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Collar rig with joints and cMuscleKeepOut nodes

April 26, 2018

Hi guys, almost a month ago I posted this rig test for a collision setup I made for a character I was working on.



The rig is joints based, therefore would be suitable for game animations. I couldn't use the same asset but I created another one for the purposes of this tutorial.

A basic knowledge of maya and rigging in is required. This is not a rigging and rigging practices tutorial, it is made specifically to cover the technique of using cMuscleKeepOut nodes in Maya. So feel free to take it and conform it to whatever practices and naming conventions you normally use in your rigging process.



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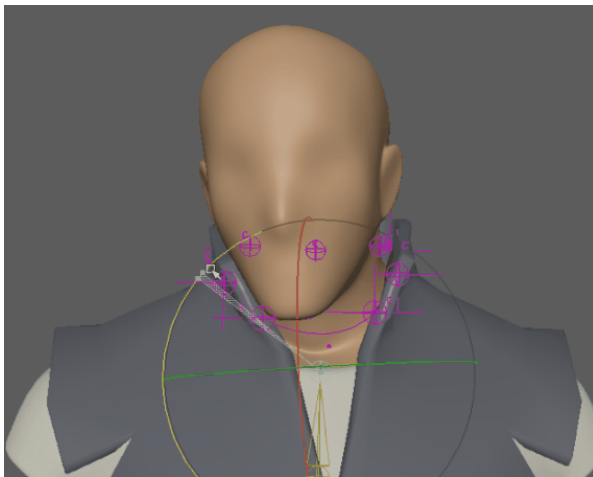
The inspiration behind the collar rig tutorial I shared a while back.

<https://t.co/RfnSQtcEYh>

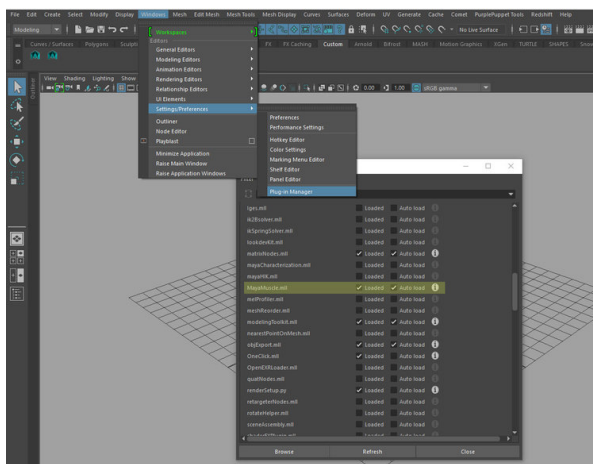
<https://t.co/Ak5AG1hs9s>

I will break this post into 3 main sections. The curve setup, the collision setup and the joints setup. But before we proceed this is how the rig should look like in the end.

You can purchase the work files for \$5 on Gumroad



Kiel Figgins kindly pointed out that the **MayaMuscle** plugin is not loaded by default in some cases so make sure you load the **MayaMuscle.mll** plugin in the **Plug-in Manager**.



Loading the MayaMuscle plugin.

A day ago



Big update for The DynamicChain #rigging #Tool. Now supports multiple selection and baking animations on multiple c...
<https://t.co/2nTS8cX65u>

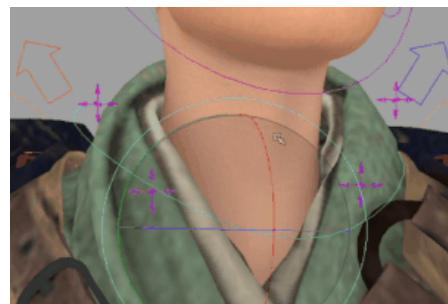
2 days ago



RT @catlikecoding: I have two new @Patreon goals for my #unity3d #gamedev #tutorials:
<https://t.co/ERKLh5PJx6>

3 days ago

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Collar rig with joints and cMuscleKeepOut nodes

4 MONTHS AGO

Matching Transformation in Maya and MFnTransform pitfalls

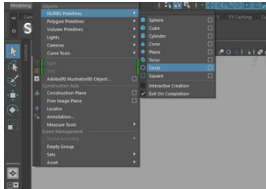
8 MONTHS AGO

Thanksgiving 50% SALE!

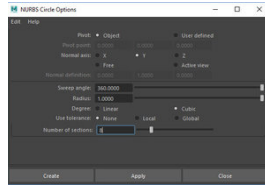
9 MONTHS AGO

The Curve Setup

1 - Create a nurbs circle with 8 spans and name it "collar_crv".

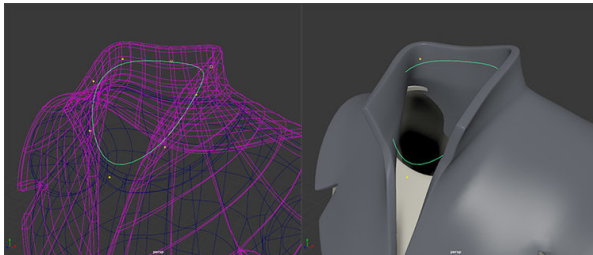


Creating a nurbs Curve.



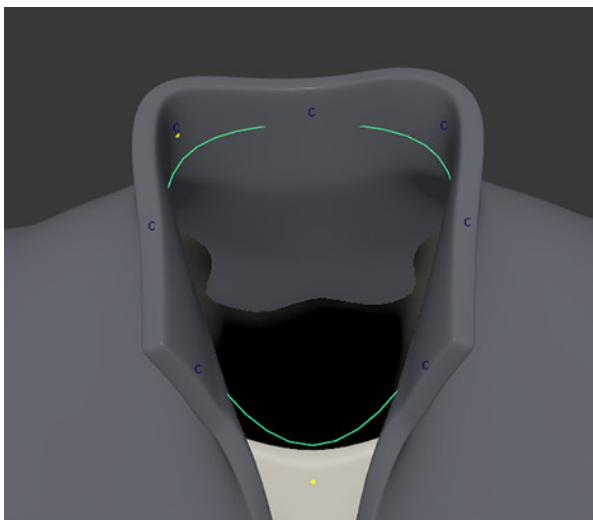
Nurbs Circle options

2 - Shape the curve along the inside of the collar. The curve vertices are the points of contact with our collision mesh so make sure they are placed where you would want the collision to happen.



Curve placement. The head is hidden for clarity purposes.

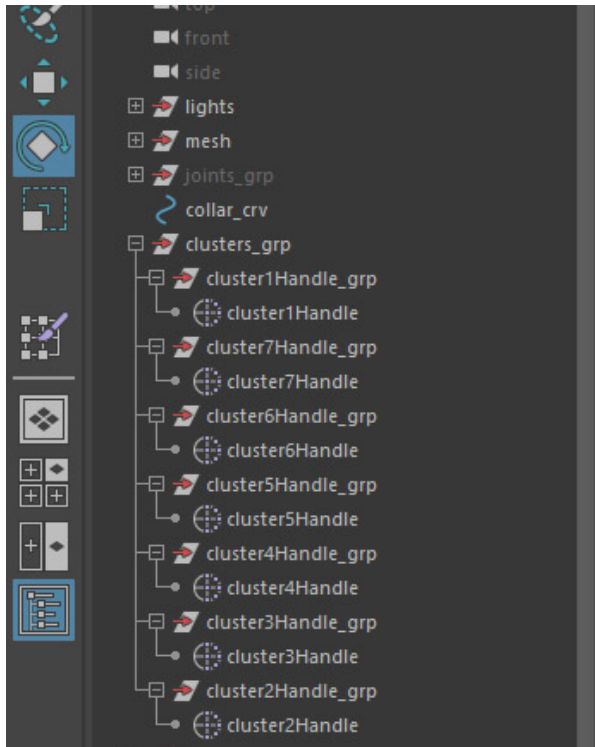
3 - Create a cluster for every vertex of the "collar_crv". In the rigging tab go to Deform>Cluster.



Space Switch Tool 1.0 for Maya
10 MONTHS AGO

What rigging tools do you need?
A YEAR AGO

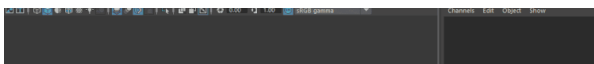
4 - We need an offset group for each cluster. Press **CTRL+G** the short cut for creating an empty group. Then select the group and the cluster and go to **Modify>Match Transformations>Match All Transforms**. Now the group is snapped to the cluster, you can parent the cluster to the group by selecting the clusterHandle and the group and press **P** or go to **Edit>parent**.

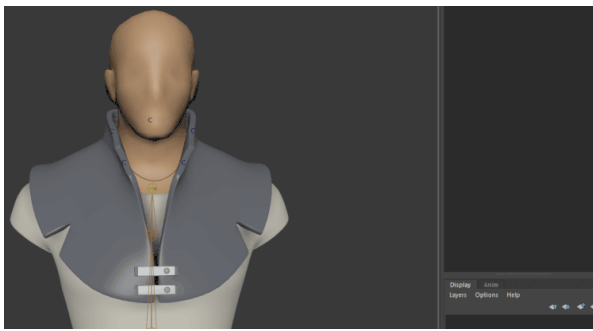


The Collision Setup

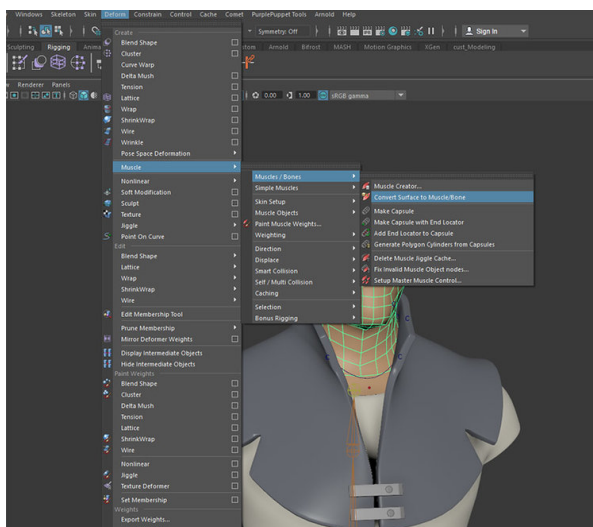
5 - Now we create our collision mesh. Most of the time I use Polygon primitives as collision shapes like a cylinder or a sphere, but in this case I will use a static duplicate of the head mesh and delete the faces I don't need to collide with the curve. Then parent the collision mesh to the neck driver. For demonstration I just parented it under the joint directly.

I chose in this case to use a duplicate of the head because his chin is quite prominent and it would be nice to have it collide against the collar.

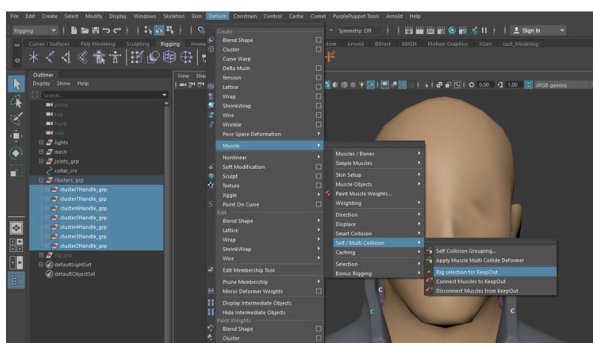




6 - The last step for creating our collision mesh is to select the collision_head and go to Rigging>Deform>Muscle>Muscles/Bones>Convert Surface to Muscle/Bone.

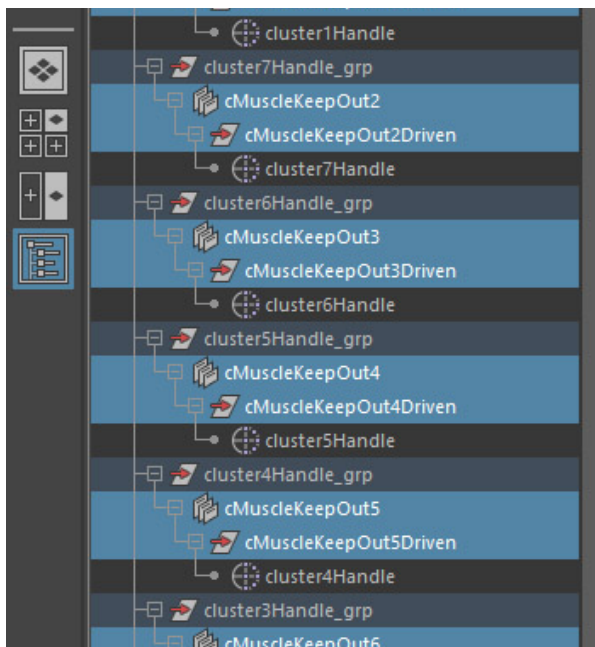


7 - Select all the cluster handles groups and go to Rigging>Deform>Muscle>Self/Multi Collision>Rig selection for KeepOut

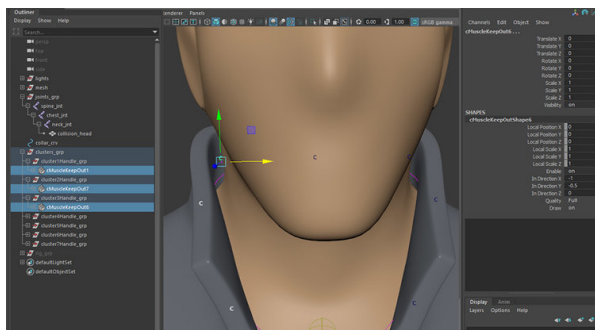


8 - If you expand the cluster groups in the outliner you will see two transforms created on top of the cluster handles. The cMuscleKeepOut and the cMuscleKeepOutDriven groups. The cMuscleKeepOut node sets the local direction the cMuscleKeepOutDriven group moves when the collision happens.

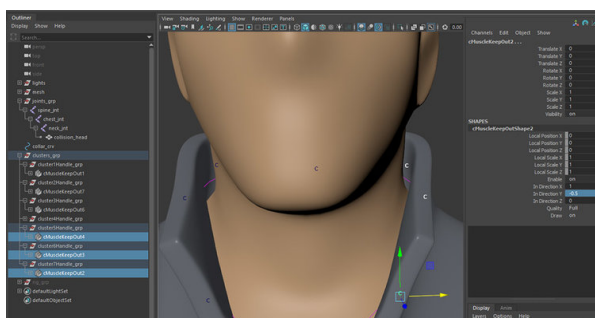




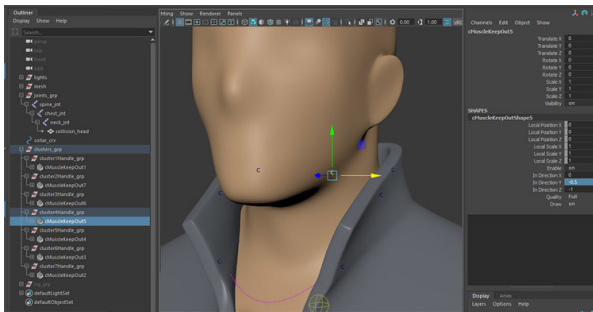
9 - Before we connect the collision mesh to the keep out nodes, lets set the In Direction values to avoid having our clusters jump to the wrong direction.
Select all the keep out nodes of the cluster handles on right side and set the In Direction X to -1 and the In Direction Y to -0.5. This way when the collision happens the cluster handle would move to the right twice as much as moving down.



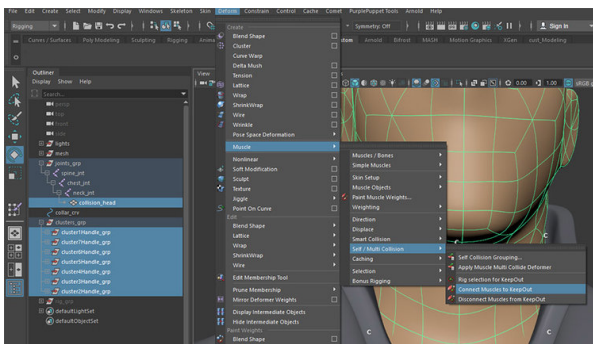
10 - Select all the keep out nodes of the cluster handles on left side and set the In Direction X to 1 and the In Direction Y to -0.5.



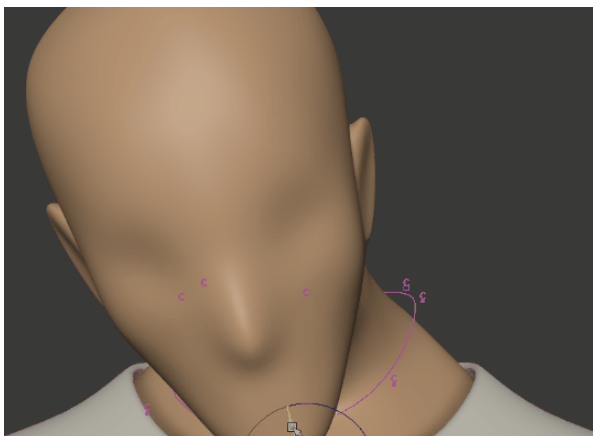
11 - Select all the keep out node of the center cluster handle on the back of the collar and set the In Direction X to 0, In Direction Y to -0.5 and In Direction Z -1.



12 - To make the cMuscleKeepOut nodes collide with our collision head, select all the cluster handle groups and the collision head lastly and go to Rigging>Deform>Muscle>Self/Multi Collision>Connect Muscles to Keep Out.



13 - Now if you rotate the neck you should see the clusters moving the direction we set when colliding with the collision head.



The Joints Setup

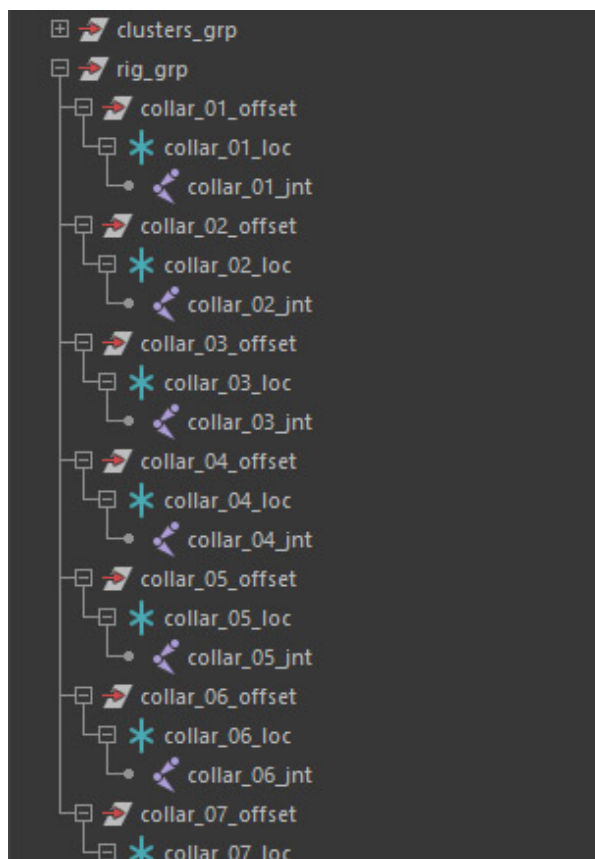
Now we move to the final section of the rig which is adding the joints, attaching them to the collar curve and adding them to the jacket skin cluster. Depending on the mesh you have and your budget you can decide how many joints you can add. However, it is important to remember this is not cloth simulation and there will be some areas in some animations that would require manual tweaking. Therefore we need to attach offset groups/ joints controllers to the curve instead of the joints themselves directly.

14 - Repeat the following steps the number of joints you would like to add to your setup. For this setup that will be 7 times:

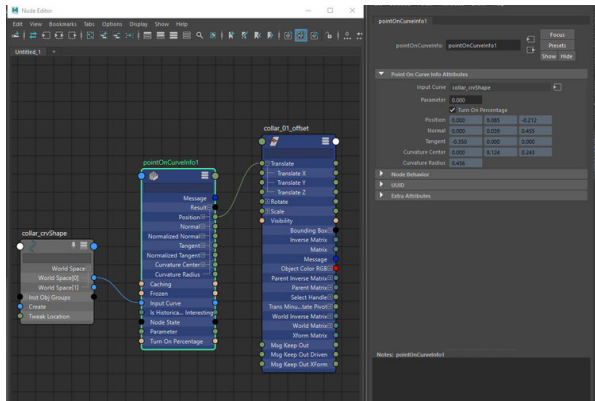
- Create a locator at the origin and then group it.
- Create a joint at the origin and then parent it to the locator.
- Rename the joint to collar_01_jnt.
Rename the locator to collar_01_loc and the group to collar_01_offset

PS: you can use any naming conventions you want, but for the sake of clarity I will refer to the locator group as the offset group.

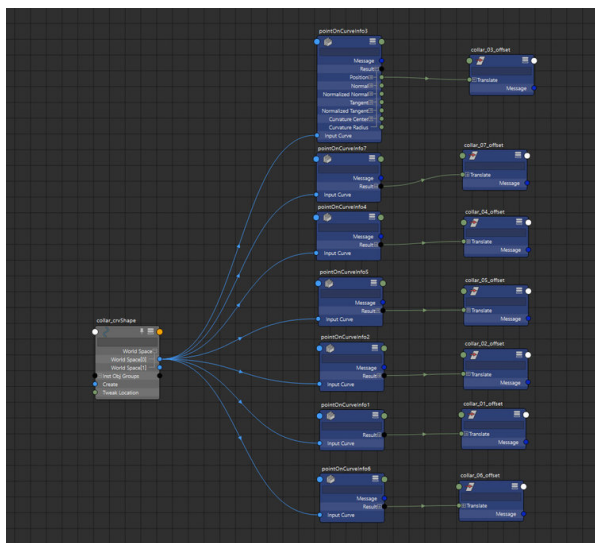
This is the structure in the outliner:



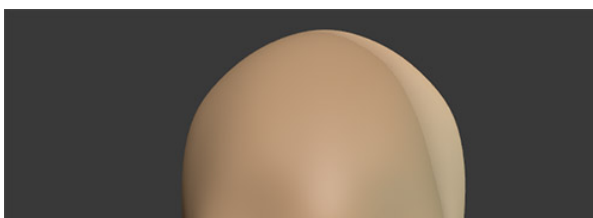
15 - In the NodeEditor create a pointOnCurveInfo node and check the Turn On Percentage option in the attribute editor. Connect the collar curve shape **worldSpace** to the PointOnCurveInfo node **inputCurve**. Then connect the pointOnCurveInfo **position** to the locator offset group **translate**.

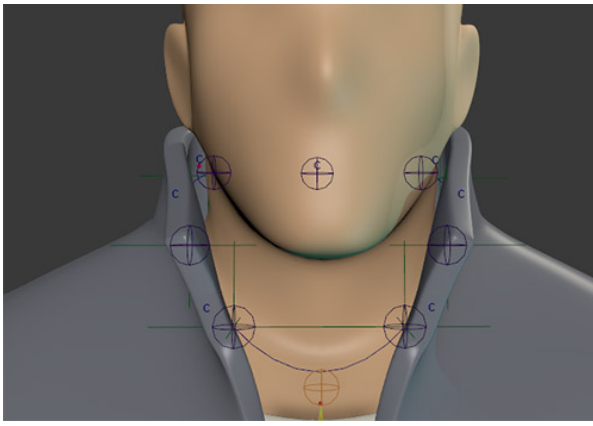


16 - Repeat the above step for every locator offset group.

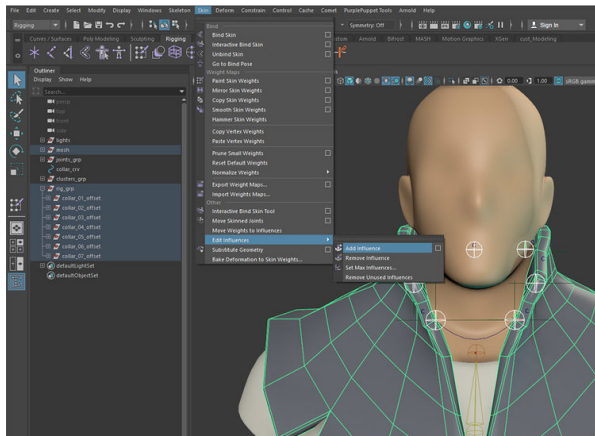


17 - To place the locator offset groups and subsequently the joints we need to adjust the parameter value of every pointOnCurveInfo node we created. These are the values I used to place the offset groups like the following 0.00, 0.13, 0.3, 0.4, 0.6, 0.7, 0.87



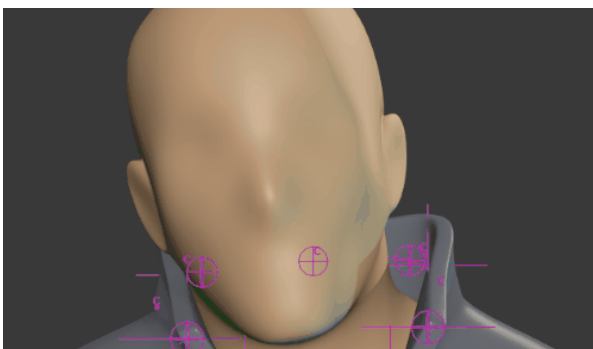


18 - Finally, lets add the collar joints to the skin cluster by selecting all the collar joints and then the jacket mesh and go to Rigging>Skin>Edit Influences>Add Influence. Tweak the skinning so it is smooth but also test with animation to make sure the influences per joint is giving the desired result.



Final Result

If you rotate the neck joint/controller now you can see that the joints are following the curve and we still have the locator channels zeroed out for direct control over the joints. Happy Animating :)





Final notes: If you can only have very few joints lets say 4 or less, you can skip the whole curve setup and just rig the joints controllers as we did for the cluster groups insted.

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Hazem Mahmoud

Abdellatif

3 weeks ago · 0 Likes

Hey Riham I got a question or let me say a request for advice: Do you use `Maya muscle` alot in your work ? if so, do you find it sufficient for what you need to do?

I wonder cause I try to invest some of free-time to learn about a good muscle system , there is a new muscle plugin for Maya called (Ziva Dynamics) but aside from its possible high price, it's a bit complicated compared to Maya muscle & it's another plugin to overload your maya & PC with it,,
I just need realistic fat/muscle motion/jiggles/subsurface sliding in real-time for certain body parts (limbs, waist, arms, breasts if it's a female...etc).. Is maya muscle sufficient for that ?? or it's an old vulnerable tool that Autodesk will replace it soon like they did to "fluid effects" using "Bifrost" instead?



Riham

Toulan

3 weeks ago · 0

Likes

Hi Hazem,
That is a good question. I actually havent used Maya Muscle in my professional projects for muscle simulation. Since my experience has been mainly working in the games industry we always use joints along with blendshapes for higher cinematic characters.
I just recently did some freelance work for a vfx company that actually uses Maya muscle heavily for their Muscle setups and so far I havent heard any rumors about Autodesk replacing it soon. But can anyone really predict whhat Autodesk will do :p



Hazem

Mahmoud

Abdellatif

2

weeks

ago

· 0

Likes

LOL Autodesk are always ready with all types of unpleasant surprises. I may stick to maya muscle for now though. at least its features for real-time collision -like your tutorial here for example- are promising for reasonable results too. Thx Riham :D



Melker · 3 weeks ago ·

0 Likes

This was awesome Riham, thank you for sharing! As I followed along I started fiddling with a pymel-script to automate some of the setup-process, but I got sort of stumped when I got to the cMuscle-bit of the setup. I haven't managed to find any documentation on how to access the functionality of the cMuscle-plugin via pymel-code, would you happen to know how one can achieve that?



koki nozawa

4 months ago · 0 Likes

Hi Riham, thanks for creating this tutorial! this is really useful! I've encountered a problem while Im following this tutorial. Everything looks good but when the driver geometry slides against the curve, the cMuscleKeepOut keeps popping instead of giving me a smooth transition. is there a way I can make it the transition from joint to joint smoother? Thanks Riham!



Riham

Toulan

4 months ago · 0

Likes

Hi Koki,
You can definetely try to reduce the

fat value on the collision mesh, that will reduce its collision bounding box and see if it works better. I would also suggest playing with the position of the clusters and the placement of the curve. It can be an iterative process so hold in there I am sure it will work out :)



koki

nozawa

4

months

ago

· 0

Likes

Hi Riham! thanks for the quick response! I've tried your way but it seems to still cause the same problem, though I got a better result of sliding deformation when I increased the vertex count on the nurbs curve.



Riham

Toulan

4

months

ago

·

0

Likes

That is great. And thanks so much for supporting me on BuyMeCoffee <3



Ben 4 months ago · 0

Likes

Hi Riham. Thanks for writing a tutorial. I tried to follow it but I encountered some problem Whenever I hit the "Rig Selection for KeepOut", the collar_crv gets distorted. Something like this:
https://www.dropbox.com/s/ra2icn2nhl04iys/MYA057_collarCollision.mp4?dl=0

Is there some specific setting in the Cluster node? I tried Relative and Absolute (Relative Tick off) but it still wouldn't work/

Thank you for your time.



Riham

Toulan

4 months ago · 0

Likes

Hi Ben,
There is apart in Collision Setup section step 9 to 12 describe how can the clusters jump if you don't have the indirection axis values on the keepOut nodes set properly. Also in the tutorial I used absolute clusters.

Let me know if changing the indirection values sort out your problem.



Ben

3

months

ago

· 0

Likes

Sorry for the late reply.
Thanks Riham for the clarification. Works as expected.

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