



ITFS Avatar Workshop - 2021/05

Mozilla Hubs Avatar Guide

By Ronald Ho Hip (@CrimsonZA) version 1

Hubs avatars use the glTF format specifically the binary form *GLB*

You can open both these formats in the latest version of [Blender](#) which is the recommended tool for most things you want to create for Hubs

To be able to make more advanced avatars you will need the [Hubs Blender Components](#) addon and [install that in Blender](#)

And the [Hubs Blender Robot Rig](#) to get started

This workshop guide assumes you are familiar with Blender and 3D environments

But if you are attending the workshop live depending on the level of experience of the group, most of this will be demonstrated if time allows

Official Customisation Documentation is [here](#)

Non Rigged Avatars (sourced)

This part of the guide is for models you find online that doesn't contain a skeletal rig or bone structure, generally they are un animated meshes.

[Reference Model](#)

Find a model you like, if it's already a glb test it in hubs, [sketchfab](#) is a good place to find models but here are some other places:

<https://cgtrader.com>

<https://Turbosquid.com>

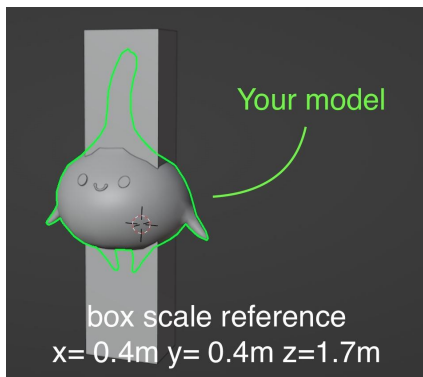
<https://clara.io>

You can have a look at the [bottom of this guide](#) on how to do a simple gltf to glb conversion without installing any special apps, *Hubs only accepts the glb format*

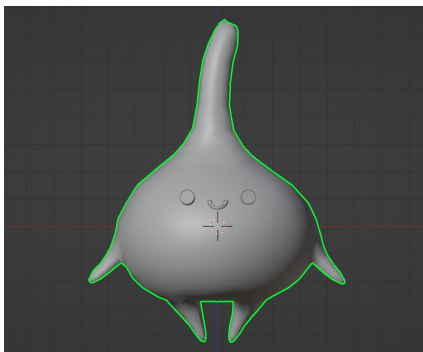
If the model isn't appearing in Hubs or is really small, massively gigantic or the model was not an glb file, you'll have to import it into Blender and inspect it,

For non Rigged Characters here is a small checklist you can follow

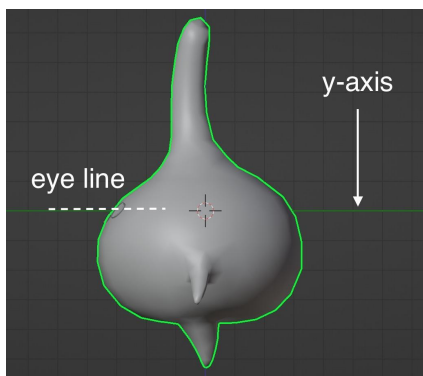
1. Scale
2. Orientation
3. Eye line
4. Shape Keys
5. Animation



For **scale** make sure your model is around the right size so that it's not too big or too small, certain characters are suitable to be large and some small, in the example on the left the character makes sense to be about half the size of the Hubs Bot



For **orientation** make sure you see the characters face in the front view, if not when you export it might be facing the wrong way



Make sure the **eyes** are right on the y-axis or the ground plane or your model will rotate in a fairly unnatural way.

Well this will depend on your model, but generally you want your view in Hubs from your character to make sense to the model. Depending on how tall it is maybe a nice centre of mass position is also good.

You can then check if the model has any **animation** or **shape keys** that you may or may not want and keep them or toss it.

When you're all set you can go ahead and export your model as a glb file and upload it in the Hubs Avatar settings

Rigged Avatars (sourced)

This part of the guide refers to characters or models you download that contains some form of rigging and has a bone structure or armature.

Reference model:

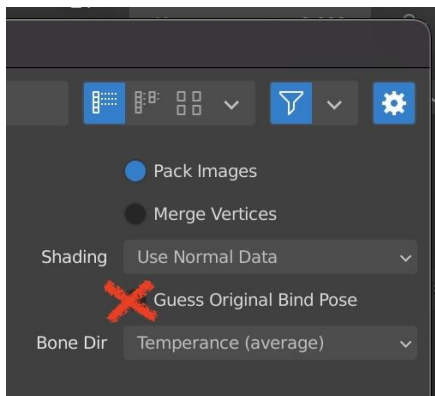
<https://sketchfab.com/3d-models/chibi-garlic-40eb591bef0443b781a8a09db5195b65>

In the event you want to use a very nice avatar such as that one referenced above, by [daniel_bar_on](#) conceptualised by [Johanna Puhl](#) which has been animated and therefore rigged accordingly, you will have to first inspect the gltf file right away.

Here are is a checklist on what to prepare:

1. Importing
2. Scale
3. Empties
4. Parenting
5. Armature Modifier
6. Orientation
7. Eye line
8. Shape Keys
9. Shaders
10. Textures

Importing



Before you import there are a few options that can interfere with how the model is interpreted by the Blender gltf importer for the reference model **disabling** “Guess Original Bind Pose” works best

Scale

Often the scale of the rig and mesh might be very large and you might not even see it at goes beyond the clipping plane of the viewport, it's usually safe to be in an orthographic view to avoid the clipping

Decide whether you want to keep the animation but next steps are for removing the rig

Empties, Parenting

Unparent all parts of the actual mesh from the original rig and empties

Armature Modifier

On all parts of the actual mesh remove the armature modifier

Orientation , Eye line

Refer to [Non Rigged Avatars](#)

Shape Keys

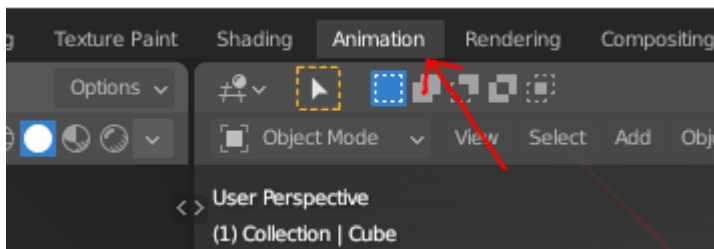
This isn't that common but just in case have a look if this it is necessary to get rid of, in this case the eyes have a blink animation using shape keys it's easier/quicker to remove, read further to keep.

Keeping animation

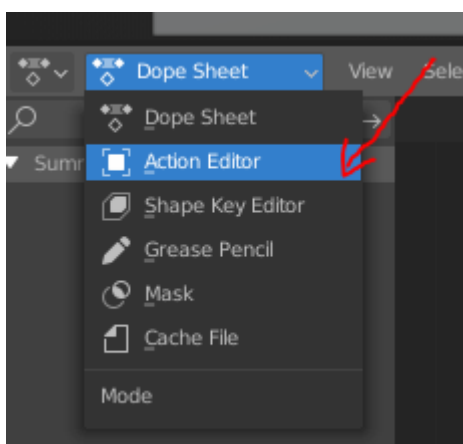
It can be safe to keep the existing animation but there's trickier steps involved to getting it working depending on how it was originally set up.

Action Editor

There might be quite a number animations on the model called actions which you can find in the animation tab / workspace inside Blender, you might want to rename all of them to make sense it.

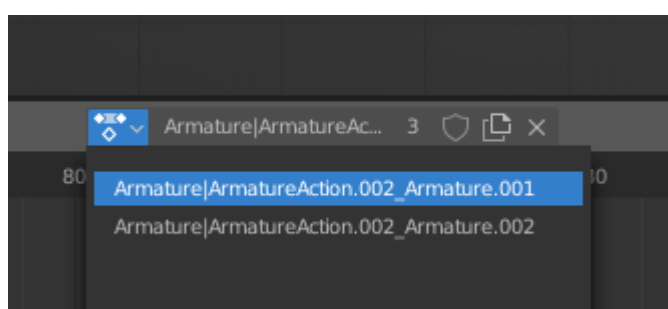


The animation tab at the top of the Blender Window

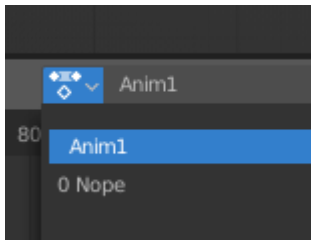


Action Editor found lower the left side of the Blender Window seen under the Dope Sheet drop down button.

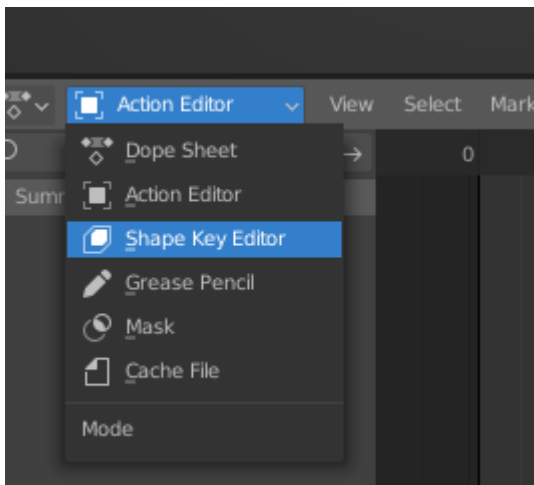
In the middle of the Action Editor title bar there's a drop down for all the actions, you can select them and each action will apply to the armature and you can decide on which to set the Hubs components to pay attention to :



Rename the action so that you know what makes sense later we will remove the garbage

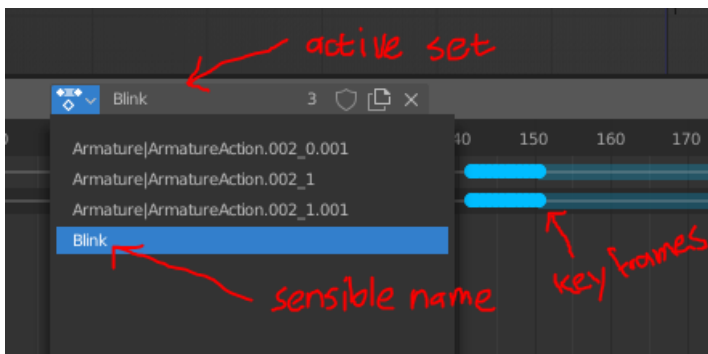


Shape Key Editor

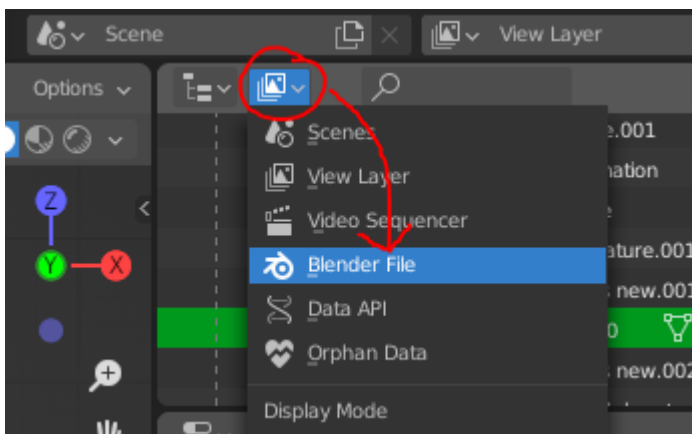


In the same drop down as the Action Editor there's the Shape Key editor and in the middle of the title bar is the animation sets for the Shape Keys much the same as the Animation Actions, you might want to check each part of the mesh for these, in the reference model they are on the eyes

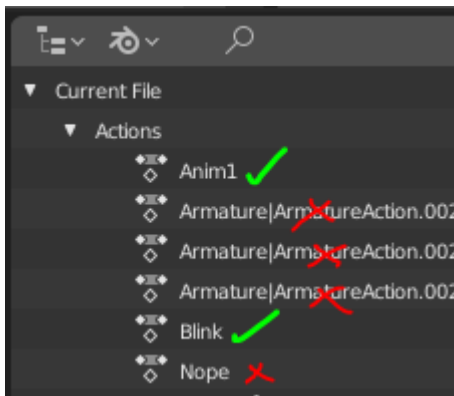
Like wise rename things here too



Blender Outliner -> File View

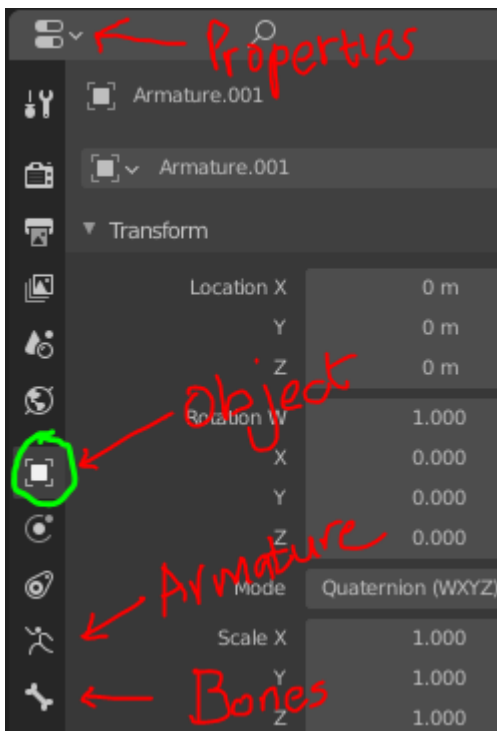


In the top right view you'll see the outliner panel that lists all the objects in the scene switch the outliner from View Layer to Blender File



Under Actions you will see all the animations we had a look at in the Action Editor and Shape Key Editor now we can get rid of the ones that we don't need so there will be no mistaking of what's what

Object Properties vs Bone Properties



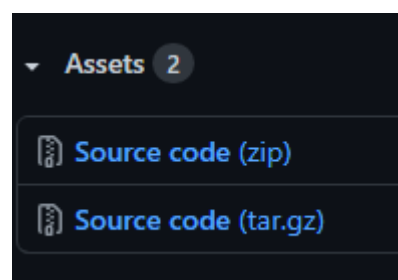
In the Properties panel on the far right side there are different properties you can find for each object in the scene in the example on the left the Armature has properties for Object as well as Armature and Bones To make sure Hubs finds the animation for the Armature you need to set the Hubs Components to the Object not the Armature or Bones

Hubs Components

You'll need to install the Hubs components in Blender in the Blender Preferences, goto the Edit Menu and you'll see preferences at the bottom, open that up.

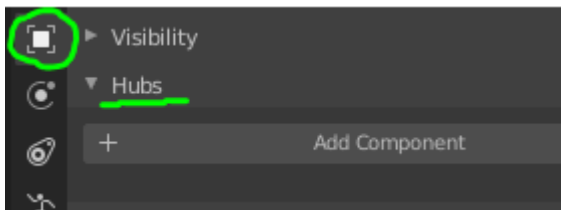
On the left side goto Add-ons and at the top right you'll find Install with a downward arrow icon, go here: https://github.com/MozillaReality/hubs-blender-exporter/releases/tag/v0_0_9

Download the latest release it will look like this ->
Choose "Source code(zip)"



go back to Blender hit that install button we just looked at and find the zip and install the addon then close the preferences.

Under Object Properties you'll see a section for Hubs and there's where you add different components to certain things when clicking Add Component



For Hubs to recognise the animation on the armature you have to add a loop-animation component to the object properties of the armature, and not the armature or bones properties. Choose the action related to the armature.

For the eyes you want to also go to the object properties and add a loop-animation component to it and set the shape key action for the blinking on each eye, also be sure that each eye has the same action you have the component referring to.

There are a number of Avatar Editors or Customisers around that you can do some basic edits to them like add logos or change its appearance with different options of hair , eyes, skin tone, etc

Here are a few popular one's:

Avatar Editors

Quilt

<https://tryquilt.io>

Hubs Humanoid Texture Editor

<https://misslivirose.github.io/avatar-texture-tool/app/index.html>

Hubs Hackweek Avatar Maker

<https://mozilla.github.io/hackweek-avatar-maker/>

There are also some advanced Avatar Generators that work of photos of faces for selfies

Ready Player Me Avatars

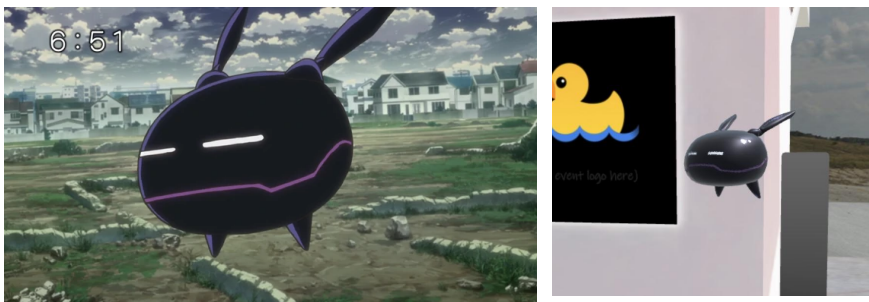
[Readyplayer.me](https://readyplayer.me)

Straight forward take a photo generate glb link or download glb

Upload to Hubs or use url

Custom Avatar Non Rigged

Using Blenders fantastic array of tools you can spend as little or as much time as you want on creating an avatar, basic modelling knowledge is required, the more you know and the more experience you have from practice the more wonderful your avatars will be, whether it's your own idea or fan inspiration, I personally loved the Replica character from the anime World Trigger and thought it was an excellent design for a Hubs Avatar



Symmetrical Sketching

Start off by doing some sketches you can do this on paper but I find it easier sometimes to use a drawing app that features symmetrical drawing , that is to be able to do draw two sides of something at once, Photoshop recently added this feature but there are others like Sketchbook from Autodesk that has it which is free to download if you have an iPad there's the new Gravity Sketch app or if you have a VR Headset you can get Gravity Sketch on there too for free.

Low Poly Modelling

You can also use Gravity Sketch for some low poly modelling, you could very well go quite far with your model in Gravity Sketch alone with enough practice, but in the conventional sense Blender is the goto for modelling I think it basically does everything you can imagine. You will have to learn well how to use some of the tools to get going with modelling and definitely familiarity of where to go around to different things in the app , there's just too much to cover in this guide so here are some links:

<https://www.blender.org/support/tutorials/>

<https://cgcookie.com/lesson/introduction-to-the-blender-beginner-course>

Unwrapping

<https://www.youtube.com/watch?v=Y7M-B6xnaEM>

Texture Painting

<https://www.youtube.com/watch?v=u9nE2Xg6Jgk>

Once you have a model refer to the [Non Rigged Avatars Section](#) to complete the steps in making sure your model is lined up and at correct scale for exporting

Custom Rigged Avatar

<<documentation in progress>>

Armatures

<https://www.youtube.com/watch?v=cZ3o5tjO51s>

Rigging

<https://www.youtube.com/watch?v=f2pTkW-1JkE>

Hubs Bot Rig

<https://github.com/MozillaReality/hubs-avatar-pipelines>

Components

[Hubs Components](#)

Hands

The Hands in an Avatar should follow exactly how the Hubs Bot Rig is built, everything is done there for you from poses to the naming conventions that trigger the gestures inside Hubs when using hand controllers on a VR System all you need to do is build your hand meshes around the hand bone structures and parent the mesh to the bot rig amature

Software Downloads / Requirements

[Blender](#)

[Hubs Components](#)

[Hubs Bot Rig](#)

[Online GLB Packer](#) - quickly convert glTF to glb

Reference model: <https://sketchfab.com/3d-models/shiba-faef9fe5ace445e7b2989d1c1ece361c>

To use this to convert a gltf to a glb make sure all textures are in the same folder as the bin file and gltf file, you can edit the gltf file in a text editor if the textures are in a separate folder you can quickly search for the folder - in this case "textures" it will be followed by the texture

```
],  
  "images": [  
    {  
      "uri": "textures/default_baseColor.png"  
    }  
  ]  
}
```

And delete that piece of text document over the original gltf file (**as .gltf**) so it looks like:

```
],  
  "images": [  
    {  
      "uri": "default_baseColor.png"  
    }  
  ]  
}
```

Save the file then drag the textures, bin, and gltf file into the packer app in your browser and you will get to download an "out.glb" file and you can go ahead and use it in Hubs if there isn't a rig in the model.