Character Animation

Character Animation Tools Documentation

General Tools

Auto-key

The auto-key feature can be found in the info bar. When it is enabled, blender will automatically set keyframes when you move objects. This is helpful for people who are not used to explicitly inserting keyframes with **IKEY**. There are two separate toggles for auto-keying: one for object mode and one for pose mode. These two options can be set independent of one another.

Figure 6. Auto key options

For Objects

``KeyOB'' will set keyframes for objects that are moved in object mode. Users who are familiar with the blender interface will likely want to leave this option disabled.
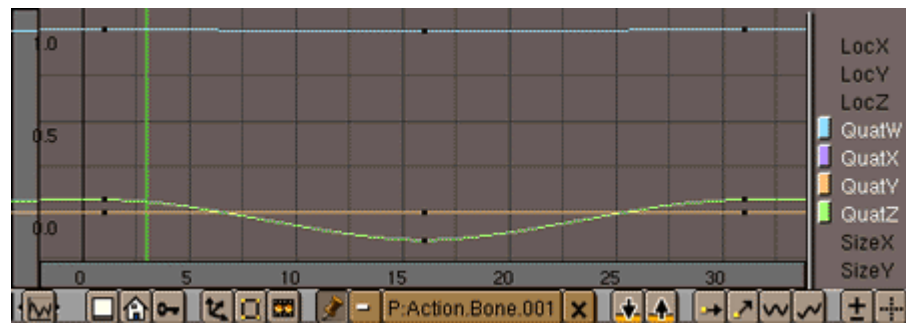
For Actions

``KeyAC'' sets keyframes for transformations done in pose mode. This ensures that you will not lose a pose by forgetting to insert keyframes. Even users who are familiar with the blender interface may find this to be a useful feature.

Ipo/Action Pinning

It is now possible to display different ipos in different windows. This is especially valuable while editing actions, which have a different ipo for each bone.

Figure 7. Pinned Action IpoWindow

You can ``pin'' an ipo or action (lock it to the current window) by pressing the pin icon in the header of the window. The contents of the window will stay there, even when the object is deselected, or another object is selected. Note that the color of the ipo block menu will change, along with the background color of the ipo window. These serve as reminders that the window is not necessarily displaying the ipo of the currently selected object.
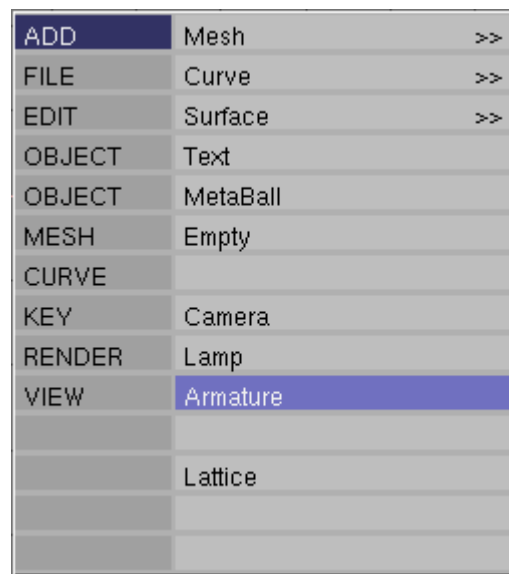
Browsing while pinned

The browse menu is still available while a window is pinned. In this case however, changing the current data will not affect the current object; it merely changes which data is displayed.

Armature Object

Creating

A single armature will contain many bones. Consider an armature to be like a skeleton for a living creature. The arms, legs, spine and head are all part of the same skeleton object.

Figure 8. Adding an Armature

To create a new armature, select "ADD->Armature" from the toolbox. A new bone will appear with its root at the location of the 3d cursor. As you move the mouse, the bone will resize accordingly. **LMB** will finalize the bone and start a new one that is the child of the previous one. In this way you can make a complete chain. Pressing **ESC** will cancel the addition of the bone.

Adding Bones

You can add another bone to an armature while it is in edit mode by selecting "ADD->Armature" from the toolbox again. This will start the bone-adding mode again, and the new bones you create will be a part of the current armature.

Extruding Bones

You can also extrude bones from existing bones by selecting a bone joint and pressing **EKEY**. The newly created bone will be a child of the bone it is extruded from.

Editing

While in edit mode, you can perform the following operations to the bones in an armature.

Adjusting

Select one or more bone joints and use any of the standard transformation operations to adjust the position or orientation of any bones in the armature. Note that IK chains cannot have any gaps between their bones and as such moving the end point of a bone will move the start point of its child.

You can select an entire IK chain at once by moving the mouse cursor over a joint in the chain and pressing **LKEY**. You can also use the boundary select tool (**BKEY**).

Deleting

You can delete one or more bones by selecting its start and end points. When you do this you will notice the bone itself will be drawn in a highlighted color. Pressing **XKEY** will remove the highlighted bones. Note that selecting a single point is insufficient to delete a bone.

Point Snapping

It is possible to snap bone joints to the grid or to the cursor by using the snap menu accessible with **SHIFT+S**.

Numeric Mode

For more precise editing, pressing **NKEY** will bring up the numeric entry box. Here you can adjust the position of the start and end points as well as the bone's roll around its own axis.

Undo

While in edit mode, you can cancel the changes you have made in the current editing session by pressing **UKEY**. The armature will revert to the state it was in before editing began.

Joining

It is possible to join two armatures together into a single object. To do this, ensure you are in object mode, select both armatures and press **CTRL+J**.
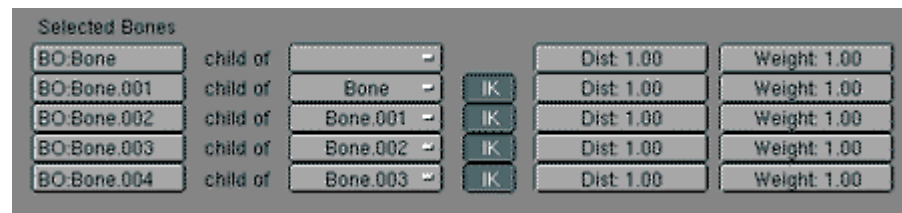
Renaming

Assigning meaningful names the bones in your armatures is important for several reasons. Firstly it will make your life easier when editing actions in the action window. Secondly, the bone names are used to associate action channels with bones when you are attempting to re-use actions, and thirdly the names are used when taking advantage of the automatic pose-flipping feature.

Note that bone names need only be unique within a given armature. You can have several bone called ``Head'' so long as they are all in different armatures.

Basic Naming

To change the names of one or more bones, select the bones in edit mode and switch
to the edit buttons with **F9**. A list of all the selected bones should appear.

Figure 9. EditButtons for an Armature

Change a bone's name by **SHIFT-LMB** in the bone's name box and typing a new
name.

It is easier to name the bones by either only editing one bone at a time, or by making
sure the ``DrawNames'' option is enabled in the EditButtons **F9** (see).

Pose Flipping Conventions

Character armatures are typically axially symmetrical. This means that many elements
are found in pairs, one on the left and one on the right. If you name them correctly,
Blender can flip a given pose around the axis of symmetry, making animation of walk-
cycles much easier.

For every bone that is paired, suffix the names for the left and right with either ``.L''
and ``.R'' or ``.Left'' and ``.Right''. Bones that lie along the axis of symmetry or that
have no twin need no suffix. Note that the part of the name preceding the suffix should
be identical for both sides. So if there are two hands, they should be named ``Hand.R''
and ``Hand.L''.

Basic Parenting

To change parenting relationships within the armature, select the bone that should be
the CHILD and switch to the edit buttons window. Next to the bone there should be a
menu button labeled ``Child Of''. To make the bone become the child of another bone,
pick the appropriate parent from the list. Note that this is much easier if the bones
have been correctly named. To dissolve a parenting relationship, choose the first
(blank) entry in the list.

Note that the parenting menu only contains the names of valid parents. Bones that
cannot be parents (such as children of the current bone) will not be displayed.

IK Relationship

The IK toggle next to each bone with a parent is used to determine if the IK solver
should propagate its effects across this joint. If the IK button is active, the child's start
point will be moved to math its parent's end point. This is to satisfy the requirement
that there are no gaps in an IK chain. Deactivating the IK button will not restore the
child's start point to its previous location, but moving the point will no longer affect the
parent's end point.

Setting Local Axes

To get the best results while animating, it is necessary to ensure that the local axes of
each bone are consistent throughout the armature. This should be done before any
animation takes place.

Clearing Transforms

It is necessary that the when the armature object is in its untransformed orientation in

object mode, that the front of the armature is visible in the front view, the left side is visible in the left view and so on. You can ensure this by orienting the armature so that the appropriate views are aligned and pressing **CTRL+A** to apply size and rotation. Again, this should be done before any animation takes place.

Adjusting Roll Handles

The orientation of the bones' roll handles is important to getting good results from the animation system.

You can adjust the roll angle of a bone by selecting it and pressing **NKEY**. The roll angle is the item at the bottom. The exact number that must be entered here depends on the orientation of the bone.

The Z-axis of each bone should point in a consistent direction for paired bones. A good solution is to have the Z-axes point upwards (or forwards, when the bone is vertically oriented).

This task is much easier if the ``Draw Axes'' option is enabled in the edit buttons window.

Setting Weights (DEPRECIATED)

The Weight and Dist settings are only used by the automatic skinning which is a depreciated feature.

Object Mode Parenting

When making a child of an armature, several options are presented.

Parent to Bone

> In this case, the a popup menu appears allowing you to choose which bone should be the parent of the child(ren) objects.

Parent to Armature

> Choosing this option will deform the child(ren) mesh(es) according to their vertex groups. If the child meshes don't have any vertex groups, they will be subject to automatic skinning. This is very slow, so it is advised to create vertex groups instead.

Parent to Armature Object

> Choosing this option will cause the child(ren) to consider the armature to be an Empty for all intents and purposes.

Toggle Buttons for Armatures in the EditButtons F9

Figure 10. Draw options for Armatures

Rest Position Button

When this toggle is activated, the armature will be displayed in its rest position. This is useful if it becomes necessary to edit the mesh associated with an armature after

some posing or animation has been done. Note that the actions and poses are still there, but they are temporarily disabled while this button is pressed.

Draw Axes Button

When this toggle is activated, the local axes of each bone will be displayed in the 3d view.

Draw Names Button

When this toggle is activated, the names of each bone will be displayed in the 3d view.
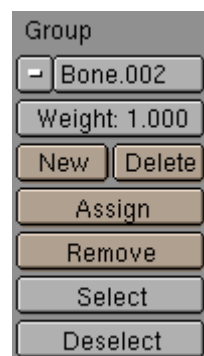
Skinning

Skinning is a technique for creating smooth mesh deformations with an armature. Essentially the skinning is the relationship between the vertices in a mesh and the bones of an armature, and how the transformations of each bone will affect the position of the mesh vertices.

Automatic (DEPRECIATED)

If a mesh does not have any vertex groups, and it is made the armature-child of an armature, Blender will attempt to calculate deformation information on the fly. This is very slow and is not recommended. It is advisable to create and use vertex groups instead.

Vertex Weights

Figure 11. Vertex Groups

Vertex groups are necessary to define which bones deform which vertices. A vertex can be a member of several groups, in which case its deformation will be a weighted average of the deformations of the bones it is assigned to. In this way it is possible to create smooth joints.

Creating

To add a new vertex group to a mesh, you must be in edit mode. Create a new vertex group by clicking on the ``New'' button in the mesh's edit buttons.

A vertex group can subsequently be deleted by clicking on the ``Delete'' button.

Change the active group by choosing one from the pull-down group menu.

Naming

Vertex groups must have the same names as the bones that will manipulate them. Both spelling and capitalization matter. Rename a vertex group by **SHIFT-LMB** on the name button and typing a new name. Note that vertex group names must be unique

within a given mesh.

Assigning

Vertices can be assigned to the active group by selecting them and clicking the ``Assign'' button. Depending on the setting of the ``Weight'' button, the vertices will receive more or less influence from the bone. This weighting is only important for vertices that are members of more than one bone. The weight setting is not an absolute value; rather it is a relative one. For each vertex, the system calculates the sum of the weights of all of the bones that affect the vertex. The transformations of each bone are then divided by this amount meaning that each vertex always receives exactly 100% deformation.

Assigning 0 weight to a vertex will effectively remove it from the active group.

Removing

Remove vertices from the current group by selecting them and clicking the ``Remove'' button.

Selection Tools

Pressing the ``Select'' button will add the vertices assigned to the current group to the selection set. Pressing the ``Deselect'' button will remove the vertices assigned to the current group from the selection set.

Weight Painting

Weight painting is an alternate technique for assigning vertices to vertex groups. The user can ``paint'' weights onto the model and see the results in real-time. This makes smooth joints easier to achieve.

Activating

To activate weight-painting mode, select a mesh with vertex groups and click on the weight paint icon.

The active mesh will be displayed in weight-color mode. In this mode dark blue represents areas with no weight from the current group and red represent areas with full weight.