



# Art and Animation (Part 2)

Introduction to Game Development in  
Unity  
Spring 2026, 98-127, Lecture 4

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# The 3D Asset Pipeline

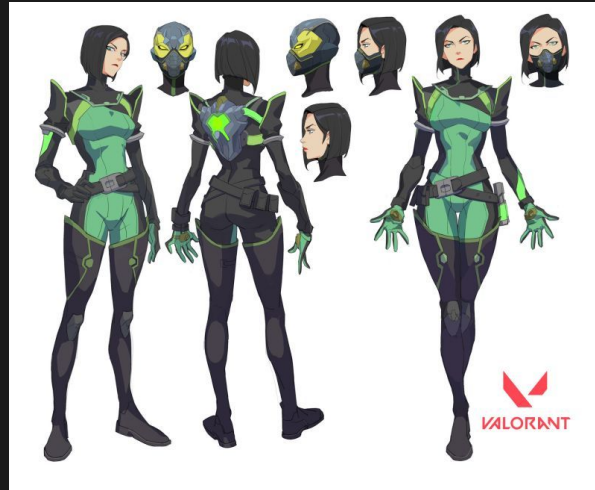
What is the 3D asset pipeline?

- A structured workflow for bringing 3D assets from start to completion.
- Has several stages:
  - Concepting
  - Sculpting and Modeling
  - UV Unwrapping
  - Texturing
  - Rigging
  - Animating



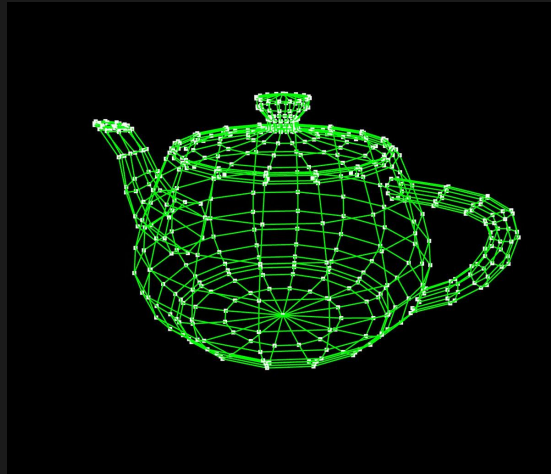
# Concepting

- Making a completed 3D asset is a long, difficult process
- We make concept art to make sure there is a clear visual target that is sufficient for aesthetic and game purposes



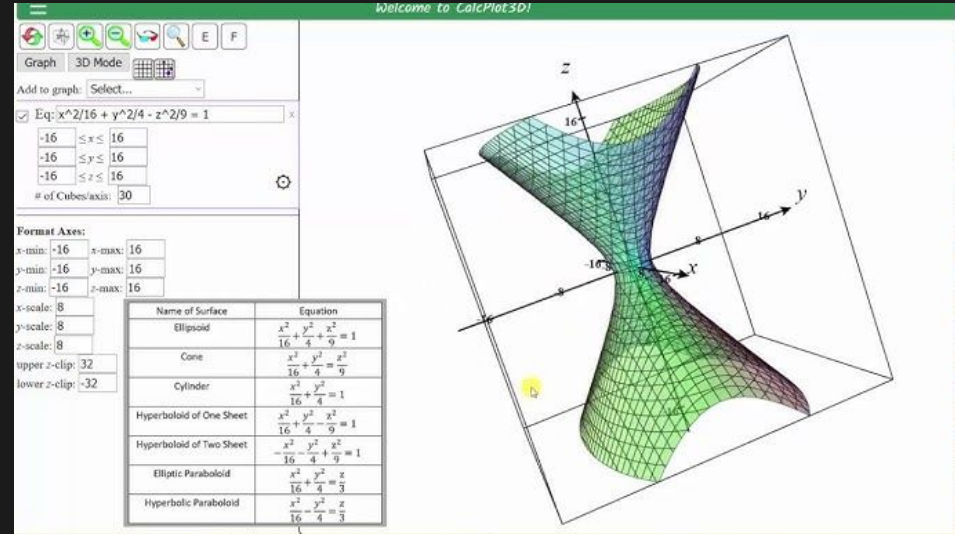
# Meshes

- Meshes are made of vertices, edges, and faces
- 3D softwares give tools for constructing meshes.
- Sculpting and Modelling are the 2 main paradigms for creating meshes



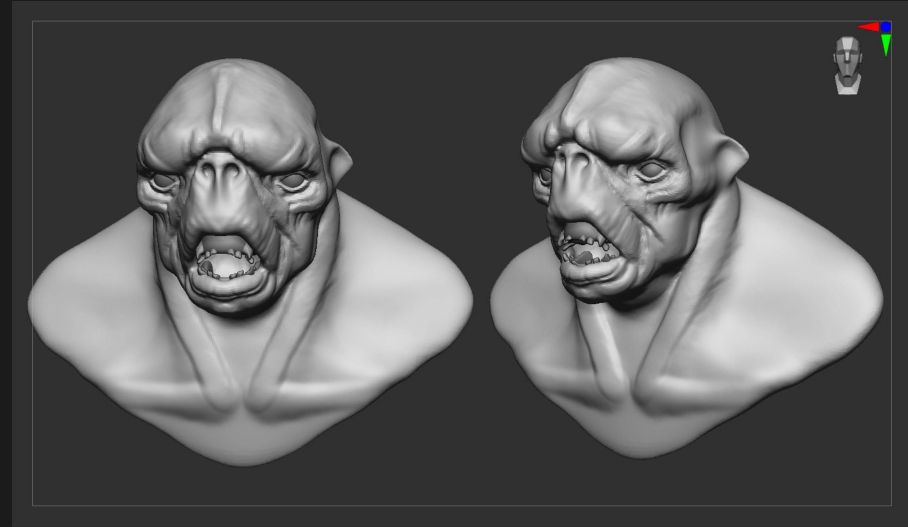
# Other types of 3D Objects

- Point clouds - Tiny discrete points make up mesh
- Implicit surfaces - Mathematical functions define mesh



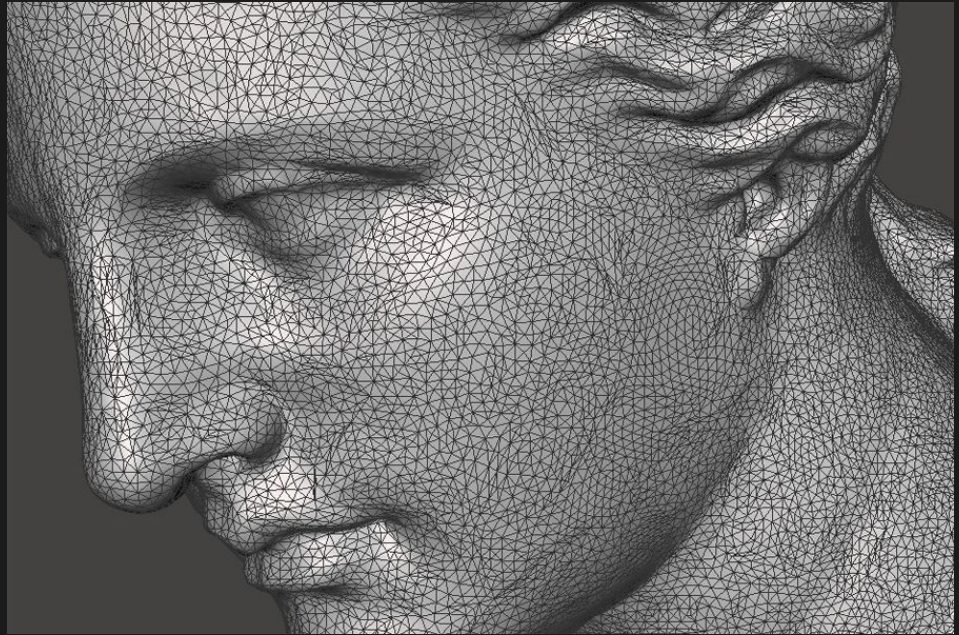
# Sculpting

- Akin to sculpting with clay
- You can also “draw” geometry onto a mesh
- Good for organic objects
- Very intuitive, with artistic skill can efficiently created stunning mesh representations of concept art



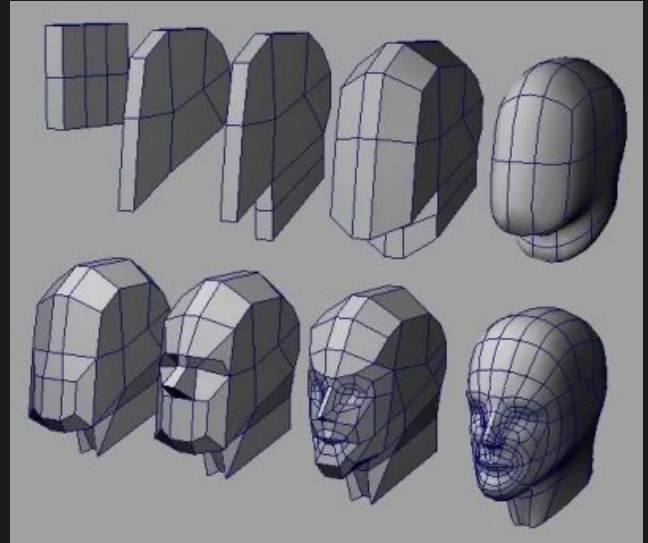
# The Issue With Sculpting

- Sculpting easily allows us to make things as finely detailed as we want
- All this geometry is still represented as triangles
- Sculpting process affords no fine control over density or structure of triangles



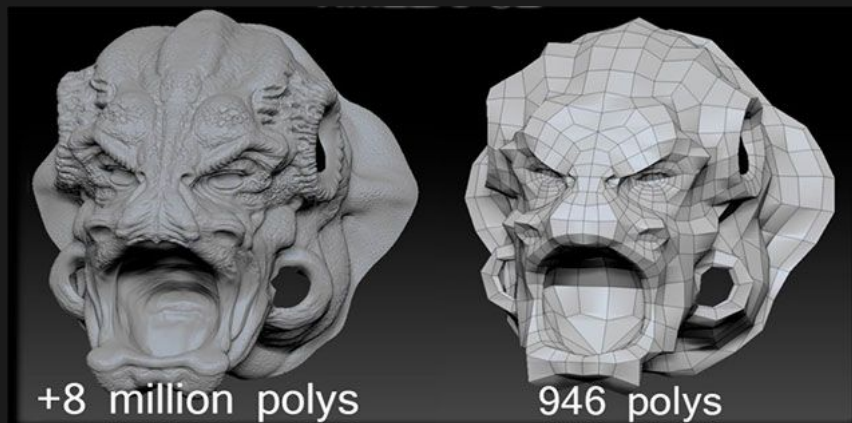
# Modeling

- Method of creating meshes which provides more explicit control over vertices, edges, faces
- Good for geometric objects, difficult for expressive forms
- Creates models well suited for texturing and animating



# Retopology

- We can get the best of both worlds with retopology
- Use sculpting to create initial base mesh, then use modelling to create an optimized representation of that base mesh



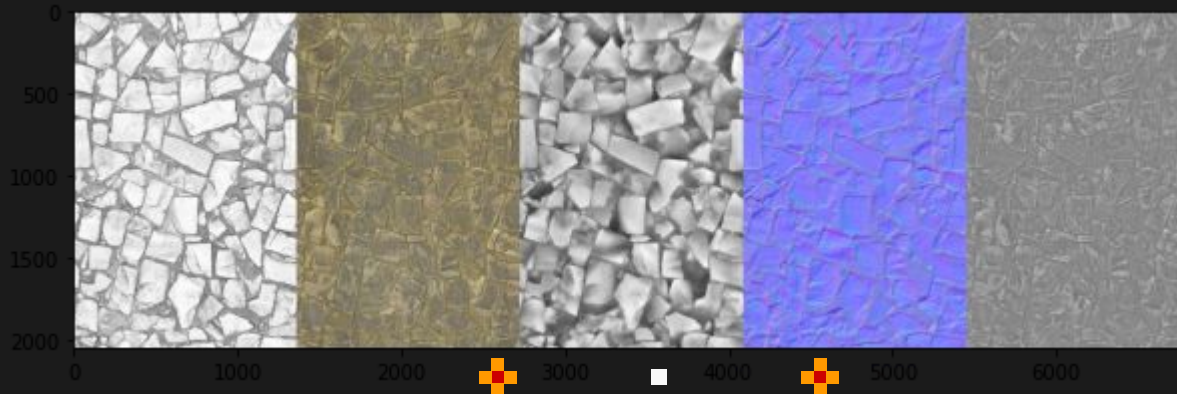
# Retopology cont.

- Retopology an art not science
- Done best manually
  - There are tools and add-ons that make this easier
- There are also programs that fully retopologize meshes, however generally not as good



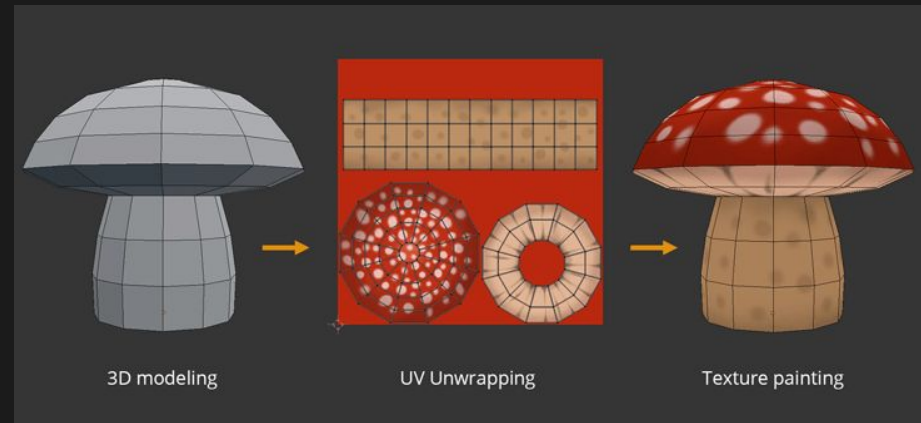
# Texturing

- We use texturizing to colorize our meshes
- However textures are not just the albedo (aka. the color) of our mesh
- Just as an albedo texture stores color information at a point on the surface of our mesh, other textures can be used to store additional information about that point's surface.
- Normal, Roughness, Emissive data

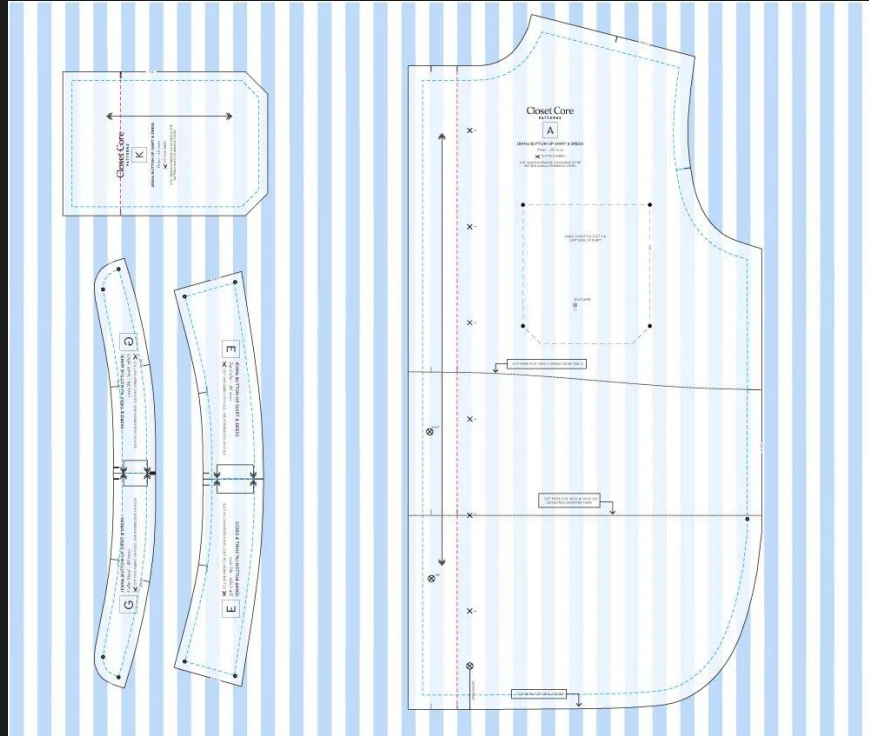


# Texture Mapping

- Furthermore, we need find some way to go from 2D Image to model covered by that image
- This is called texture mapping
  - We map 2D Image coordinates to 3D Mesh coordinates
- Multiple ways to project image onto mesh, most common and versatile is UV Unwrapping



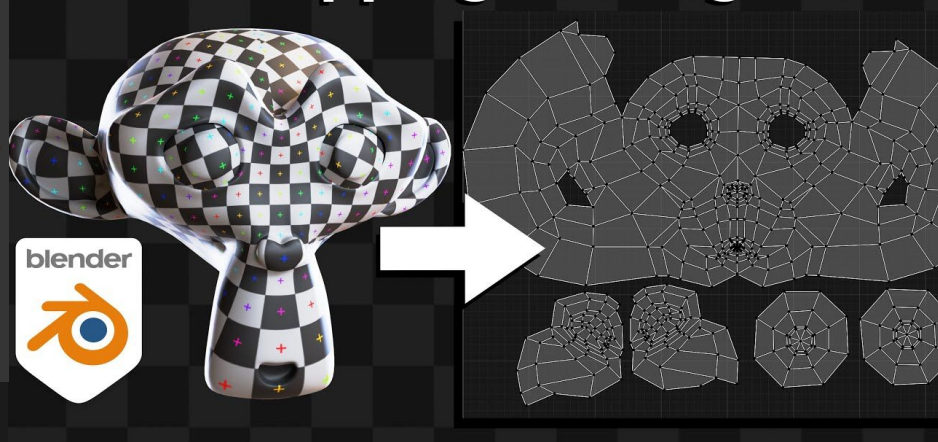
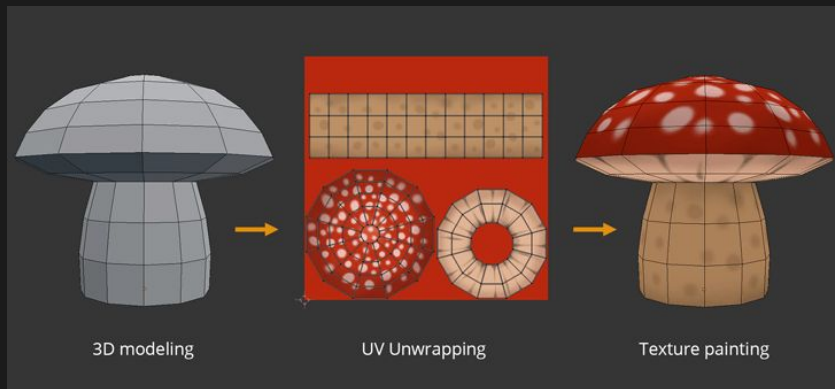
# UV Unwrapping



# UV Unwrapping

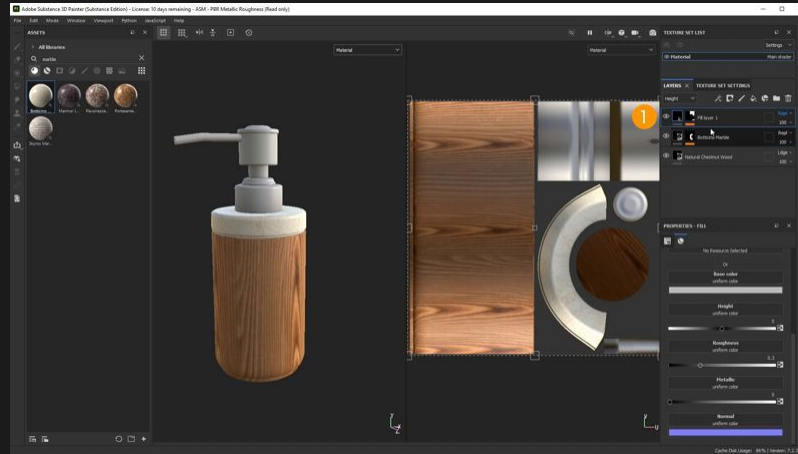
- We define a way to cut our mesh into 2D islands (This is uv unwrapping)
- This results in a UV map (In sewing terms, a sewing pattern)
- We can arrange our islands any way we want to choose how they lay on our image texture

## UV Unwrapping for Beginners



# Texturing

- Substance Painter 3D excellent program for texturing
  - Provides tools for making all texture types
- Allows us to define multiple materials per mesh
  - Each material has its own texture set



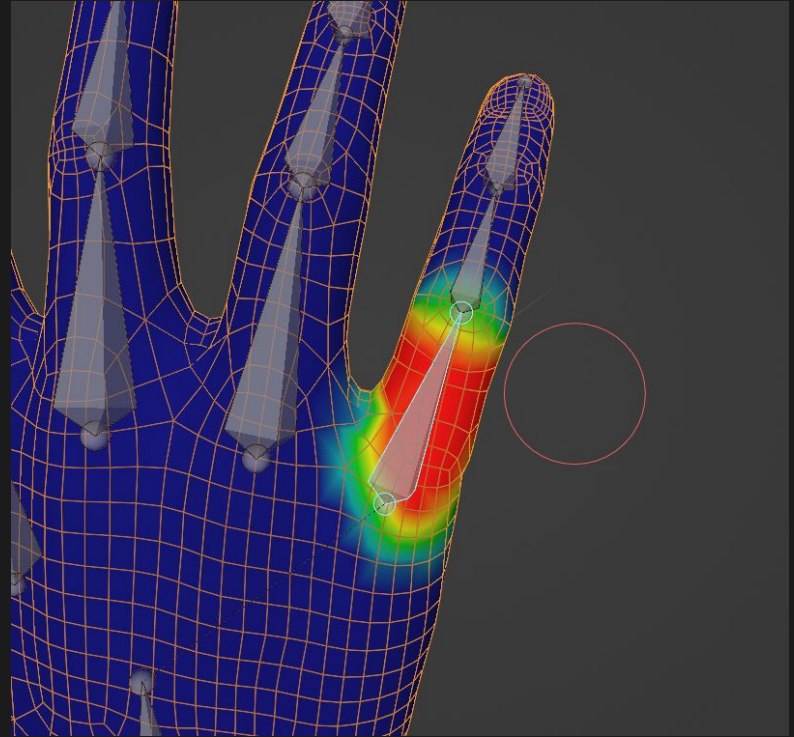
# Skeletons

- How do we animate our meshes?
  - Unfeasible to create new mesh for each frame of animation like how we did with sprite sheets
  - We want some way to move and pose our meshes
- We create skeletons within our meshes which enable us to pose them
- Skeletons made of bones that exist in an hierarchy



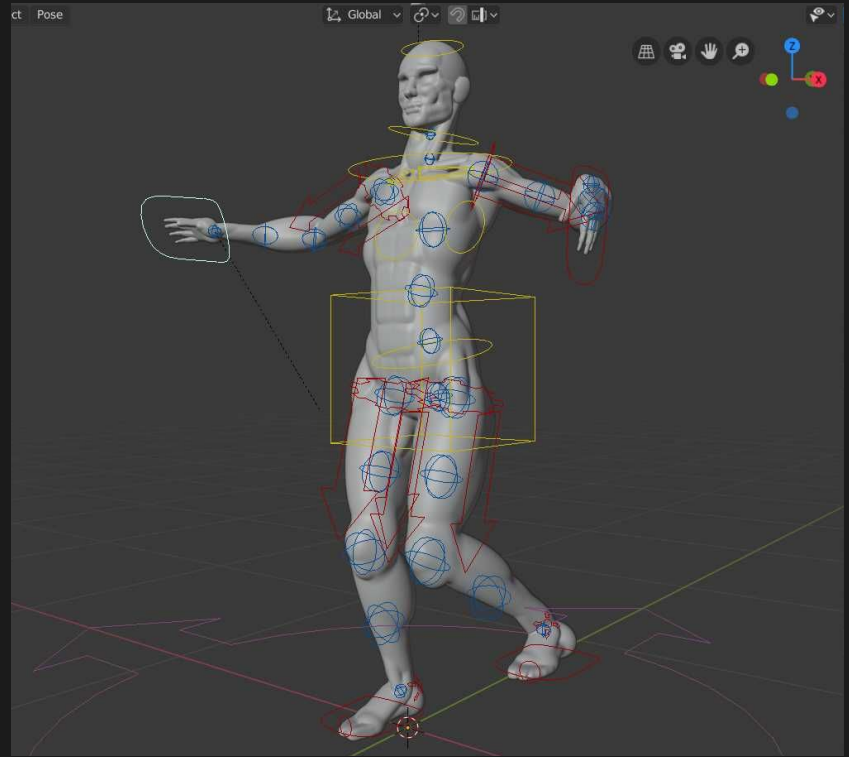
# Bone Weights

- We need to dictate how much each bone influences a particular vertex
- Each vertex has a bone weight *for each bone*
- Bone weights of this pinky bone indicated by right image
- Automatic bone weight algorithms are good, often helped by manual tweaking



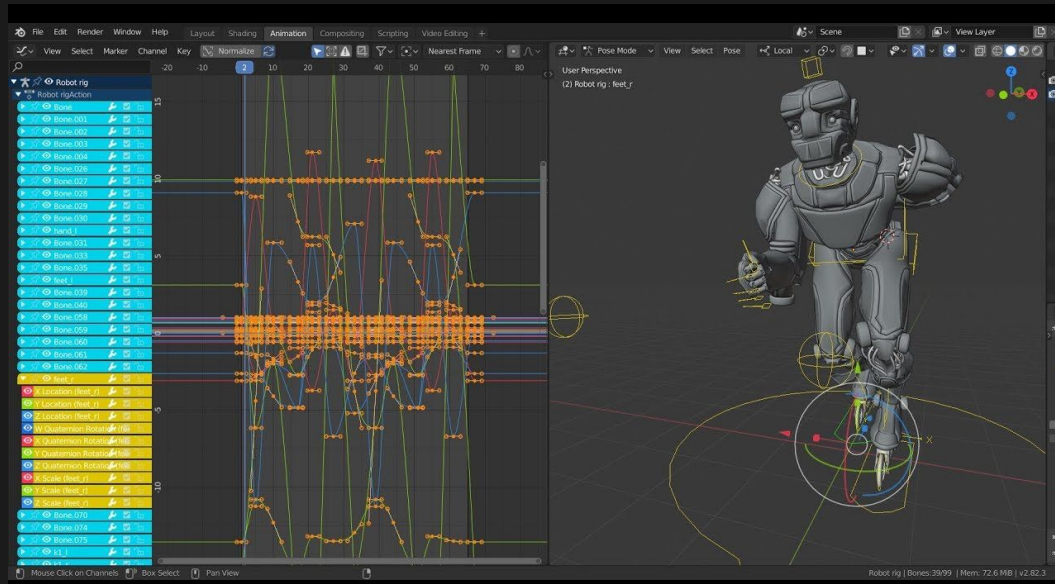
# Rigs

- Say we want to animate a hand making a fist
- Very tedious to rotate 3 bones per finger to make a fist
- We create rigs to automate bone movements
- Rig suits movements done by character



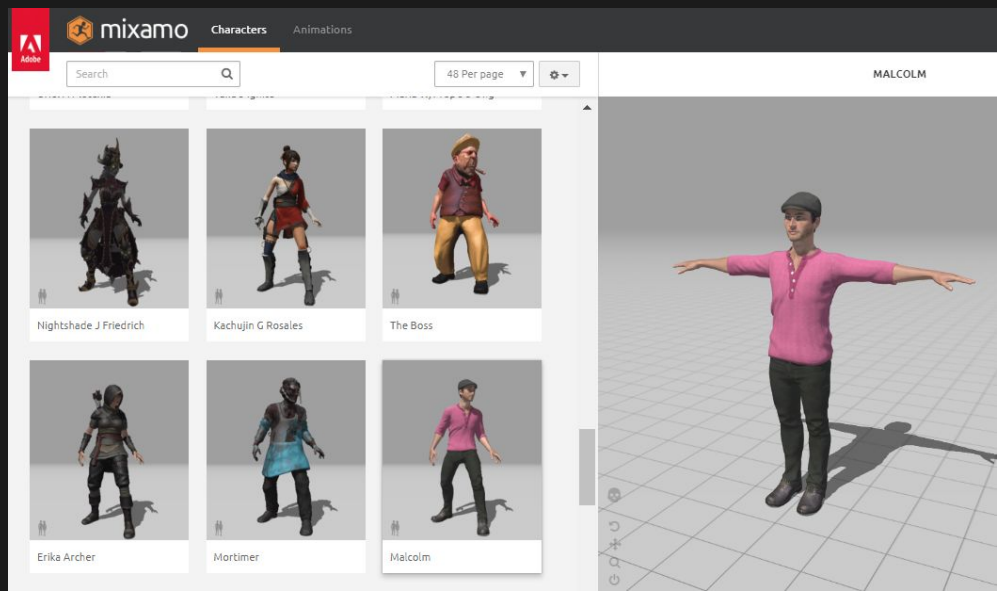
# Animation

- We then use the rig to create our final animations
- Pose character -> Keyframe Pose -> Make next pose -> Continue
- Use curves to tweak interpolation between poses



# Mixamo

- Mixamo is a free solid online resource for:
  - Auto-skeletonization
  - Humanoid mocap animations
- Can be used to rig any mesh
- We look at this again in a bit!



# Mocap

- Process of using real data to generate animations
- Rokoko Vision is an app that allows you to turn phone footage into skeletal animations

## Now anyone can animate for free, from anywhere

Built with love for our community, Rokoko Vision unlocks motion capture for everyone, from creators just starting out to studio animators looking for a quick way to pre-visualize ideas. Upload a video, use single-cam or [upgrade to dual-cam](#) for even better tracking accuracy.

Capture your motions for free

Enjoy limitless free usage for recordings up to 15 seconds



Mocap with Rokoko Vision (single-cam) by @raffo\_vfx

# Recap

Each of these parts of the asset pipeline build upon the previous. It's generally hard to modify something related to a previous part of the pipeline and retain work done after that.

Therefore planning is crucial!

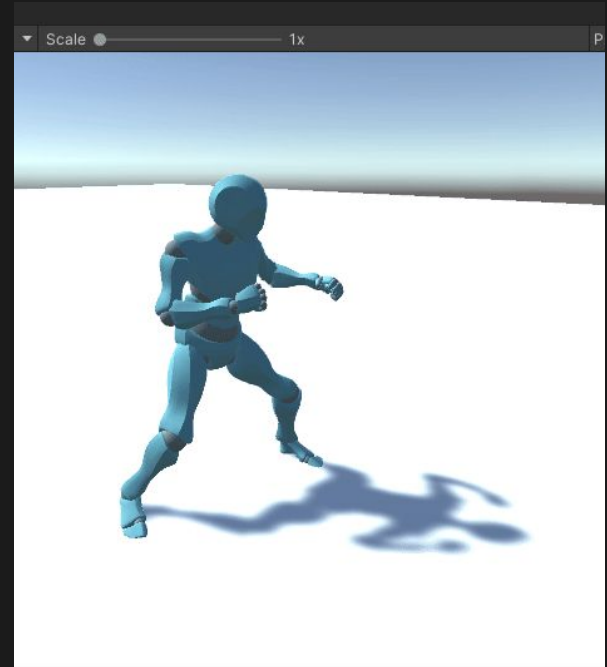


dreamstime.



# Back to Unity (Demo Time)

We will import a simple already-made animated 3D asset into Unity, look at some important-to-know parameters, and also walk through using Mixamo to easily animate our own models.



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**Download this:**

<https://free3d.com/3d-model/giant-stone-765391.html>

