

# FIMPOSSIBLE CREATIONS

## ANIMATION DESIGNER USER MANUAL

### About Animation Designer:

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- Animation Designer is an Editor Tool **dedicated to be used on already animated models**, in order to adjust them, upgrade, fix or highly modify motion with help of procedural animation algorithms.
- Tool gives a lot of freedom with many adjustable parameters controlled with use of curves depending on the source animation playback time.
- **Animation Designer requires AnimationClips which already exists to start work.** Animation can be adjusted with real-time preview on the scene view and after all wanted tweaks baked and **exported into a new AnimationClip** file without changing anything in the source AnimationClip file. **This tool is not generating any additional components in objects on scene**, just changing bones pose which can be restored when you end designing your animation!
- Before starting to work, animator armature needs to be prepared. **It is done with single clicks on GUI buttons which will appear and guide.**
- Armature and adjustments done on the source clip will be lost when closing Unity Engine, but everything **can be saved for in the "AnimationDesignerSave" file with the "Save" button** which will appear on the top of the Animator Designer window.
- When starting to work on a new AnimationClip, clip's Animation Designer parameters, **save data is automatically generated** and stored in the "AnimationDesignerSave" file, if you already created a save. That means, you can modify multiple different animation clips without needing to hit save, everything is automatically remembered.

*Contact and other links you will find in Readme.txt file*

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[Check the tutorial videos for the Animation Designer here!](#)

[Link to the Fimpossible Creations Asset Store Page](#)


# 1: Start work with Animation Designer

## First Steps:


Animation Designer requires selection of object on the scene, with skeleton structure in child objects. In all cases it's an object with Unity's **Animator** or **Animation** component attached.

To open the Animation Designer Window, you can hit the right mouse button on the unity's Animator component and select the "Open in Animation Designer" option, which should be visible on the bottom of the menu popup. You can open Animation Designer one other way - by going to Unity Editor top bar "Window" bookmark -> "Fimpossible Creations" -> "Animation Designer Window"

Animation Designer requires skeleton data in order to work. You gather this data by clicking the "Prepare Armature" button. When you select a character with already saved skeleton data, the window will ask with the green button, for refreshing references to bones of selected model.

After gathering skeleton data, make sure that "Skeleton Root" and "Skeleton Pelvis" (setup  bookmark) bones were chosen correctly. (You can hide the "Make Sure" helper box just by clicking on it few times)

Next, you need an animation clip which is working with your model skeleton. You can choose it in the "Work With Clip:" field. You can use "▼" button to display list of animation clips of Animation controller attached to the model (there will be no clips to choose, if animator controller with animation clips was not found) The next button with the magnifier icon, will search the project for a list of animations which may work with your rig (if it's humanoid rig then only humanoid clips will be displayed, if generic then all generic clips will be displayed - most of them may not work with your model!)

The  button can allow you to create multiple animation clip variations if you need. It's useful in example cases as: you want to create many variants of animations out of single walk animation. (more description below in [Additional Animation Clip Design Versions](#))

## Save Presets:

You can use Animation Designer to quickly change some animation and then forget about the Animation Designer parameters setup you've done, but if you want to go back to your setup and be able to modify - update modified animation clips then it's important to create the Animation Designer Save file. You will do it by clicking "New Save" on the top part of the designer window. The Animation Designer Save file will be generated in the default directory. (the directory is selected through inspector window of AnimationDesignerWindow.cs file which you can change if you need to)

The directory is important, since selecting a new model to work on, Animation Designer will try to automatically search the directory for the save for your selected character and automatically select it if you were working on this character in the past.

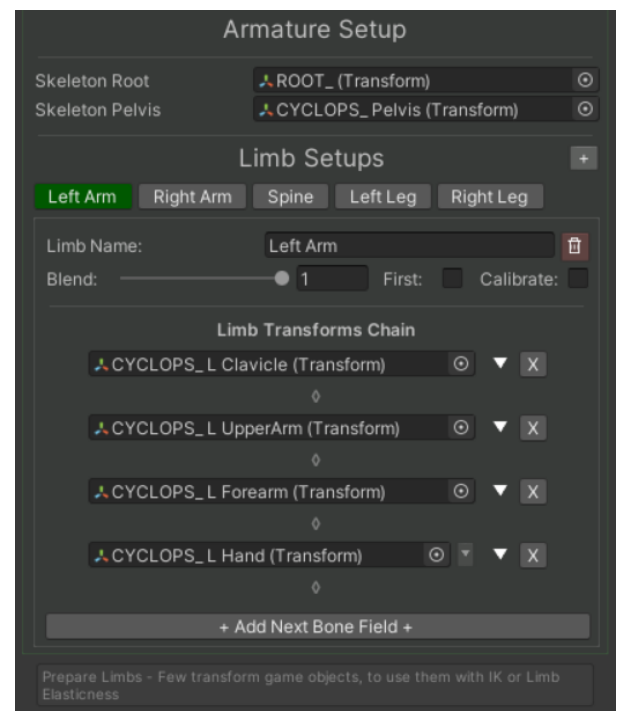
**AnimationDesignerSave** is a file which will hold your design settings even when you turn off the Unity Editor. It keeps your character bones setup, limbs and settings you set up with any of the edited AnimationClips.

AnimationDesignerSave should be created for each different character / creature you design animation for. Remember that the AnimationDesignerSave file keeps settings for all AnimationClips you edited, so **you DON'T need to create a separate Save file for every animation.**

## Limbs:

Limbs are very important for Animation Designer to use all features of the plugin. Each limb is a chain of few connected bones. It's important to name it, which will help identify different bones during the animation design process.

You can set the main blend value for each limb (but you probably will never change this value). Toggling "First:" will schedule a limb to execute it's algorithms before other limbs, it will be important for spine "Limb" to make it's changed motion, influence arms in procedural motion. "Calibrate" can do some calculations to prevent flipping bones if they occur, it should be enabled **only** on bones which weren't animated in the animation clip, you can encounter something like this when adding some cloth bones as limbs, this bones are sometimes added by rigger of the model but not animated by animator.



If you're using a Humanoid Rig, limbs will be generated automatically. After that you can add some additional limbs like mentioned cloth bones, if your character model has ones.

If you're using a Generic or Legacy rig, you will need to add each limb manually by drag & dropping bones from the hierarchy view, or use an automatic limb detection algorithm button. The automatic limb detection algorithm can give best results when your character has setted correct T-Pose, which will be described more below, on the bottom of the "Exporting" part of this manual. Algorithm can correctly find limbs as well as for humanoid creatures and quadrupeds etc.

After automatic limb detection, review all added bones and correct them / remove if something seems to be detected wrong!

Limbs with 3 bones will be treated as leg bones (new animation clips will have automatically chosen foot ik settings in IK bookmark)

Limbs with 4 bones will be treated as arm bones (shoulder->upper arm->forearm->wrist)

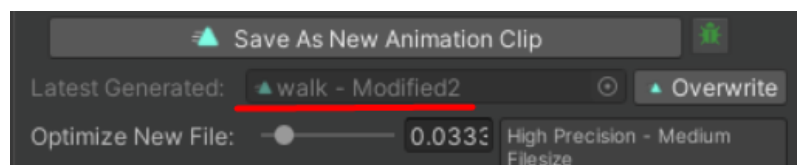
## Exporting:

After designing animation, you can save the animation which you see on the scene view by hitting the "Save As New Animation Clip" button. Choose directory and filename to save a new clip in (by default, directory of original clip is selected) hit "Save" and Animation Designer will quickly simulate and bake animation.

Now you can check your animation in the preview.

Latest generated clip should be visible like this:

(if the name of original clip is similar)



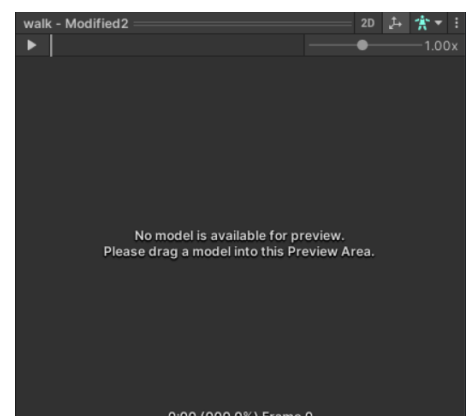
If the preview is empty:

**drag and drop your model from the scene onto the preview view** (animation designer is not including models in it's files, thanks to that you can reduce file size of your animation clips!)

You should see your new animation played on your model.

**If something seems to be wrong here, please check the "Solving Issues" part of this manual.**

If the animation loop is not matching, go to "Solving Issues" as well.



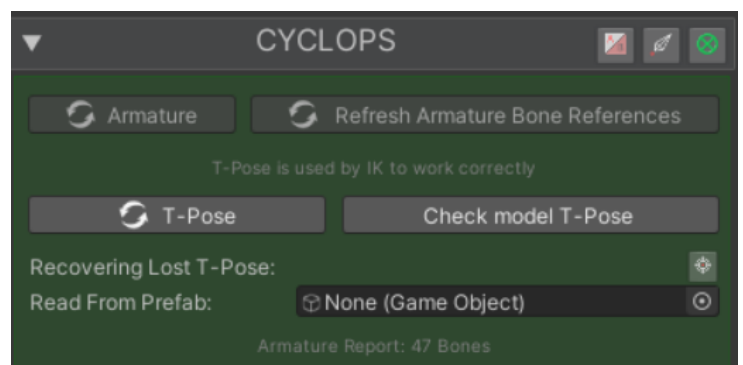
If you want to make an animation clip file smaller in file size, you can boost “Optimize New File” value, but default value is recommended for balanced precision and optimal file size. If the original clip has toggled “loop” in animation settings, you will see “Loop Additional Frames” parameter which can help create a perfect - seamless loop for your new animation clip.


Under “Additional Export Setting” you will find toggles to do some automatic stuff for you, like setting motion settings (mostly for humanoid rigs) to be selected as “Original” and “Baked” (settings you see in the inspector window when you’re selecting humanoid rig animation clip)

If you used inverse kinematics for feet and it’s idle animation and after exporting, feet seem to move a bit on ground, try increasing “Hips and Legs Precision Boost” value. It will make the file bigger but it should keep leg bones stable on the ground.

If you want to add some additional bones/objects for animation, or remove some bones from baking / switching baking position keyframes, you need to display a **helper view**. It’s the top bar with the name of your model on it, when you click it, **the new menu will fold out:**



Hitting text on the bottom **“Armature Report: [XX] Bones”** will display a list of bones gathered by Animation Designer, all these bones will be keyframed and saved in the animation clip file.



If you want to change it, you can use toggles, remove bones references with  button, or add new bones with a button in the bottom of the list.

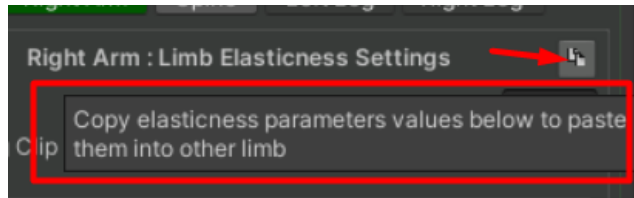
In addition, in the **helper view**, you find buttons to refresh bone references from the scene, and T-Pose buttons.

### **T-Pose is very important for an Animation Designer.**

Hit “Check model T-Pose” to see if it’s assigned correctly, the model on the scene should repose into its original T-Pose. If it seems to be wrong, you can fix it with the menu below. Hitting left mouse button on the  button (it will not appear if no reference to project file was found) will identify the project model file which is probably in T-Pose and you can use it to restore the pose. Hit right mouse button on the  button to try automatically set T-Pose out of the found project model file.

## Additional Options:

Almost all of the parameters/buttons requiring some description you see in the animator designer window are documented within the Unity Editor. Meaning when you enter with cursor on some field, the tooltip with description will appear:



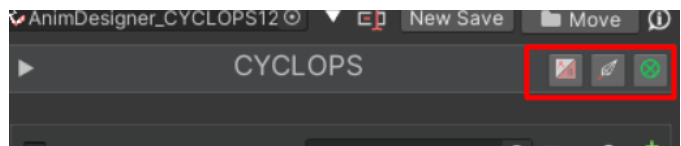
(it probably won't be displayed in the playmode)

## Additional Animation Clip Design Versions:

You can have multiple design versions of one AnimationClip file.

To add new versions, simply hit the “++” button on the right of the “Target Clip” field. Popup will give you the option to choose one of the existing versions or create a new one. **If you want to copy** setup of one version to another, hit the “+” button **with the right mouse button**.

You can use the buttons on the right of Helper View for switch to focus mode GUI (hiding many views to focus on the design process), disabling limbs and modifiers gizmos on scene, and disabling skeleton gizmos.




## 2: Procedural Animation Helper Algorithms

### Elasticness:

“**Elasticness**” is muscle simulation algorithm which can be applied only on previously prepared Limbs. You can use it for stimulating arms / spine / cloth motion for your animations. To use it, select limb and hit the left upper toggle - it will turn elasticness on for the selected limb.

The settings for each limb are different for every animation clip you will modify! So you can adjust these settings in very different ways for different animation clips.

You can use copy/paste  buttons to quickly transport some favorite settings if you want to.

You can control the whole effect of the Elasticness algorithm with the “**Full Blend**” value. You can also animate this value with the curve, which can be very important if you want to make the character bones less flappy in some sudden motion moments of the original animation clip.

“**Rotation Based Elasticness**” is using bone rotations coordinates to compute modified motion for the bones. “Euler Mode” is changing computations to not be computed with quaternions, which can result in different motion, using default - non euler mode is recommended.

With the “Rapidity” parameter you will make muscle reaction time faster or slower. With low rapidity, motion will be slow, mild and calm, with high rapidity it will be more stiff and jumpy, so adjust it to your needs and keep balance.

Damping defines spring effect, with high damping, motion again will become slow and mild, but lowering damping will make motion bouncy, going with this value too low will result in crazy motion out of control, so it's recommended to play with this value in a safe range of 0.1 to 1 value.

Swinginess is boosting target computed velocity for the motion, sometimes it can be hard to notice, but in some cases it can add nice “swing” to the limb motion.

“**Position Based Elasticness**” is using bone position coordinates to compute modified motion for the bones.

The parameters are working in the same way like described for “Rotation Based Elasticness”.

“Position Based Elasticness” contains two other parameters.



“Smoothing” is required for motion based elasticity to avoid jitter, it also can change motion a bit and you can adjust it and check if it helps your motion.

“Milding” is similar to inverse of “Rapidity” but it computes motion in a slightly different way which in some cases can help out your animation.

**“Individual Limb Bones Blending”** are settings which are constant for all animation clips you will modify. You can blend elasticity effect amount individually on each bone of the limb.

For arm limbs: it’s recommended to blend the effect applied to the shoulder to about 50% and to the wrist to about 40%.

For Spine: it’s recommended to blend first spine bone to about 40% and neck/head bones to about 20%

## **Bone Modifiers:**

Bone Modifiers are simple algorithms applied to a single bones.


You can add some constant rotation offset to a bone and apply it on the whole animation time progress or animate the values with the curve to create some new motion on the animation.

The changes you apply with Bone Modifiers can be decorated by elasticity motion if you want to, which can give you a very nice looking effect without too much effort!

With the “All Modifiers Blend” you can compare the original clip to your modifiers modifications if you prepared many of them.

Hit the “+ Add Job for a Bone +” button and choose the bone you want to modify. Each modifier applies its own blending curve which gives you many possibilities for animating them.

As for now, Animation Designer offers few types of modifiers and the list can be bigger with the future updates.

You can choose to offset rotation/position or **override** (override local pos/rot) it. Take in mind that putting **override** position/rotation, **after** position/rotation **offset** modifiers **will erase effect of the offsets**, you can solve it by moving overriding modifiers to the left of the list with the arrow  buttons.

### **Update Order:**

Bone modifiers can be updated in defined update order.

“Before Everything”: It should be used when animating Root Motion bone, changed motion will influence all other algorithms.

“Inherit Elasticness”: Will be executed before elasticness - driving elasticness algorithm to work.

“Affect IK”: will be called after elasticness but before IK, you can try modifying rotation of pelvis bone in this order, which will make legs synchronized with IK processes.

“Last - Override”: It will override all motion done before, and can be helpful when using the look at modifier for head look correction.

Hitting the “▶” button next to the selected modifier name will reveal some additional settings which can be helpful for advanced users.

### **Inverse Kinematics (IK):**

Animation Designer offers a few algorithms of Inverse Kinematics to use.

Each of them can be blended with an amount slider and animation curve.

Each of them supports parameters to offset IK targets based on animation or override IK target position/rotation for more customized motion.

To use inverse kinematics features you must have prepared limbs.

To be able to use Arm IK, your limb must contain 4 bones.

(shoulder -> upper arm -> lower arm -> wrist)

To be able to use Leg IK, your limb must contain 3 bones.

(upper leg -> lower leg -> foot)

Chain IK for spine bones and longer bones chains may be improved in the next updates of the Animation Designer plugin.

You can read in-editor documentation for more complex parameters of the IK by holding the mouse cursor on it, then tooltip should appear.

## **Main & Hips IK Settings for a Current Clip:**

In this foldout, you can adjust pelvis animation of your character. These settings are for the animation clip you are working on and these settings are for all limbs.

These settings are very important if you're reworking some walk/run cycle animation. This also requires leg IK turned on, so legs will not clip through the floor. To know how to work with these parameters, you need to have some animating experience, [or check this tutorial](#).

In addition, you can adjust floor Y level and floor angle slope with "Floor Y Height Level" foldout.

Last thing is "Extra Settings" foldout where you will find "Hips Elasticness" toggle to use elasticity algorithm on hips which can speed up your animation design process.

# 3: Grounding IK

Animation Designer offers grounding IK algorithm which can help you re-design cyclic motion for legs. After analyzing the original animation clip, you will be provided with a bunch of different parameters which will allow you to instantly change legs animation.

## Analyze:

To start working with the Grounding IK, you need to prepare some data for the algorithm. It's good practice to **switch all your leg bones to Foot IK and "Foot Ik Mode" to "Grounding" as the first step**, thanks to that you will be able to do all of the calculations for all legs with a single click without needing to go through each leg limb.

With "View IK Grounding Stage" set to "Analyze" **the original motion will not be changed at all** to let you analyze motion correctly.

Now you should toggle "Sync other legs settings with this" to be enabled.

Thanks to that, analysis will be computed on all other limbs with Foot IK and Grounding Mode enabled.

Now you need to prepare some threshold values to help the algorithm create a foot grounding curve for you. It's not very important to know exactly what each parameter is doing, since effect of the parameters depends highly on the character armature you're working on, and you will probably quickly check different setups of "Heel" and "Toes" grounding thresholds to quickly prepare most accurate curves for you.

Heel Grounding defines threshold height of predicted heel position in which motion of leg limb should be treated as touching ground.

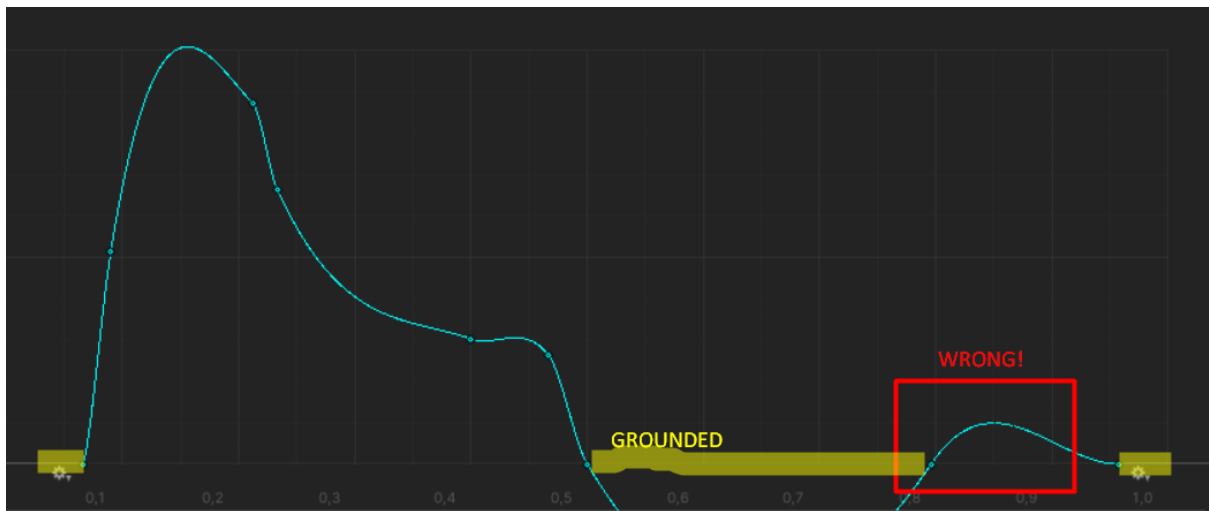
Toes Grounding defines threshold height of predicted toes position in which motion of leg limb should be treated as touching ground.

You can switch to isometric view and follow guides for this values in scene gizmos (guides will be visible after first analyze check)

Hit the "analyze" button to generate a grounding curve. Feel free to change threshold values slightly and hit the "Re-Analyze" button again to quickly adjust settings for the most accurate curve.

In scene gizmos you will see contours of character predicted foot grounding moments. When it becomes green that means the animation moment is detected as a grounded state for the limb. It's important to adjust grounding curve manually, in most cases, but in the most cases it will be just offsetting few keyframes to left/right.

When the curve value is at zero point that means in this animation time foot should be treated as grounded, when above - foot is not touching ground/rising leg up. Sometimes algorithm can detect the foot up moment wrong which will cause it to put its leg up when it should be grounded. Then you should fix it manually, putting the wrong area down to zero.

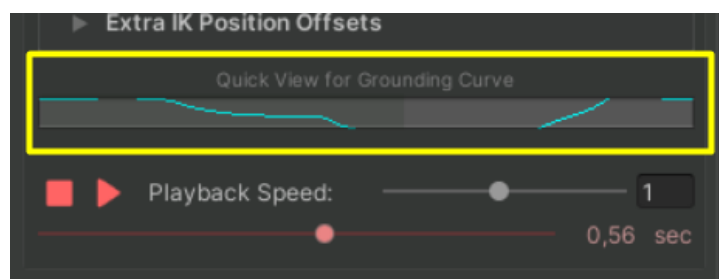


## Processing:

After preparing curves in the Analyze Stage you can go to the Processing Stage. Again: it's good practice to toggle "Sync other legs settings with this" to see main parameters effects on all legs with foot IK and grounding IK mode.

To see documentation of each parameter, enter the parameters in unity editor with the mouse cursor, hold it still for a second, and a tooltip describing the parameter should appear.

On the bottom of the IK settings view, you will find grey text "Quick View for Grounding Curve" clicking it will expand the grounding curve for the limb for quick tweak which can be very handy.



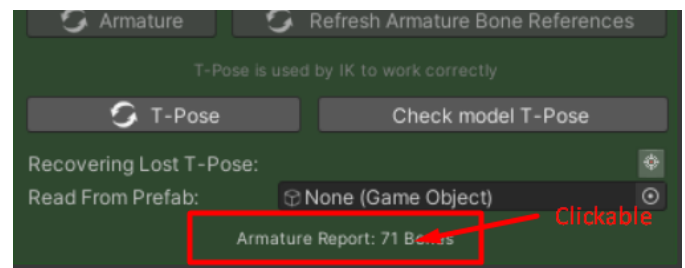
## 4: Solving Issues

If after exporting the clip your characters seem to be floating, rotating in a strange way, that's probably because of the wrong "Root Bone". You can adjust it in the Setup tab, just below "**Armature Setup**", by drag & dropping current bone from the hierarchy (probably parent of currently chosen "Root Bone")

If after enabling the arm IK, the shoulder seems to glitch, try just changing "IK Shoulders Blend" to zero.

If you encounter some issues when switching between objects on scene with Animation Designer, try closing Animation Designer window, open it again, select the model you want to work on and start the design again with a button in the designer window.

If after exporting animation clip, you will see some bones out of place, this can be caused by not baked animation position, which you can enable under foldout below designer saves selector (top bar) and by clicking "Armature Report : [bones count]" It will display a list of bones scheduled for baking and you can choose if some bones you don't want to bake, or if you want to bake position in addition to rotation. It can be caused by one more thing: not having some bone in the armature list which can be added on the bottom of the armature bones list.



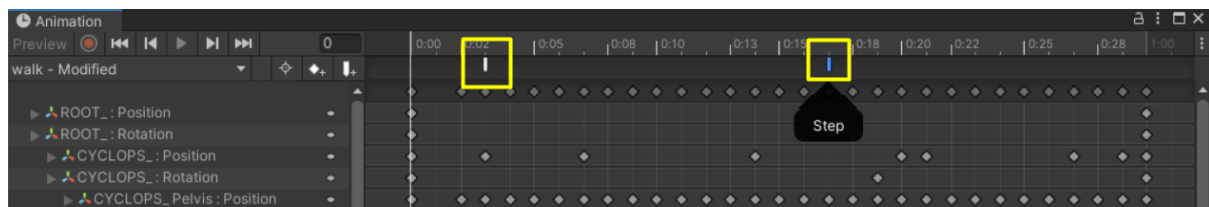
**Elasticness can cause wrong loop pose!** Elasticity is based on the active bones motion which can result in not matching loop pose. In most cases toggling "Loop Pose" in an animator clip is enough, but if not - try animating elasticity blend values with curves, change it lower on clip start and end. You can also try increasing "Loop Additional Frames" under the "Optimize new File" field (**it will be displayed only if original animation clip have toggled "loop"**). This option should provide a seamless loop in all situations.

If you encounter some foot jittery on exported animation clip with humanoid setup, it's Unity Humanoid retargeting bug. Most of the exceptions are handled

by Animation Designer but it can still occur. To solve it you can try making leg animation less stretched for legs by increasing “Max Leg Stretch” parameter or lowering pelvis. Another solution is using a bit different character model for wanted animation, some characters shouldn’t reveal this bug ever.

The curve and sliders ghosting guides of animation progress time, sometimes can be a little bit off. It will be fixed in the next updates of the package.

If you generate step-events with the grounding IK algorithm, you can check and adjust timing of the event by simply opening the animation clip file by double clicking. It will reveal an animation window where you can see the event markers and move them around.



If you set IK for the animal legs and it seems wrong, you probably need to assign further child bone of paws as the third bone (skip one bone in chain)

If the auto limb detection algorithm for generic rigs fails, make sure you don’t keep in the hierarchy leftovers of animator’s rig controls.

When you want to generate root motion without jump-effect caused by elasticity, try changing the value “motion influence” to zero in the elasticity settings (for the hips bone in the IK tab too!)

If your humanoid animation feet are going jittery when ending collision with ground, it can be caused by wrong humanoid retargeting, in most cases you can solve it by animating “Max Stretching” value making leg NOT stretched to the limit. It seems humanoid retargeting ik encounters troubles when the leg is too much stretched out.

## 5: Shortcuts:

### **Loop Curve Keys:**

If you hold the shift key on your keyboard and hit the left mouse button on some curve field, the algorithm will make the same values on the first and last key of the curve. If you hold shift and hit the right mouse button, then the average value of the first and last key will be applied to start and the last key of the curve.

### **Reduce Curve Keys:**

If you hold the control key on your keyboard and hit the left mouse button on some curve field, the algorithm will try removing some keys from the curve to minimize key density.

(Some of the curve fields may not support shortcuts yet!)

If some of the helper boxes like "MAKE SURE" annoys you and you want clear GUI space, try clicking on it, after a few clicks it should disappear.

By default it will disappear after a few switches to target Animation Designer bookmarks.

If you like this package please visit my asset store page for more or write a review for this asset ;)