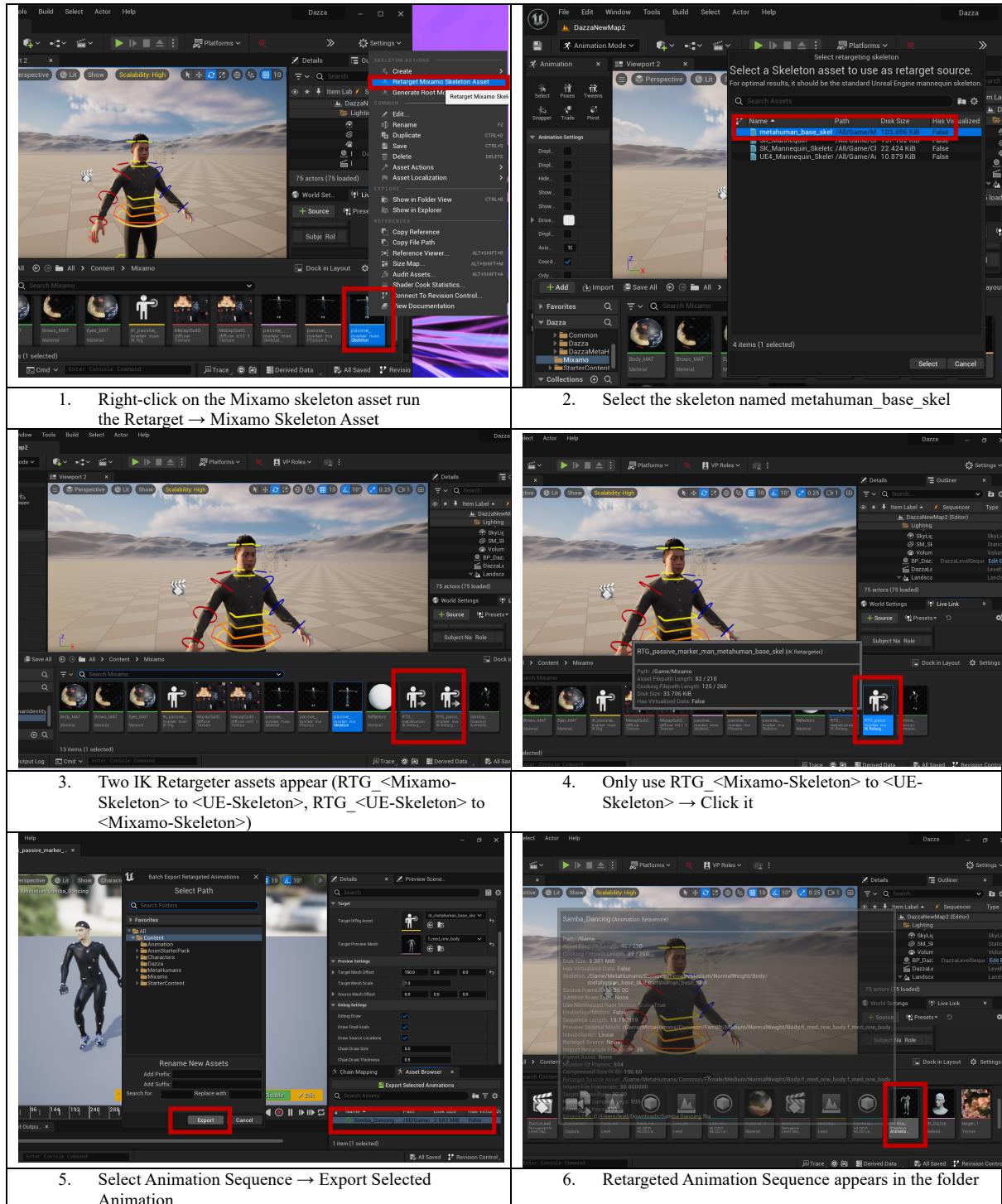


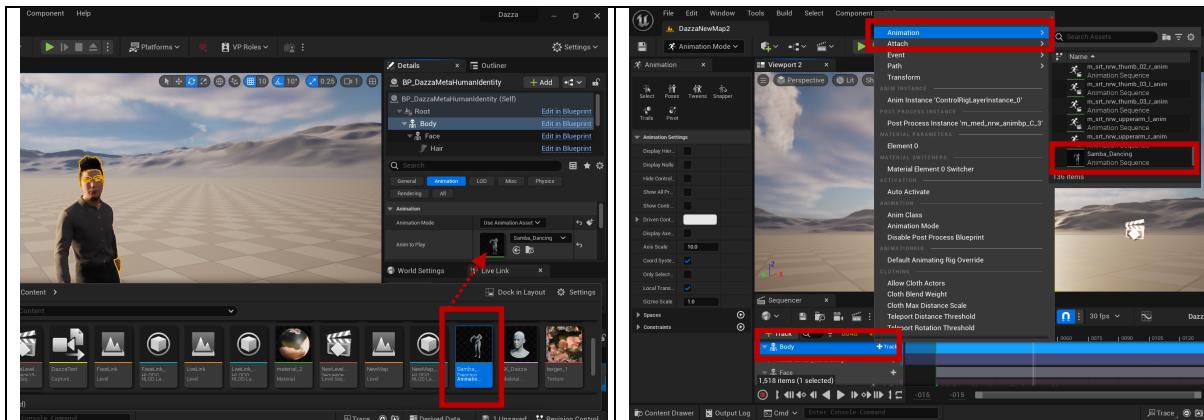
*Result of the exported animation sequence is applied to imported MetaHuman*

## Body Animation

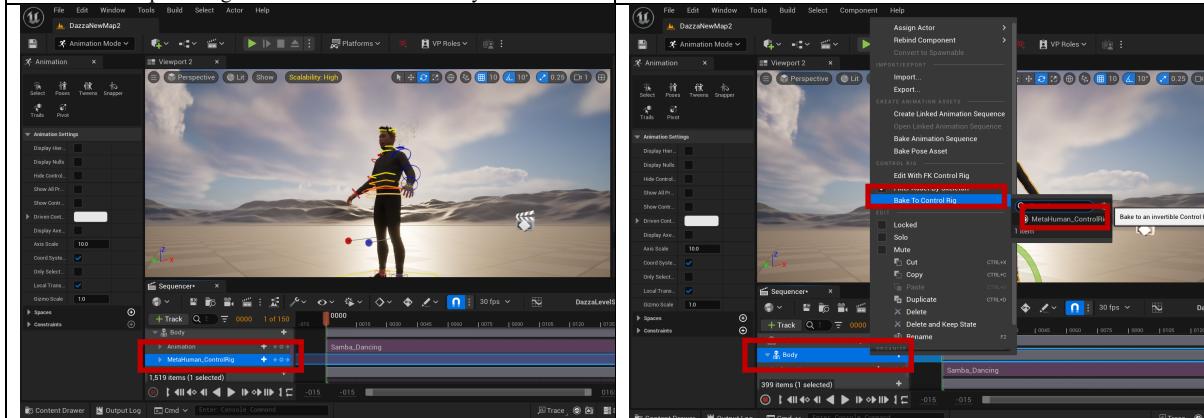
### Workflow: Retarget a Mixamo skeleton to a UE MetaHuman

- The IK Rig and IK Retargeter engine feature, which enables animations to be reused between characters using different Skeleton assets, are automatically created by the UE5 Mixamo Animation Retargeting plugin in Unreal Engine 5.2.
- Make sure the [Mixamo characters and animations](#) are imported properly.





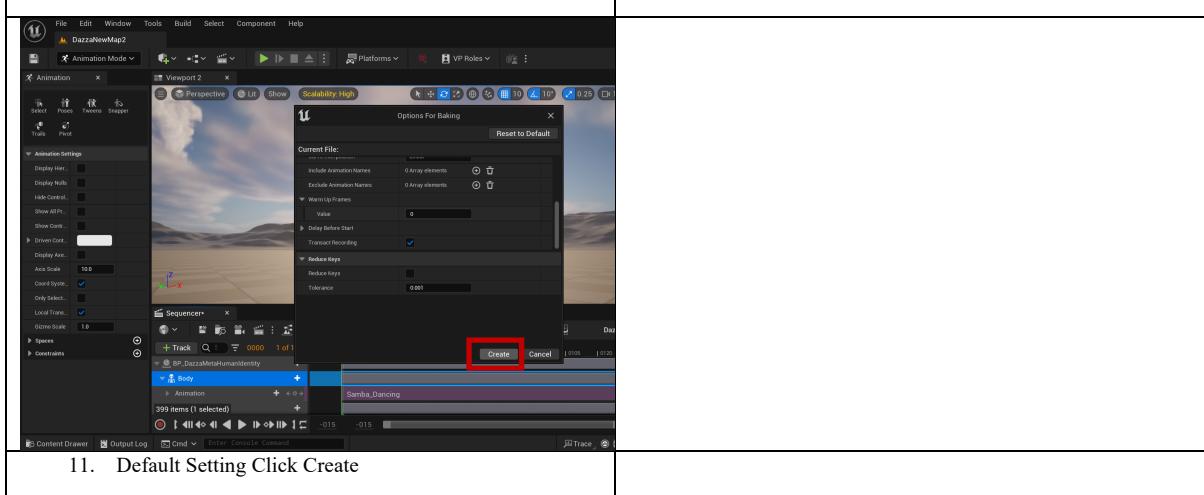
7. **Optional Method:** Select Body → Animation → Change Animation Mode to Use Animation Asset → Dope Retarget Animation to Anim to Play



9. Delete Metahuman Body ControlRig

8. **Best method:** Select Body → Animation → Select Retargeted Animation Sequence

10. Select Body → Back To Control Rig → Metahuman ControlRig



11. Default Setting Click Create



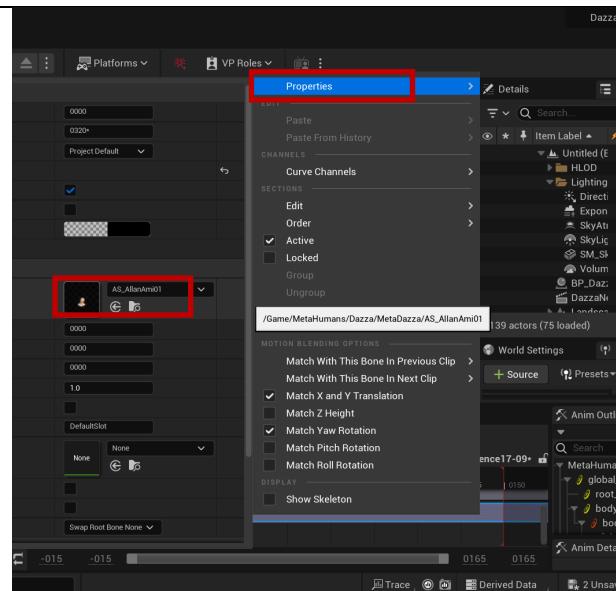
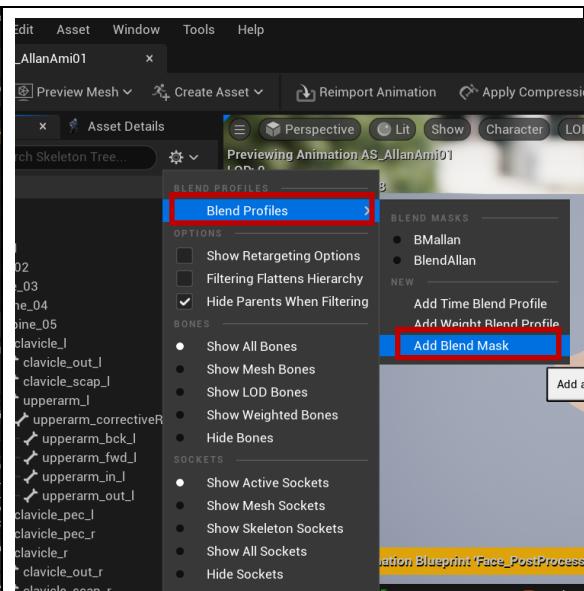
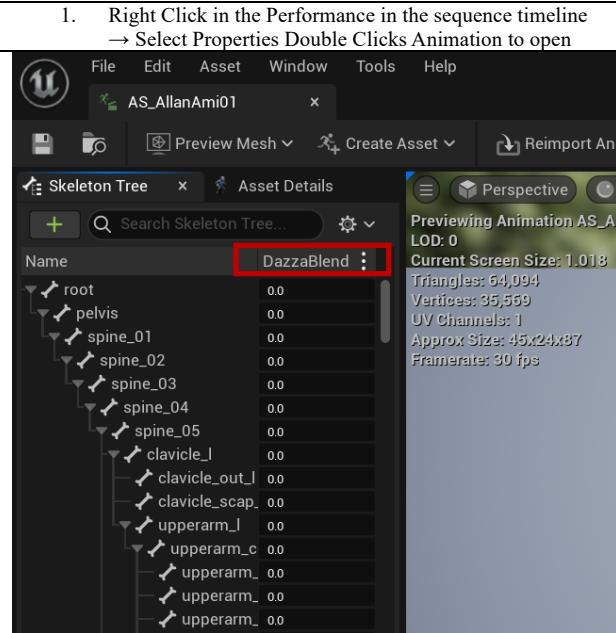
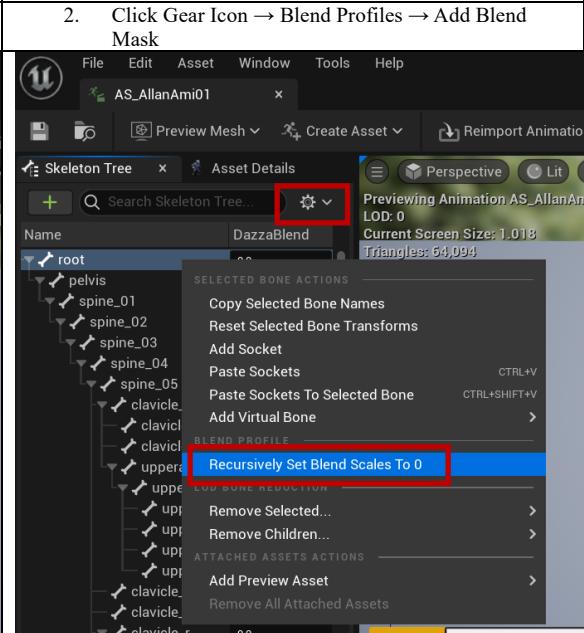
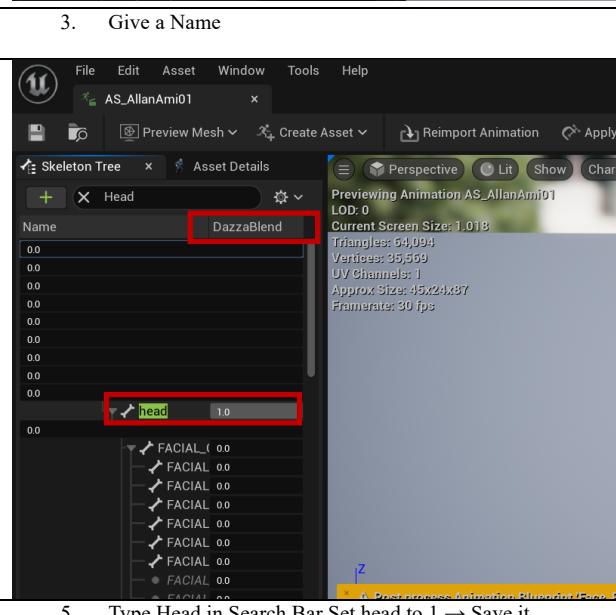
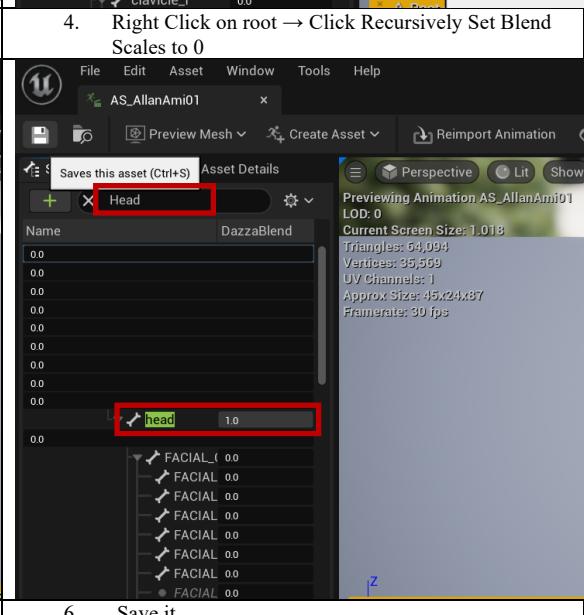
*Result of Maximo to Metahuman Retargeted Body Animation*

## Tips for UE 5.2 Head Reattachment

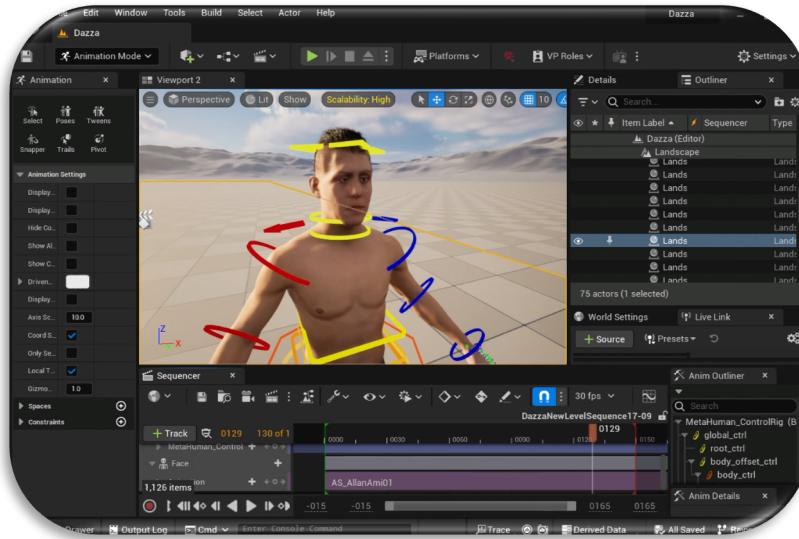
Fix issuers that face animation does not connect with the body when playing back the recorded performance on the iPhone / iPad Live Link Face.



*Face animation does not connect with the body*

 <p>1. Right Click in the Performance in the sequence timeline → Select Properties Double Clicks Animation to open</p>	 <p>2. Click Gear Icon → Blend Profiles → Add Blend Mask</p>
 <p>3. Give a Name</p>	 <p>4. Right Click on root → Click Recursively Set Blend Scales To 0</p>
 <p>5. Type Head in Search Bar Set head to 1 → Save it</p>	 <p>6. Save it</p>

<p>7. Double Click Face_AnimBP Icon</p>	<p>8. Locate Layered blend per bone in AnimGraph → Click it</p>
<p>9. Blend Mode Select Blend Mask → Blend Masks → Select the Name Created → Curve Blend Option → Normalize by Weight</p>	<p>10. Click Compile Button → Save it</p>
<p>11. Outliner → -Select BP_Level Sequence</p>	<p>12. Details → Select Face → Animation → Use Animation Blueprint → Face_AnimBP C</p>



*Result of Face animation connects with the body*

## Optimising Asset Transition

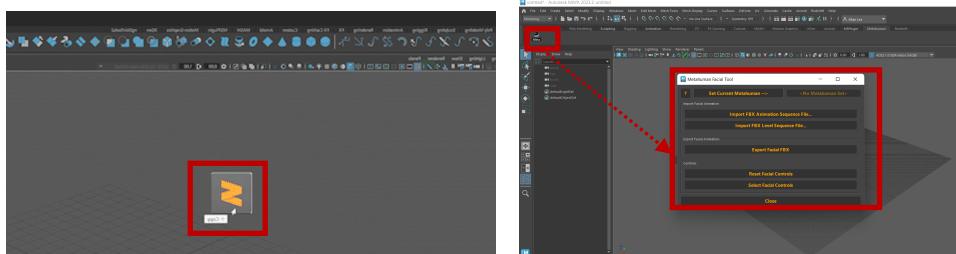
Transferring resources between software applications and assuring compatibility.

Reference links:

- [Unreal Engine for Unity Developers](#)
- [Exporting a MetaHuman to Maya](#)
- [Working with ContentUnreal Engine 5 to Zbrush Asset Pipeline](#)
- [Ana Carolina Pereira | Making an Appealing Render with ZBrush and Unreal 5](#)
- [Metahuman To Maya](#)

Set Up:

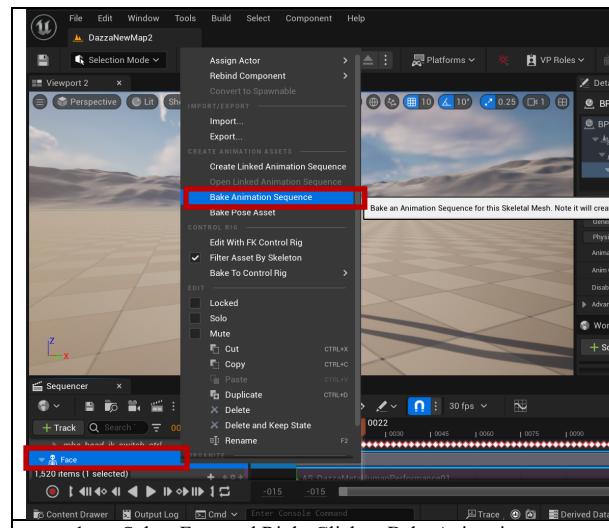
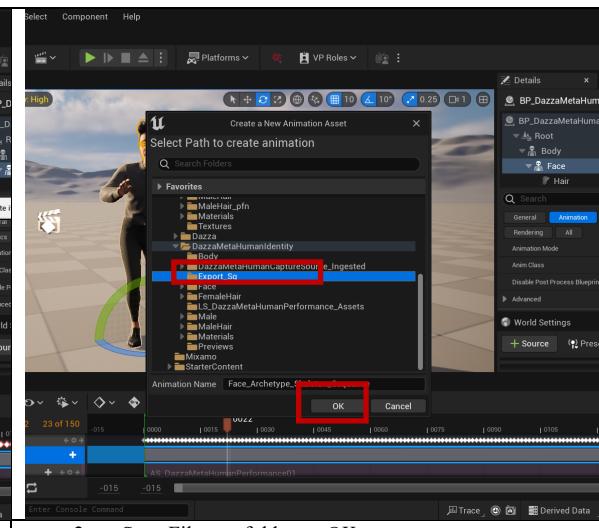
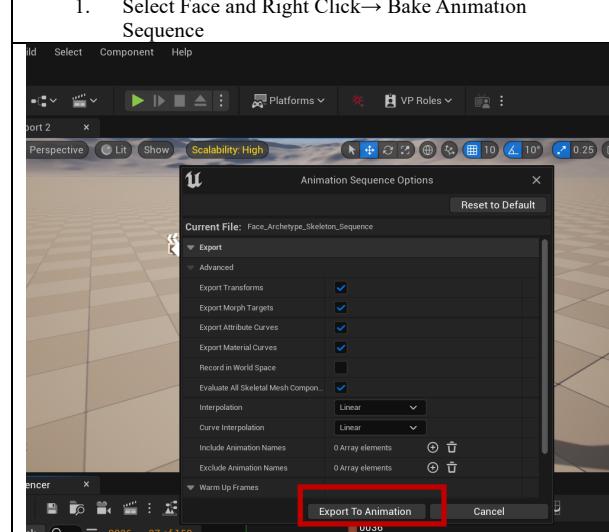
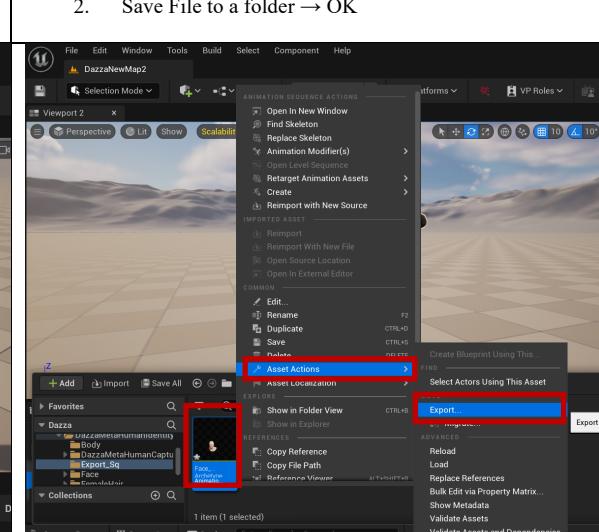
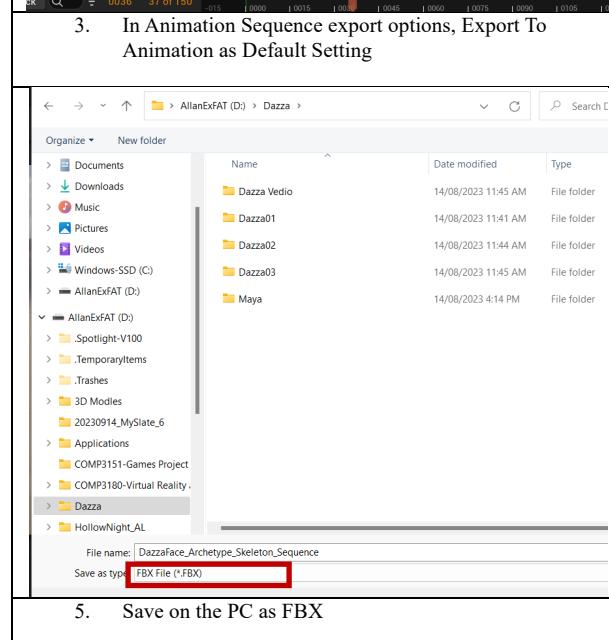
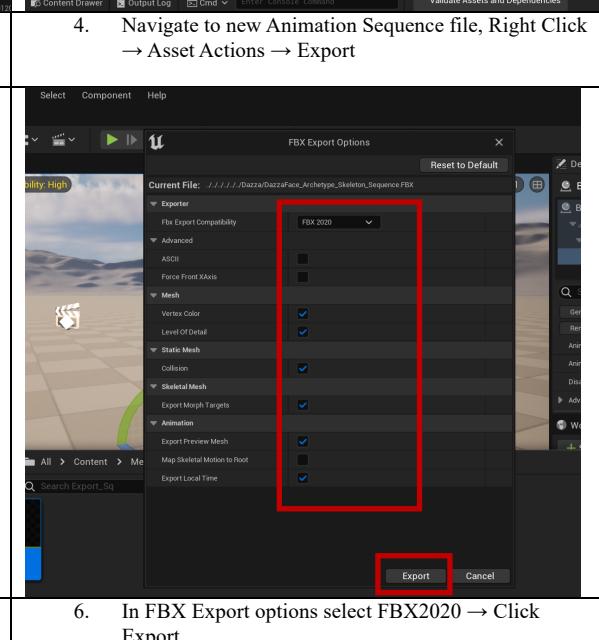
- [Install Metahuman Facial Transfer Maya Python code.](#)



- Drag and Drop install python file into Maya viewport.
- A Shelf and code installed into maya/scripts folder.
- Install Maya installed component PyMEL.
- Download MetaHuman Project from
- UE 4.27-5.2 & Maya 2020-2023.
- [Install Stand Alone Quixel Bridge.](#)

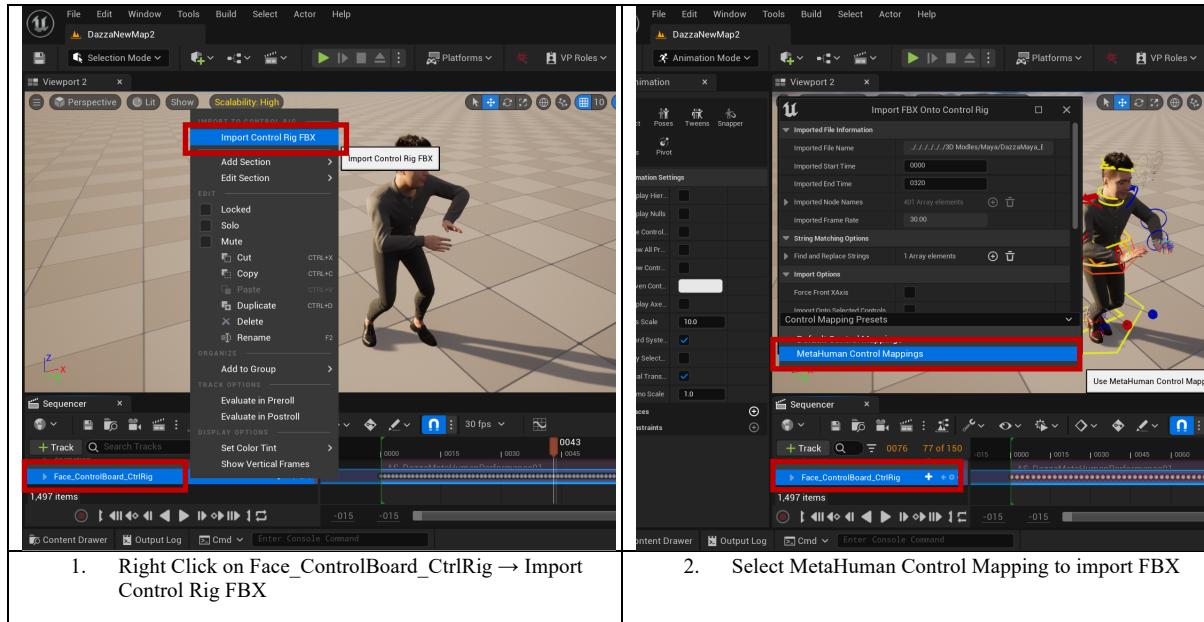
## Exporting a FBX Data from UE to Autodesk Maya

### Workflow: Export Facial animation out from UE Level Sequencer as FBX

 <p>1. Select Face and Right Click → Bake Animation Sequence</p>	 <p>2. Save File to a folder → OK</p>
 <p>3. In Animation Sequence export options, Export To Animation as Default Setting</p>	 <p>4. Navigate to new Animation Sequence file, Right Click → Asset Actions → Export</p>
 <p>5. Save on the PC as FBX</p>	 <p>6. In FBX Export options select FBX2020 → Click Export</p>

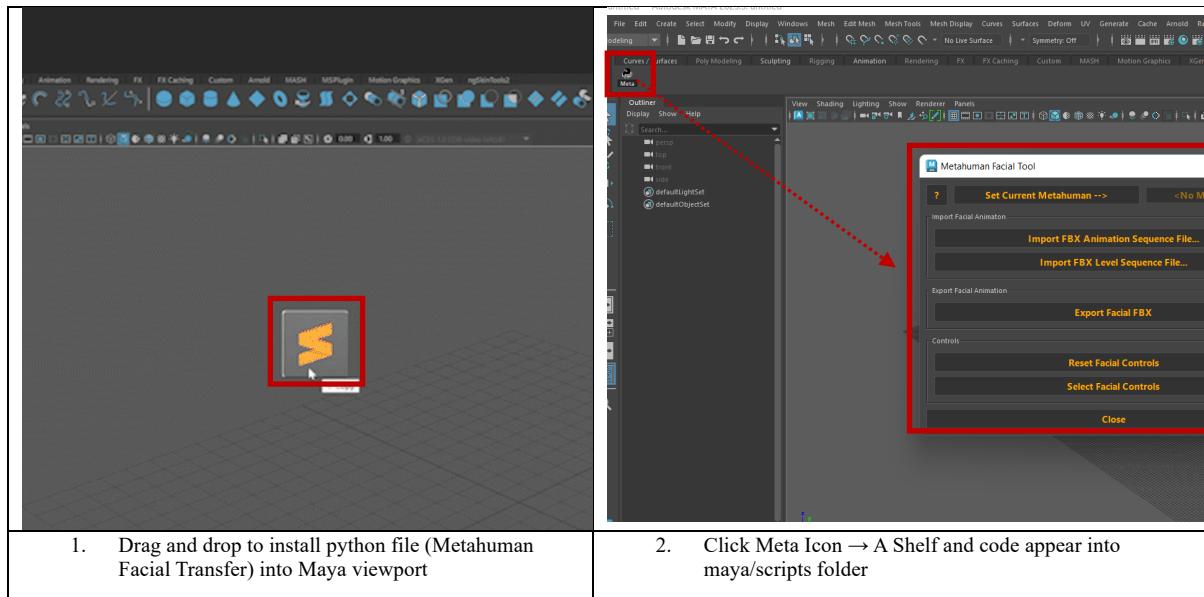
## Importing Control Rig from Maya as FBX Data

### Workflow: Import Control Rig

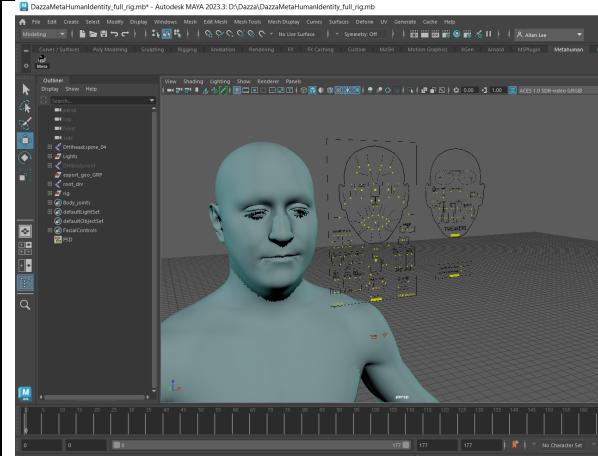
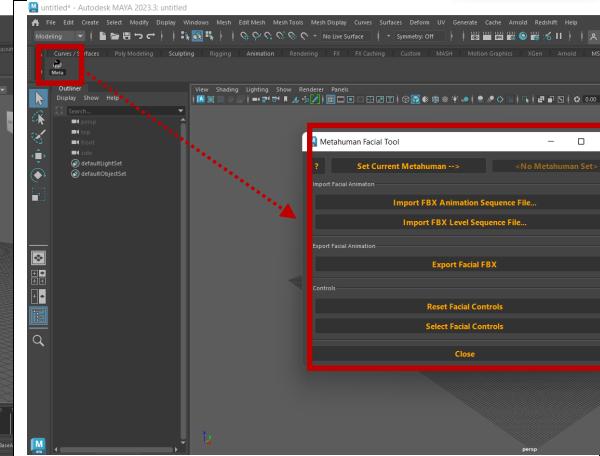
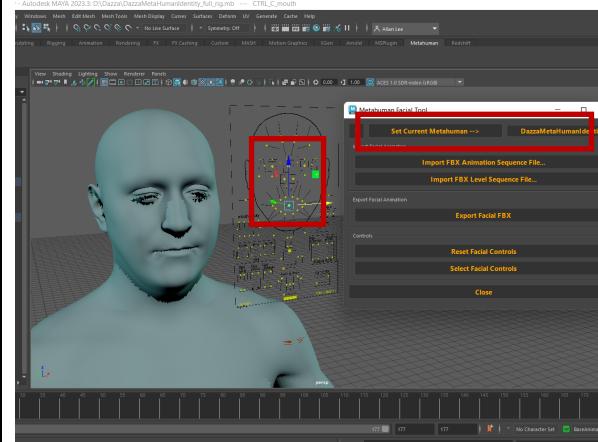
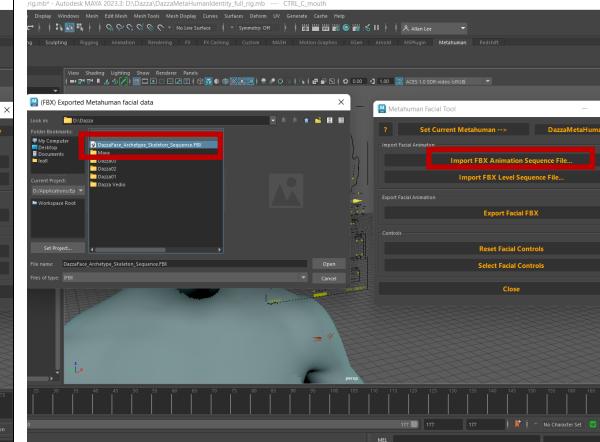
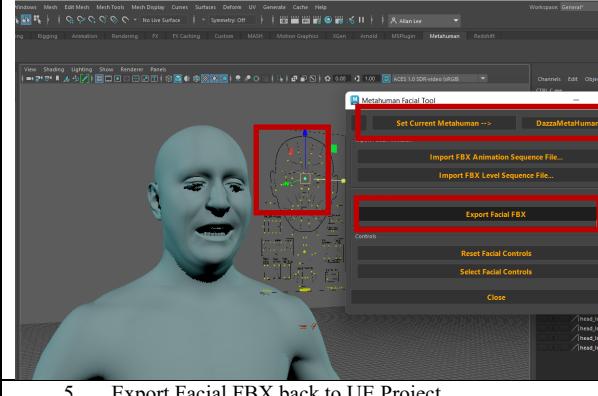


## Using MetaHuman Facial Transfer

### Workflow: Install MetaHuman Facial Transfer



## Workflow: Use MetaHuman Facial Transfer in Maya

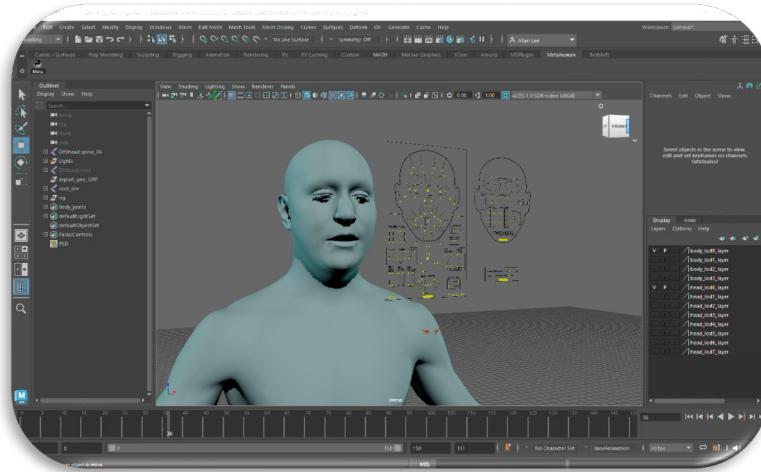
	
<p>1. Downloaded Project (Exported from Stand Alone Quixel Bridge → Open → Reference → Import Metahuman rig into the scene)</p>	<p>2. Click Meta Icon to Launch Tool</p>
	
<p>3. Select Face control on Metahuman face rig → Select Set Current Metahuman</p>	<p>4. Select Import Animation Sequence File → Select exported Metahuman facial data → Open</p>
	
<p>5. Export Facial FBX back to UE Project</p>	

\*[Downloaded Project](#)

The benefit of doing MetaHuman Facial n in Maya

- User can finesse and control facial animation using non-destructive animation layers.

- Maya is still popular 3D software. Many people might not be necessarily familiar with MetaHuman UE.
- Facial animation with a control board, which can easily be tweaked in Maya.



*Result of Imported Facial Animation Sequence in Maya*

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6. *Recording Facial Animation from an iOS Device*. (2021). Docs.unrealengine.com. <https://docs.unrealengine.com/4.27/en-US/AnimatingObjects/SkeletalMeshAnimation/FacialRecordingiPhone/>

7. *MetaHuman Documentation*. (2023). Epic Developer Community.  
<https://dev.epicgames.com/documentation/en-us/metahuman/metahuman-documentation>
8. *Mixamo Animation Retargeting 2 in Code Plugins - UE Marketplace*.  
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9. Nolan, S. (2023, September 22). *Metahuman Facial Transfer*. GitHub.  
[https://github.com/swnolan/metahuman\\_facial\\_transfer](https://github.com/swnolan/metahuman_facial_transfer)