Automatic Rig Script: Documentation

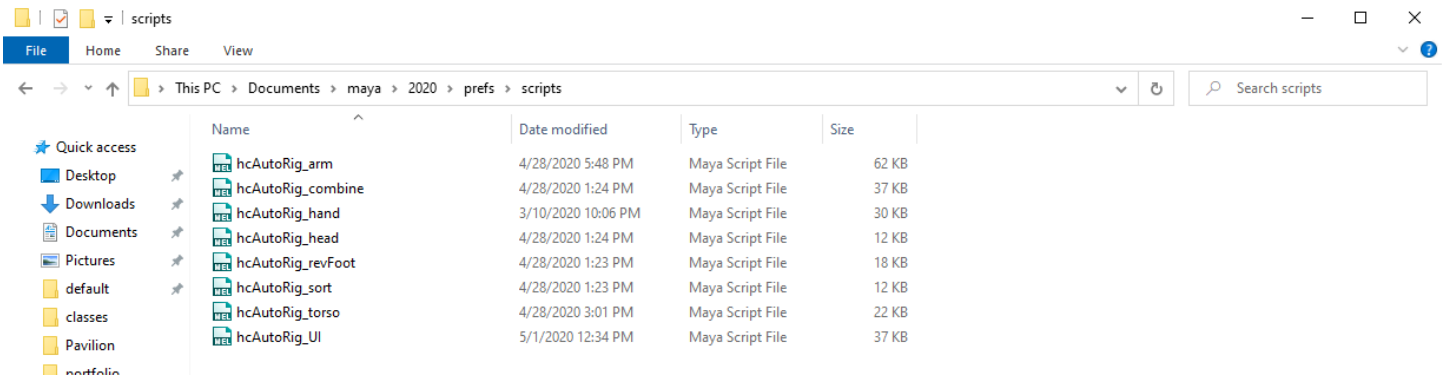
Hannah Chase

Downloading the scripts

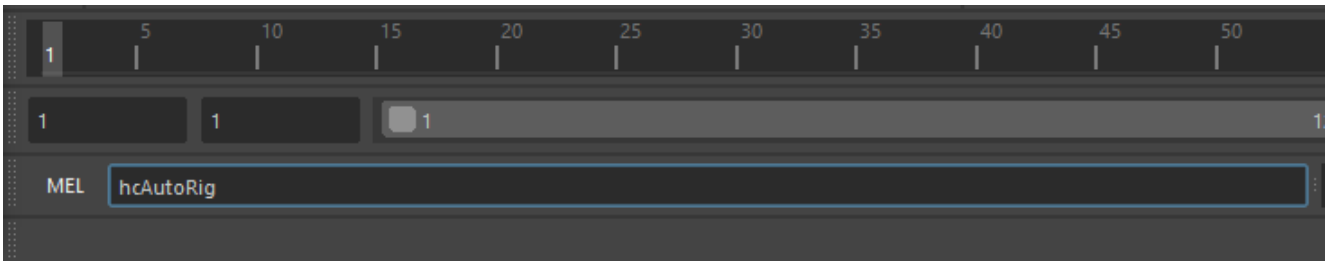
Download the .zip file, 'HC_AutoRigTool', from GitHub (https://github.com/HannahChase/Automatic-Rig-Script)

Place each .mel file in the following folder:

windows: <drive>: \Documents\maya\<version(2020 or current year)>\prefs\scripts
Mac: ~/Library/Preferences/Autodesk/maya/<version(2020 or current year)>/prefs/scripts
Linux: ~maya/<version(2020 or current year)>/prefs/scripts



Once the scripts are in this folder, start-up Maya and type 'hcAutoRig' in the MEL command line, then hit enter. This opens the Auto Rig Tool.



Warning:

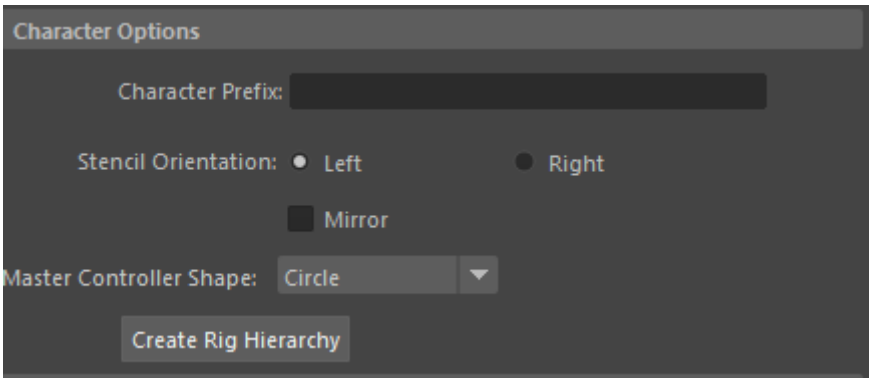
If you already have a userSetup.mel file in this directory you should not upload the userSetup.mel file in the zip folder, instead open the file and add 'source "hcAutoRig_UI.mel";' into it.

Things to Know

All rigs are created with the character facing the positive Z-axis. This script follows this convention, so if you place the locators in a different orientation it will not work. To know if your character is properly placed go into front view, if you can see the front of your characters' face, it is placed correctly.

This was made for my 2020 Capstone at RIT, it is by no means a complete tool, so if you have suggestions, pointers, or something goes wrong, please contact me. You can reach me at HannahAbigailChase@gmail.com.

Rig Set-up Tab



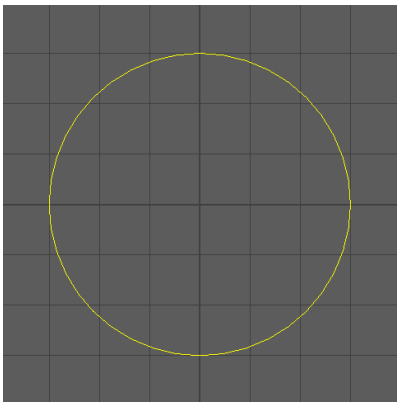
Character Options: This is the basic set up of your character, and will dictate the rest of the rig.

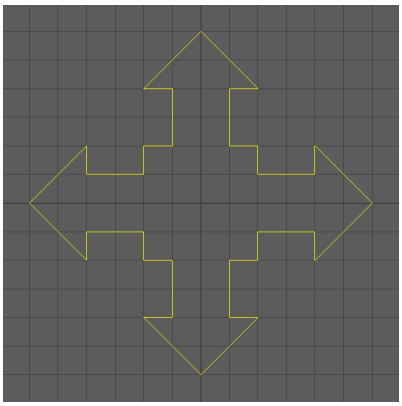
Character Prefix: This is the abbreviation of your characters name, it should not be longer than five characters long. (Nothing wrong happens if it is, it's just not a good naming convention otherwise). Be careful not to change this once you start placing your rig.

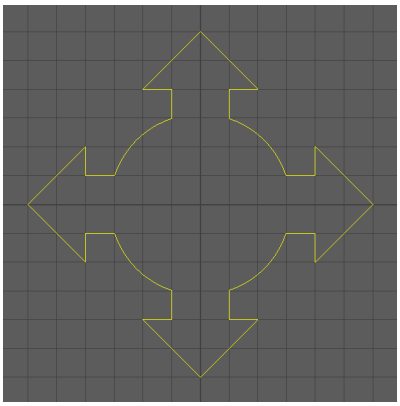
Stencil Orientation: This is the orientation the stencil will be created in. If it is centered (like the spine) it will ignore this section of the UI.

Mirror: When enabled, it will mirror the placement of the locators when you click on 'Create Rig'.

Master Controller Shape: This will let you decide what you would like your master controller to be. There are three options: Circle, Box Arrows, and Circle Arrows.


Circle


Box Arrows

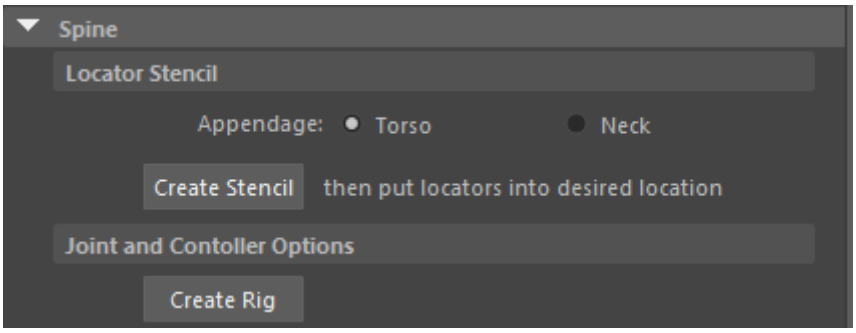

Circle Arrows

Create Rig Hierarchy: This will create a rig hierarchy in the outliner. If you do not click this when you start making your rig, it will automatically make one for you when you click any of the 'Create Rig' buttons.

Everything created by this script will get sorted into the proper groups in this hierarchy.

You should not create two rigs in the same scene, but it can be done with this script as long as you have a different Character Prefix name.

Spine



Spine: This section can be expanded and collapsed by clicking anywhere on the banner.

Appendage: Choose which part of the rig you would like to make: the Torso or the Neck.

Create Stencil: Click this when you have selected the desired appendage. This will create a series of locators in the scene. The Torso will have 7 locators and the Neck will have 4. These locators have been locked to limit incorrect placement of the joints.

Create Rig: Click this when all of your locators are in their desired spot.

Spine Placement Tips

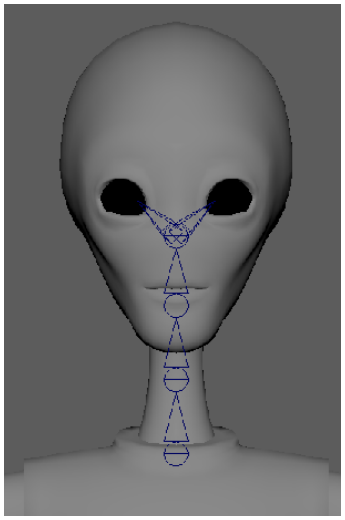
Neck
Avoid moving the locators in the X direction

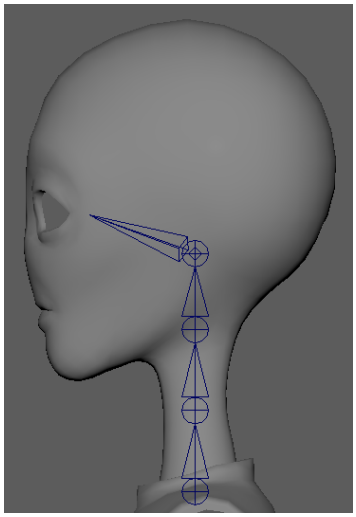
You can scale the joints in the Y direction to keep even neck spacing.

The root should be at the base of the neck.

The end joint should be at the base of the skull where the head pivots. This is usually where the jaw bone meets the ear.

The joints in between should softly follow the contour of the neck in side view.


Front View


Side View

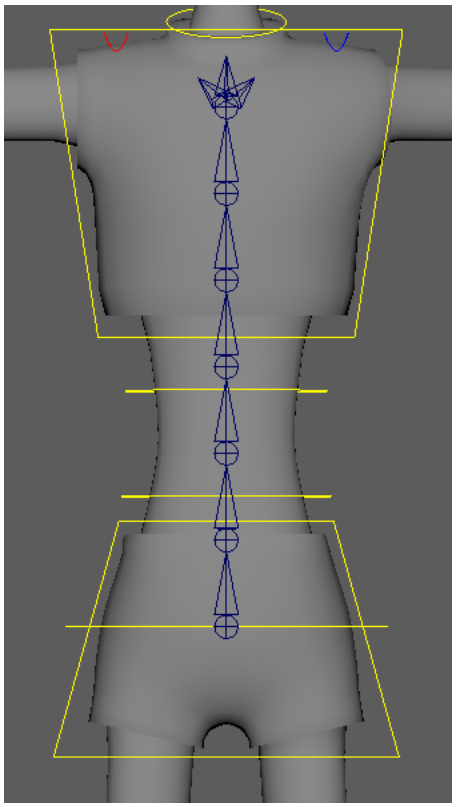
Torso
Avoid moving the locators in the Z direction

You can scale the joints in the Y direction to keep them evenly placed.

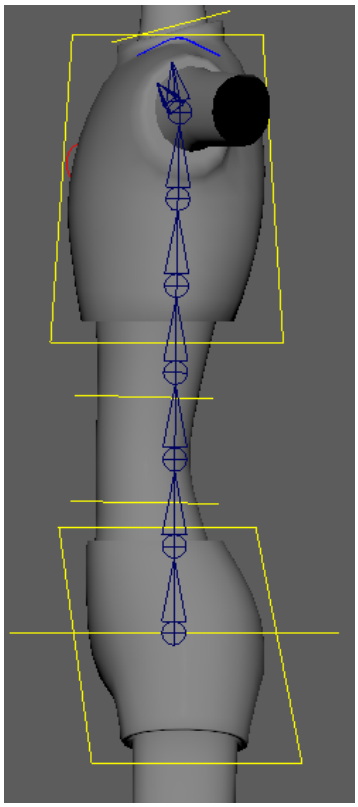
The root should be in the center of the pelvic bone

The end joint should be placed near the upper third portion of the sternum in the Y direction, and the middle of the body or slightly towards the back of the character in the Z direction.

The joints in between should softly follow the contour of the back in side view.

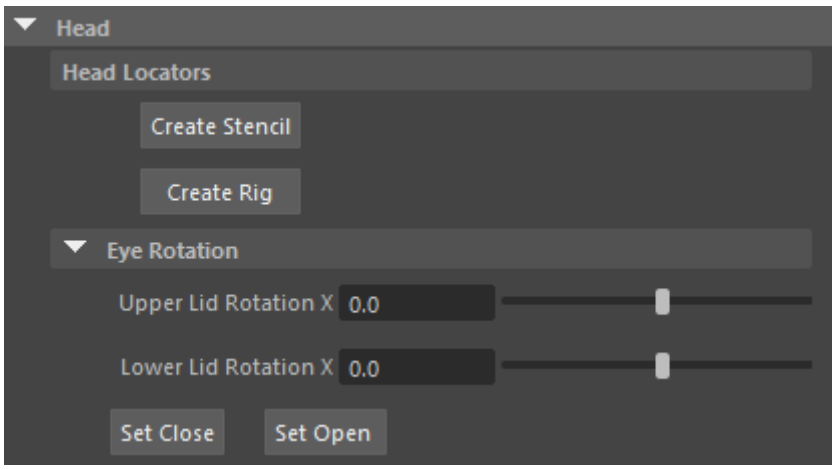


Front View



Side View

Head



Head: This section can be expanded and collapsed by clicking anywhere on the banner.

Create Stencil: This create three locators, an eyeball, a upper eye tip, and lower eye tip. Place them in desired location.

Create Rig: Click this when all of your locators are in their desired spot.

Eye Rotation: This section will help you creating the blink upper and blink lower attributes on the eye controls.

Upper Lid Rotation: Use this to control the rotation of the upper lid.

Lower Lid Rotation: Use this to control the rotation of the lower lid.

Set Close: Once you get both the upper and lower lid into your desired closed potision, click 'Set Close'. Once clicked, it will set the joints back to their original position.

Set Open: Once you get both the upper and lower lid into your desired open wide position, click 'Set Open'. Once clicked, it will set the joints back to their original position.

Tips:
The Eye Rotation section of this only works right after the rig set up has occurred, if you exit out of this UI and re-open it, the constraints on the sliders will not be set up. On the 'Controller Options' tab in the UI, there are another set of sliders you can hook up to these attributes if you need to use them later.

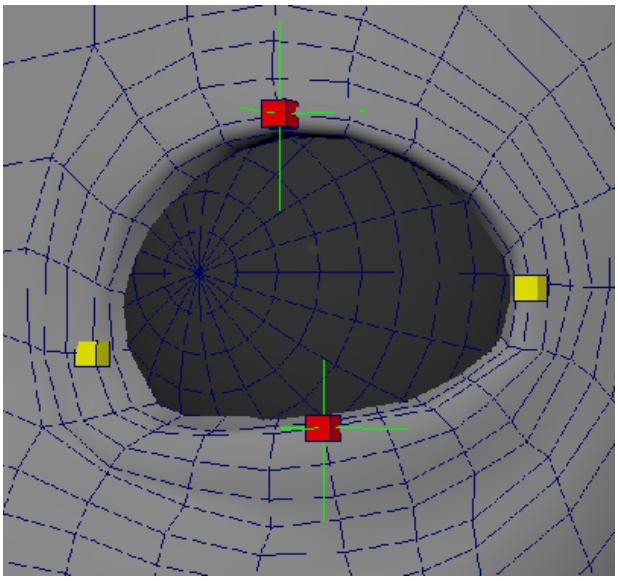
Head Placement Tips

Head
The locator labeled eyeTipUpper_loc_01 should be placed on the top Red marker in the picture. This is the middle edgeloop on the vertex that is the farthest outwards in the Z direction.

The locator labeled eyeTipLower_loc_01 should be placed on the bottom red marker in the picture. This is the middle edgeloop on the vertex that is the farthest outwards in the Z direction.

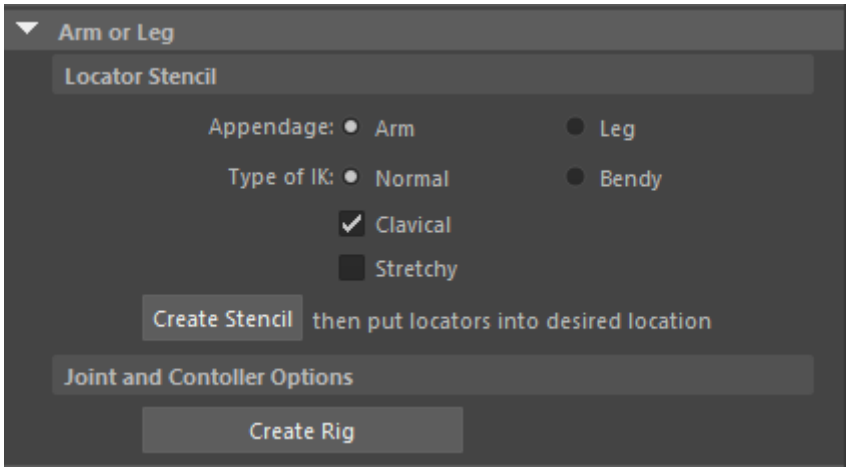
If your eyelid does not have an exact middle edgeloop between the corners it it not necessary to create one, however try to do this in the future as it makes rigging easier.

You can use a point constraint on the eyeBall_loc_01 to get it in the middle of the eye geometry so long as you delete the constraint afterwards.



Yellow Cubes: the corners of the eyes
Red Cubes: the middle edgeloop between the corners of the eyes.

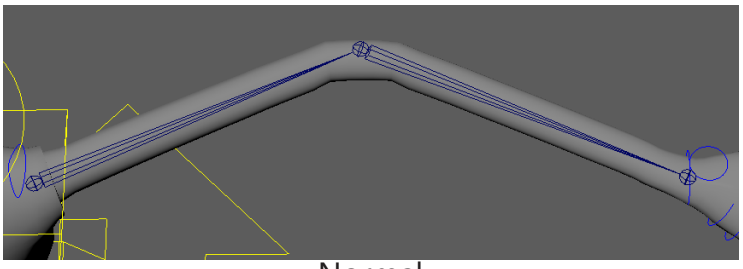
Arm and Leg



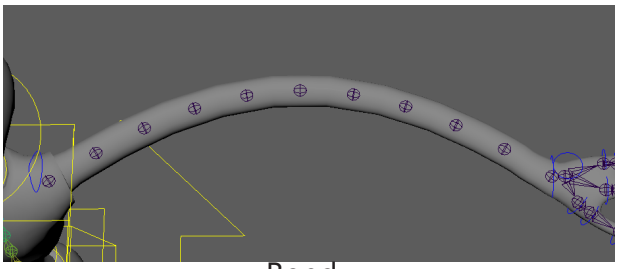
Arm or Leg: This section can be expanded and collapsed by clicking anywhere on the banner.

Appendage: Choose between making the Arms or Legs of the character.

Type of IK: Choose between a normal and bendy set up. A normal set up has three joints, a bendy set up uses curves to create a smoother bend.



Normal



Bendy

Clavicle: Enabling this gives you a locator to place the clavicle joint. This becomes disabled when you have Leg selected in Appendage options.

Stretchy: Enabling this gives you an extra attribute on the hand controller to enable or disable stretchiness on the limb.

Create Stencil: Click this once all the above settings are where you want them to be. The normal IK will have three locators and the bendy IK will have a curve. The locators have been locked to limit incorrect joint placement.

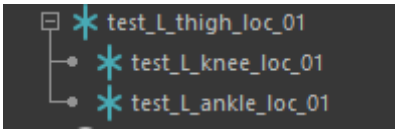
Create Rig: Click this once all the locators or the curve is in place to create the rig.

Arm and Leg Placement Tips

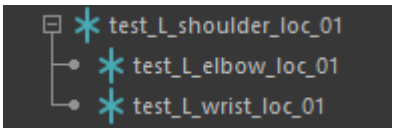
The wrist/ankle locator is not parented under the elbow/knee locator for ease of placement.

The three locators for the Normal IK method should be placed at the center of rotation of each joint.

Try to keep either stencil completely horizontal for a T-Pose or at a 45% angle for an A-Pose.



Leg Locator Hierarchy



Arm Locators Hierarchy

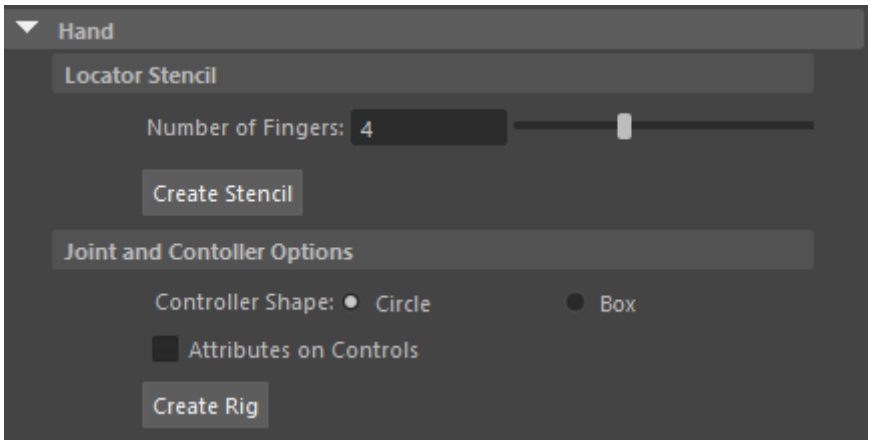
For the Bendy IK method place the first curve point at the center of rotation of the shoulder and the end curve point at the center or rotation of the wrist.

Be sure to keep the Bezier wings evenly between the two end points. If you stretch them out too far, or not far enough it will not place the joints evenly apart. The lower two images show what good placement and bad placement look like.

Bad Placement

Good Placement

Hand



Hand: This section can be expanded and collapsed by clicking anywhere on the banner.

Number of Fingers: Choose how many fingers your character has. This number excludes the thumb because the thumb will always be created.

Create Stencil: Once the Number of Fingers has been set, you can click on this to create the locator stencil. The locators have been locked to limit incorrect joint placement.

Controller Shape: Choose what controller shape you want the fingers to have.

Attributes on Controls: Enabling this adds attributes on the palm controller to control the finger rotation from there. Enabling this will still allow the controllers to be animated, it just gives the animator another way of controlling the rig.

Create Rig: This creates the rig according to the settings you chose for the hand.

Hand Placement Tips

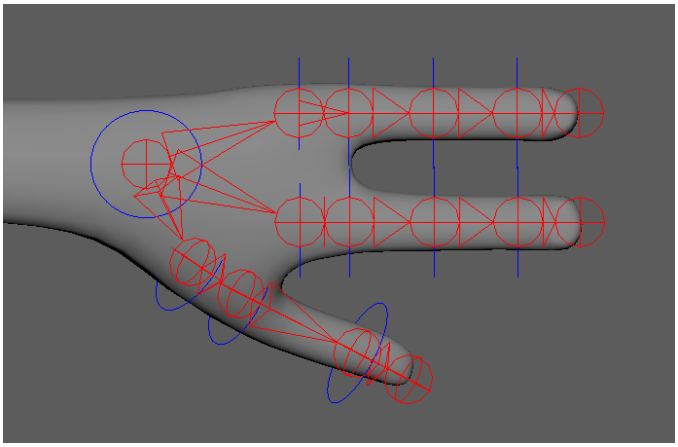
Create the arm before you create the hand.

Once the locator stencil has been made, snap it to the wrist joint made from the arm section of the script. This will ensure accurate wrist placement.

The spread joints should be placed inside the hand to help finger movement.

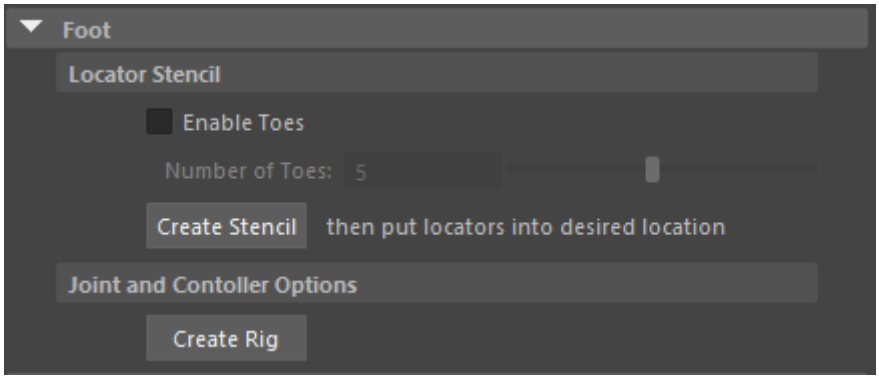
The last joint on the finger chain should go on the tips of the fingers.

The joints between the spread and the tip joint should be placed on the centers of rotation for each knuckle joint.



Example of Joint Placement

Foot



Foot: This section can be expanded and collapsed by clicking anywhere on the banner.

Enable Toes: Enabling this allows you to select how many toes your character has.

Number of Toes: If you enable toes, the slider will become adjustable. You can use the slider, or the text box to choose how many toes your character will have.

Create Stencil: This creates the stencil according to the settings adjusted in this section.

Create Rig: Click this to create the rig when your locator stencil has been placed correctly.

Foot Placement Tips

Create the leg before you create the foot.

Once the locator stencil has been made, snap the ankle joint of the foot to the ankle joint from the Leg. This will ensure accurate ankle placement.

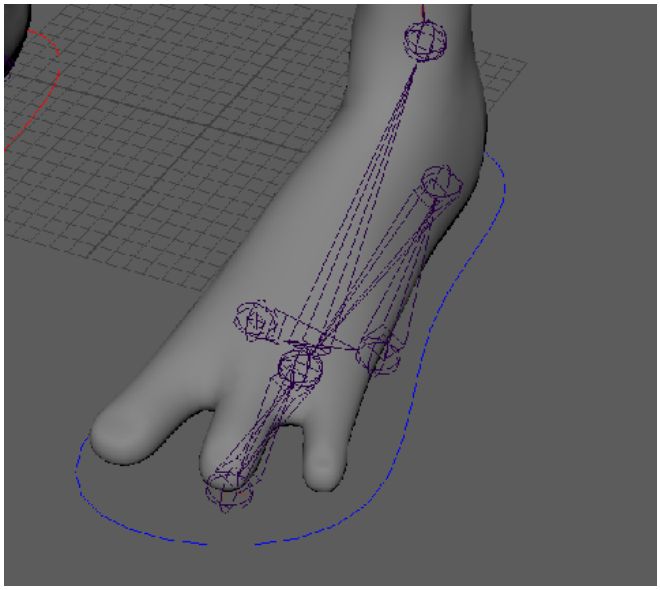
The inner and outer locators need to be placed on the widest part of the feet on the ground plane.

The heel needs to go on the furthest outer point on the heel that is still on the ground plane.

The toe needs to go on the furthest outer point on the toe that is still on the ground plane.

The ball locator should be placed on the center of rotation for the ball of the foot on the ground plane.

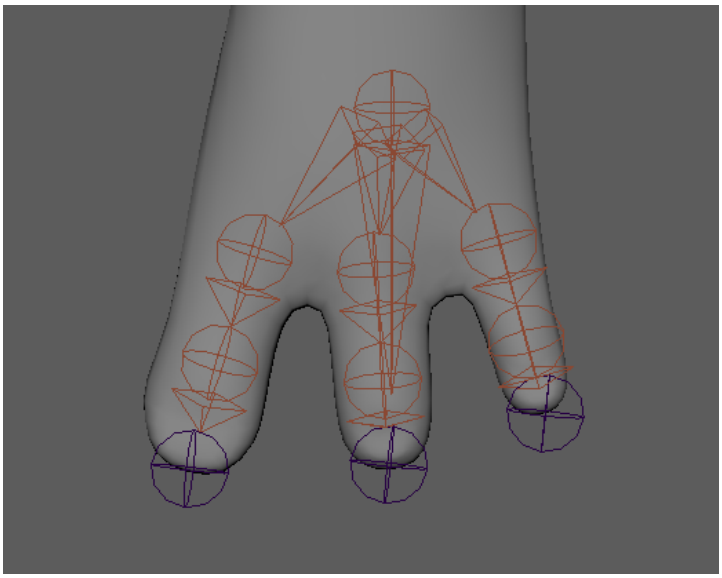
It is necessary to keep these joints on the ground plane so the rolls, taps, and banks do not hover over the ground when animated.



Example of Joint Placement

The toe locators should be placed in the middle of the geometry with the middle joint lifted slightly upwards.

The middle toe joint has to be lifted upwards for the IK to work, otherwise they will bend towards the center of the scene.



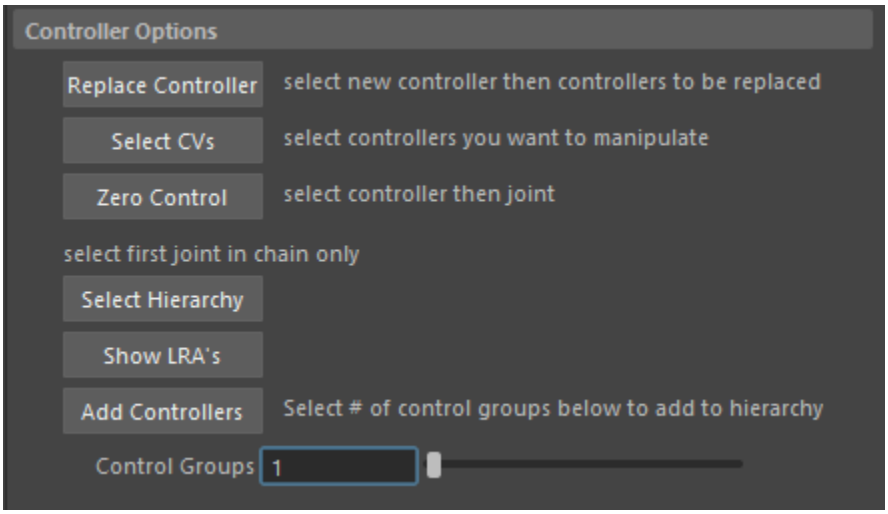
Example of Joint Placement

Combine

Combine Tab: This section is not collapsable and should only be used when all parts of the rig in the script are finished.

Combine Button: Once every part of the rig has been placed and created hit combine. Any other joints in the scene will be ignored when this button is pressed.

Controller Options Tab



Controller Options: This can be used on any controller, and is here to help you create any extra part of the rig that might be missing from this tool.

Replace Controller: If you do not like the shape of a controller on the Rig, you can replace it with one that you've made with this button. Simply select the new controller then any controller on the rig you want to replace with your new shape before clicking this button. It will maintain the original controllers color.

Select CVs: The controllers do not adjust to the size of the rig, so you will have to go in and edit them, this button will select the CVs on any controller you have selected when clicking this button. Manipulate the controls to where you see fit.

Zero Control: If you need more than what this script provides for joints, this button can be used at any time to zero a controller to a joint. If the joint has a naming convention that lables a joint as 'jnt' it will name the control following that naming convention by converting 'jnt' to 'ctrl'.

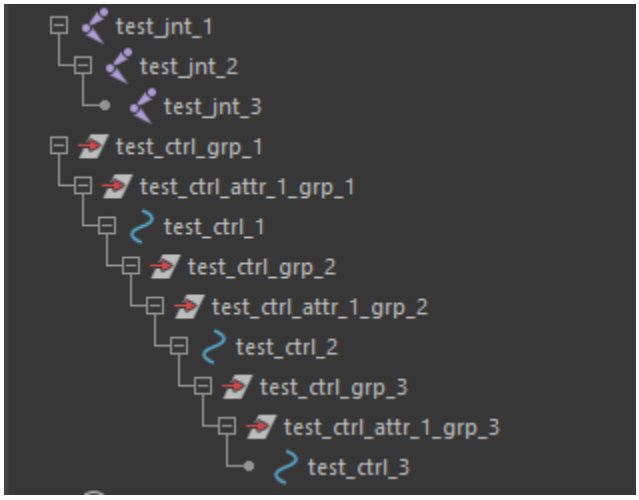
Select Hierarchy: This is the equivalent of typing 'select -hi;' in the MEL bar. I've added it here for convienence. It will select all of the children under your current selection.

Show LRA's: This section will enable or disable Local Rotation Axes. This script will turn them all on, or all off, so you won't have to worry about a floating LRA that doesn't turn off.

Add Controllers: This button will put controllers on every joint in the chain you select. Use the Control Groups slider to adjust how many groups you want between each controller.

Control Groups: Use this to determine how many control groups are added when making controls on the Add Controllers button.

The image to the right shows the controller hierarchy created from the test_jnt_1 chain when the Control Groups slider is set to 2.



Color Controllers

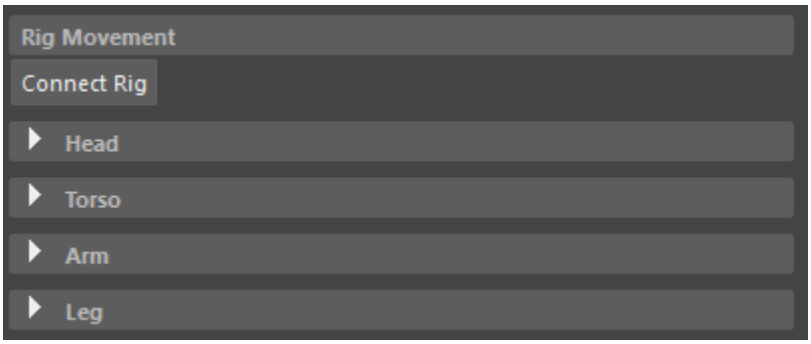
Reset: All selected controllers will return to the default controller color.

Red Yellow and Blue Buttons: All selected controllers will turn into the color button you select.

Custom: All selected controllers will turn into the color of the box to the right of this button. You can use the slider to change the color of the box.

The Red, Yellow, and Blue boxes above are for the standard rigging colors. Red for Right, Blue for Left, and Yellow for center. The custom color is if you want to further delineate controllers.

Rig Movement



Rig Movement: This section is meant to help you move the rig when weight painting the rig.

Connect Rig: This connects the controllers to the sliders in the below sections; Head, Torso, Arm and Leg. You have to click this every time you create a new auto script window, or if you just opened up a file. **WARNING:** make sure on the Rig Set-up tab you have the character prefix of your character typed into text prompt in Character Options. If not the script won't work.

Head, Torso, Arm, Leg: These sections can be opened by clicking on the banner, inside each contains a series of sliders to move the rig in the scene. This is to help you move the rig while weight painting, so you can see the changes live.

Hierarchy Clean Up

Once the rig has been created place the geometry of the character inside the rig hierarchy group labeled: '<your prefix>_geometry'.

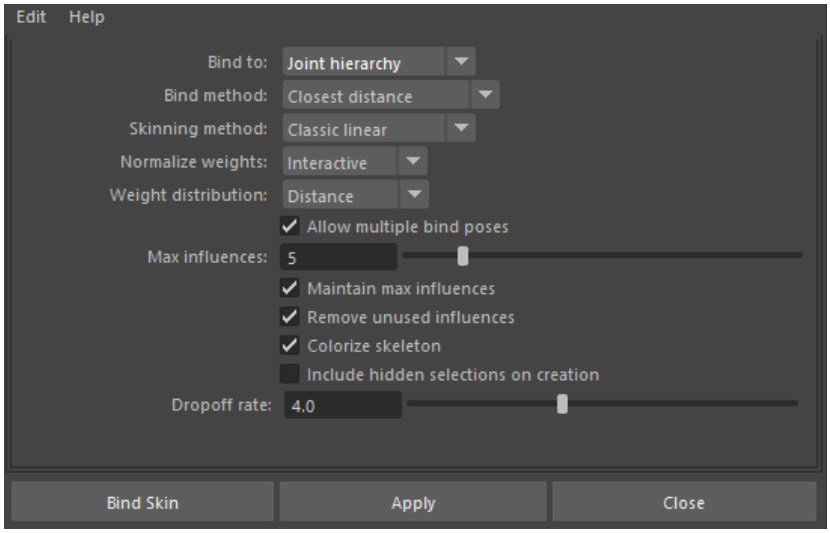
Hide the following groups: <prefix>_extraNodes, <prefix>_IKs, <prefix>_jointsDrive, <prefix>_joints.

Binding the Joints

Easy Bind:
Make sure the <prefix>_joints group is not hidden.

Select all the objects in the group labeled <prefix>_jointsBind and match the following Joint Bind settings.

The binding won't be perfect, but if it is really bad you can rebind the rig with Max Influences set to 3.

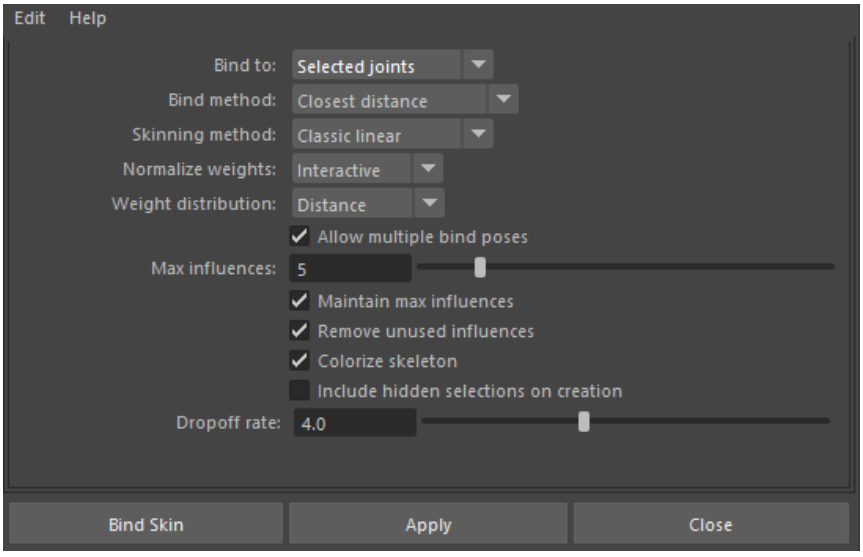


Easy Bind Skin Options

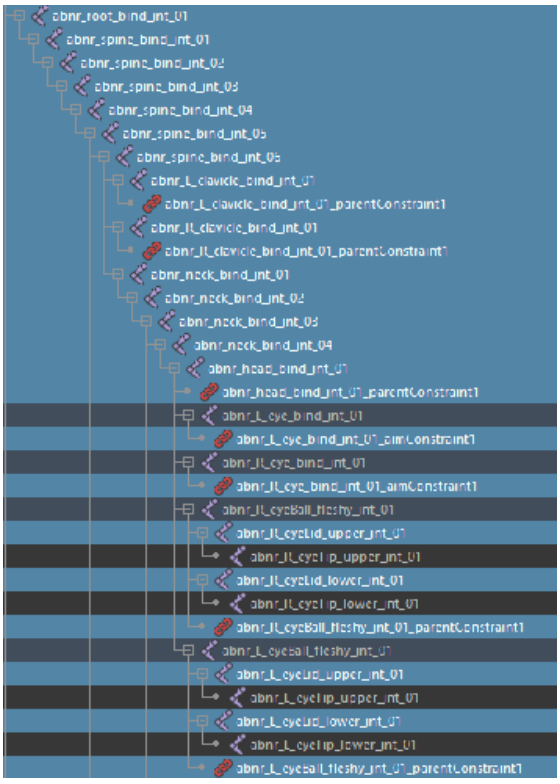
Good Bind:
Select all of the objects in the group labeled <prefix>_jointsBind. At the top of the window go to Select>hierarchy.

De-select the following Joints:
- eye bind joints
- fleshy joints
- eyeTip joints
- the last joint on the fingers

Use the bind options below, with Max Influences at either 5 or 3.



Good Bind Skin Option



Deselected Joints Example

Feedback

How to Contact Me:

Email: HannahAbigailChase@gmail.com

Critiques:

This is the first tool I've made, so point everything out to me. I would love as much feedback as you can give to help me improve this tool. What would you like to see added, what could be improved upon, look through my code and let me know if there's a better way to do something, anything.

If an error occurs:

If you get an error while running the script let me know. For me to find the problem faster, let me know what you were trying to do, and send the error log to me. You can capture the error log using a screenshot, a snipping tool, or by copying the text into a file and sending that to me.

The image to the right is a window of the script editor, This is where the error logs are going to pop up. I need the information from the area in the box to see where my script went wrong.

You can open this window in Maya by going to Windows > General Editors > Script Editor, or by finding the script editor icon on the lower right of the scene.

Script Editor Icon