Week_28__animation
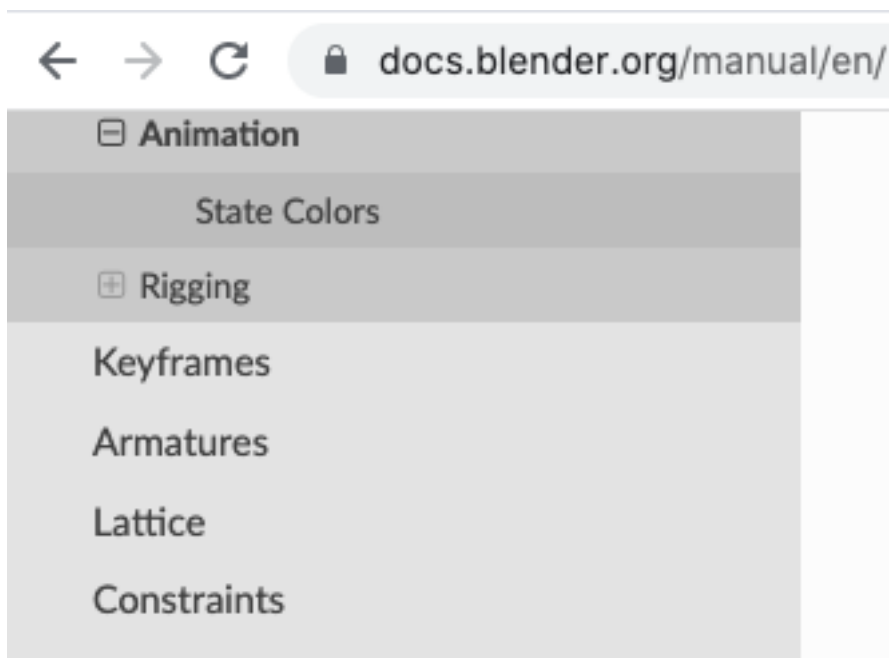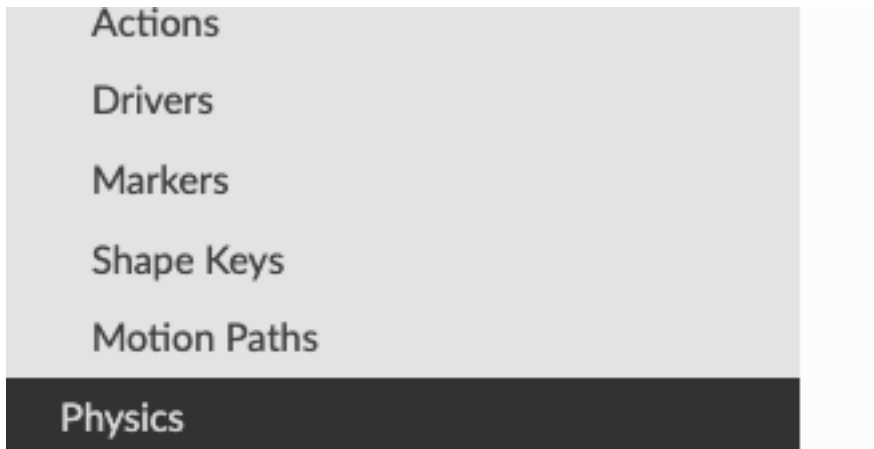
Trinity Computer Animation 04/17/2024

Today we will continue with our Blender Series.
And see a video tutorial.

Actions

Drivers

Markers

Shape Keys

Motion Paths

Physics

Animation_

Animation is making an object move or change shape over time. Objects can be animated in many ways:

Moving as a whole object
Changing their position, orientation or size in time;
Deforming them
Animating their vertices or control points;
Inherited animation
Causing the object to move based on the movement of another object (e.g. its parent, hook, armature, etc.).

State Colors

▼ Transform	▼ Transform	▼ Transform	▼ Transform

Location:		Location:		Location:		Location:	
X:	0m	X:	0m	X:	1m	X:	0m
Y:	0m	Y:	0m	Y:	0m	Y:	0m
Z:	0m	Z:	0m	Z:	0m	Z:	0m

State colors of properties.

Properties have different colors and menu items for different states.

Gray	Not animated
Yellow	Keyframed on the current frame
Green	Keyframed on a different frame
Orange	Changed from the keyframed value
Purple	Controlled by a driver

Rigging

Rigging is a general term used for adding controls to objects, typically for the purpose of animation.

Rigging often involves using one or more of the following features:

Armatures
This allows mesh objects to have flexible joints and is often used for skeletal animation.
Constraints
To control the kinds of motions that make sense and add functionality to the rig.
Object Modifiers
Mesh deformation can be quite involved, there are

Shape Keys
To support different target shapes *(such as facial*

Object Modifiers

multiple modifiers that help control this.

Shape Keys

To support different target shapes *(such as facial expressions)* to be controlled.

Drivers

So your rig can control many different values at once, as well as making some properties automatically update based on changes elsewhere. Rigging can be as advanced as your project requires, rigs are effectively defining own user interface for the animator to use, without having to be concerned the underlying mechanisms.

Examples

- An armature is often used with a modifier to deform a mesh for character animation.
- A camera rig can be used instead of animating the camera object directly to simulate real-world camera rigs (with a boom arm, mounted on a rotating pedestal for example, effects such as camera jitter can be added too).

A *Keyframe* is simply a marker of time which stores the value of a property.

For example, a Keyframe might define that the horizontal

For example, a Keyframe might define that the horizontal position of a cube is at 3 m on frame 1.

The purpose of a Keyframe is to allow for interpolated animation, meaning, for example, that the user could then add another key on frame 10, specifying the cube's horizontal position at 20 m, and Blender will automatically determine the correct position of the cube for all the frames between frame 1 and 10 depending on the chosen interpolation method (e.g. Linear, Bézier, Quadratic, etc.).

An overview of existing keyframes can be seen via the Dope Sheet editor.

Visualization

There are some important visualization features in the 3D Viewport that can help animation.

When the current frame is a keyframe for the current active object, the name of this object (shown in the upper left corner of the 3D Viewport) turns yellow.
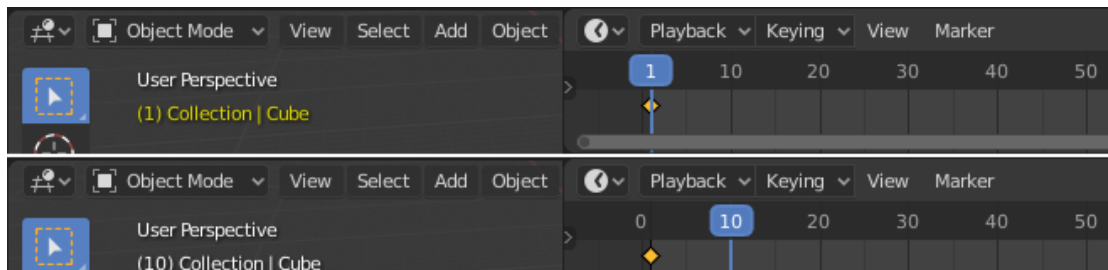
Top: Current frame is a keyframe for Cube. Bottom: Current frame isn't a keyframe.

Interpolation

Keyframe interpolation is represented and controlled by [animation curves](#), also known as [F-Curves](#). These curves can be viewed and modified via the [Graph Editor](#).
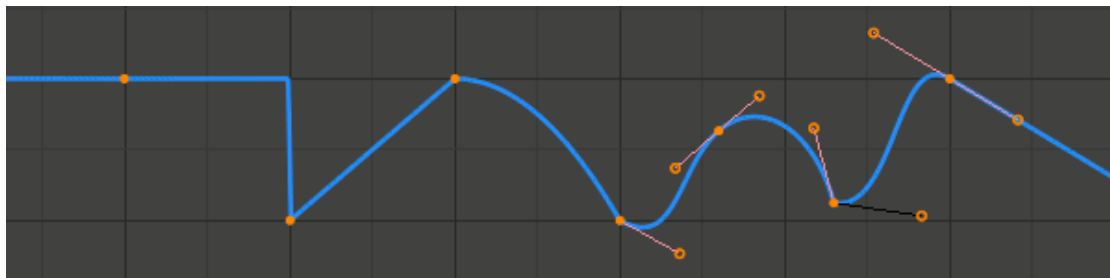
Constant, Linear, Quadratic and Bézier interpolation, with Linear extrapolation.

The X axis of the curve corresponds to time, while Y represents the value of the property. Keyframes themselves define points of the curve, while interpolation is controlled by additional parameters.

The [Interpolation Mode](#) is the main setting that specifies for each keyframe how the curve is interpolated from that key to the next one. There are a number of modes with fixed shapes, e.g. *Constant*, *Linear*, *Quadratic* etc, and a free form *Bézier* mode.

[Extrapolation](#) specifies how the curve extends before the first, and after the last keyframe. The main available choices

and after the last keyframe. The main available choices are *Constant* and *Linear*; it is also possible to configure the curve to loop.

Bézier interpolation is controlled by handles, which have a handle type and position. The position of *Free* and *Aligned* handles must be set manually from the Graph editor, while *Vector, Automatic* and *Auto Clamped* handles are computed automatically from keyframe values.

Interpolation, Extrapolation and Handle Type can also be changed from the Dope Sheet editor.
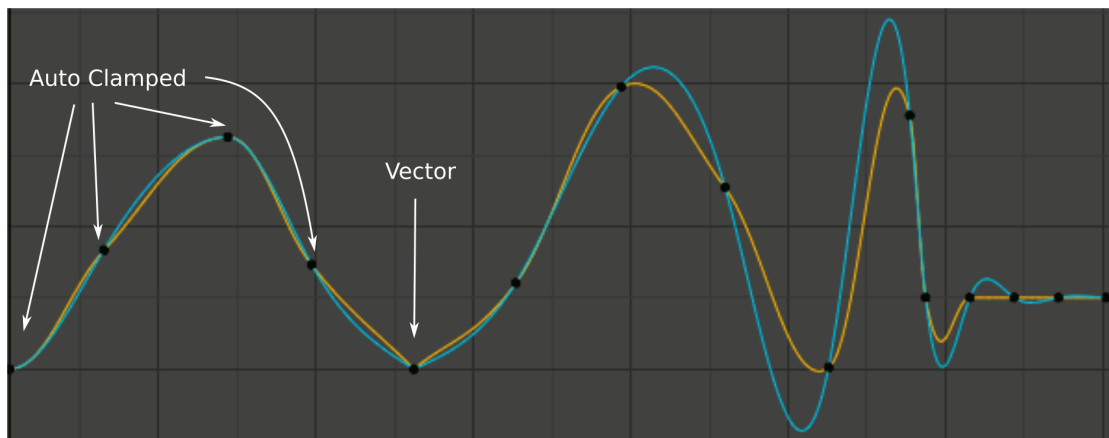
Handle smoothing modes. Yellow: None, Cyan: Continuous Acceleration.

The method how the three automatic handle types are computed is controlled by the per-curve Auto Handle Smoothing setting. The *None* mode resembles how most other software works and only considers the values of the immediately adjacent keys. The *Continuous Acceleration* mode considers the shape of the whole curve, which produces

smoother results out of the box, but means that changes in one key affect interpolation over a larger section of the curve; it also tends to overshoot more with *Automatic* handles.

Keyframe Types_

For visually distinguishing regular keyframes from different animation events or states (extremes, breakdowns, or other in-betweens) there is the possibility of applying different colors on them for visualization.

Left: not selected; Right: selected._

Keyframe (white / yellow diamond)
Normal keyframe.
Breakdown (small cyan diamond)
Breakdown state. e.g. for transitions between key poses.
Moving Hold (dark gray / orange diamond)
A keyframe that adds a small amount of motion around a holding pose. In the Dope Sheet it will also display a bar between them.
Extreme (big pink diamond)
An 'extreme' state, or some other purpose as needed.
Jitter (tiny green diamond)
A filler or baked keyframe for keying on ones, or some other purpose as needed.

Handles & Interpolation Mode Display_

Dope Sheet can display the Bézier handle type associated with the keyframe, and mark segments with non-Bézier interpolation. This facilitates basic editing of interpolation without the use of the Graph Editor.

The icon shape represents the type of the Bézier Handles belonging to the keyframe.

From top: summary, Bézier, linear._

Circle	Auto Clamped (default)
Circle With Dot	Automatic
Square	Vector
Clipped Diamond	Aligned
Diamond	Free

If the handles of a keyframe have different types, or in case of summary rows representing multiple curves, out of the available choices the icon that is furthest down the list is used. This means that if a grouped row uses a circle icon, it is guaranteed that none of the grouped channels have a non-auto key.

Horizontal green lines mark the use of non-Bézier Interpolation. The line is dimmed in summary rows if not all grouped channels have the same interpolation.

Display of this information can be disabled via the *Show*

Handles and Interpolation option of the Dope Sheet's

Insert Keyframe

Reference

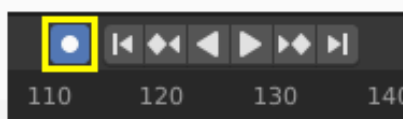|	
Mode:	Object Mode
Menu:	Object ‣ Animation ‣ Insert Keyframe...
Shortcut:	I

There are several methods of adding new keys. Namely:

- In the 3D Viewport, pressing I will bring up a menu to choose what to add a keyframe to.
- Hovering over a property and pressing I or with the context menu by RMB a property and choose *Insert Keyframe* from the menu.

Auto Keyframe

Note: RMB = Right Mouse Button

Delete Keyframes

Reference

Mode:	Object Mode

There are several methods of removing keyframes:

- In the 3D Viewport press `Alt-I` to remove keys from selected objects on the current frame.
- When the mouse is over a value, press `Alt-I`.
- `RMB` a value and choose *Delete Keyframe* from the menu.

Clear Keyframes

☰ Reference

Mode: Object Mode
Menu: Object ‣ Animation ‣ Clear Keyframes...
Shortcut: `Shift-Alt-I`

This will remove all keyframes from an area.

Editing Keyframes

Keyframes can be edited in two editors. To do so go to either the Graph Editor or the Dope Sheet.

Examples

Keyframe Animation

This example shows you how to animate a cube's location, rotation, and scale.

1. First, in the Timeline, or other animation editors, set the frame to 1.
2. With the cube selected in Object Mode, press I in the 3D Viewport. From the *Insert Keyframe* menu select *LocRotScale*. This will record the location, rotation, and scale, for the cube on frame 1.
3. Set the frame to 100.
4. Use Move G , Rotate R , Scale S , to transform the cube.
5. Press I in the 3D Viewport. From the *Insert Keyframe* menu, select *LocRotScale*.

To test the animation, press Spacebar to play.

Keying Sets

Keying sets are a collection of animated properties that are used to animate and keyframe multiple properties at the same time. For example, using keying sets you can press I in the 3D Viewport, Blender will add keyframes for all the properties in the active keying set. There are some built-in keying sets and, also custom keying sets called *Absolute Keying Sets*. To select and use a keying set, set the *Active Keying Set* in the Keying popover in the Timeline header, or the Keying Set panel, or press Shift-Ctrl-Alt-I in the 3D Viewport.
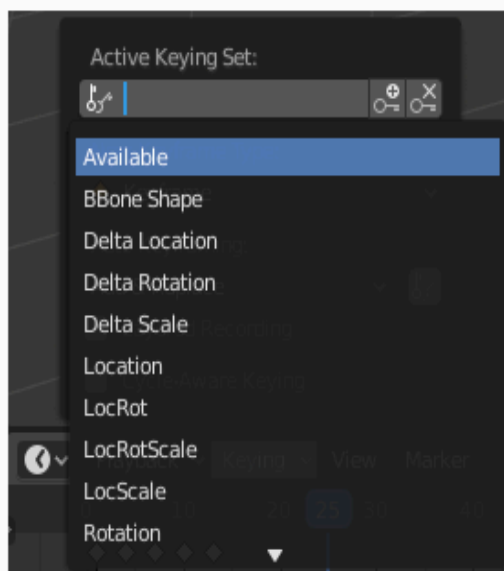
The Active Keying Sets data ID in the Timeline.

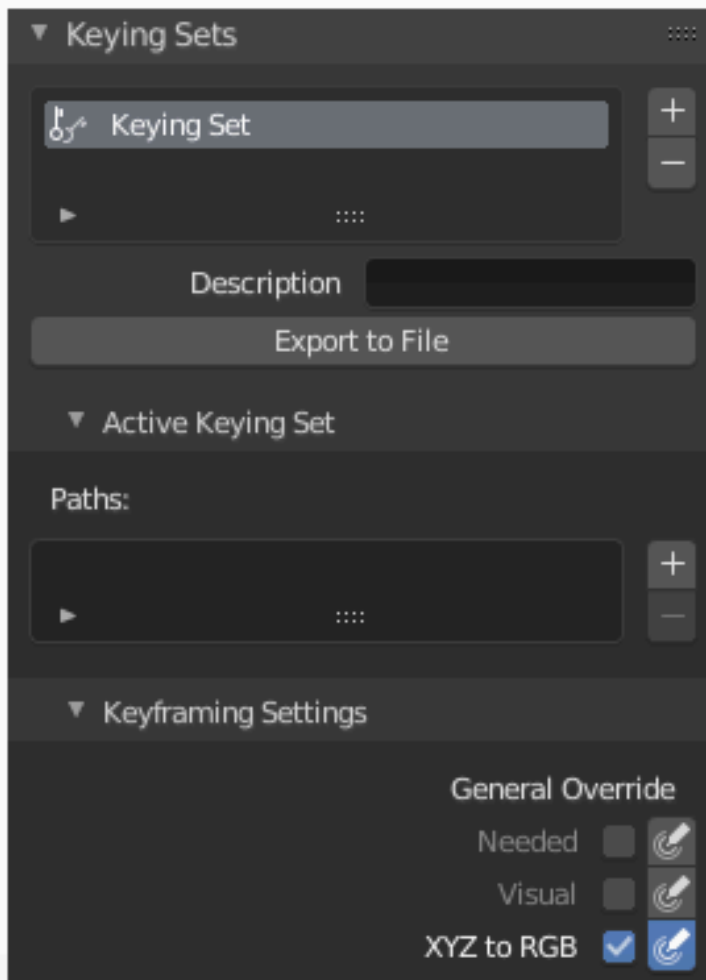# Keying Set Panel

Reference

Editor: Properties

Panel: Scene ‣ Keying Set

This panel is used to add, select, manage *Absolute Keying Sets*.

▼ Keying Sets   ::::

    🗝 Keying Set   +

    ▶   ::::   −

      Description

      Export to File

    ▼ Active Keying Set

Paths:

                   +

    ▶   ::::   −

    ▼ Keyframing Settings

              General Override

              Needed   ☐ ✎

              Visual   ☐ ✎

        XYZ to RGB ✅ ✎

Active Keying Set
    The List View of keying sets in the active scene.

    Add +
        Adds an empty keying set.

Description
    A short description of the keying set.

Export to File
   Export keying set to a Python script `File.py`. To re-add the keying set from the `File.py`, open
   then run the `File.py` from the Text Editor.

Keyframing Settings

General Override
   These options control all properties in the keying set. Note that the same settings in *Preferences*
   override these settings if enabled.

Active Set Override
   These options control individual properties in the keying set.

Common Settings
   Only Needed
      Only insert keyframes where they are needed in the relevant F-Curves.

   Visual Keying
      Insert keyframes based on the visual transformation.

   XYZ to RGB
      For new F-Curves, set the colors to RGB for the property set, Location XYZ for example.

Active Keying Set Panel

:≡ Reference

Editor: Properties
Panel: Scene ‣ Active Keying Set
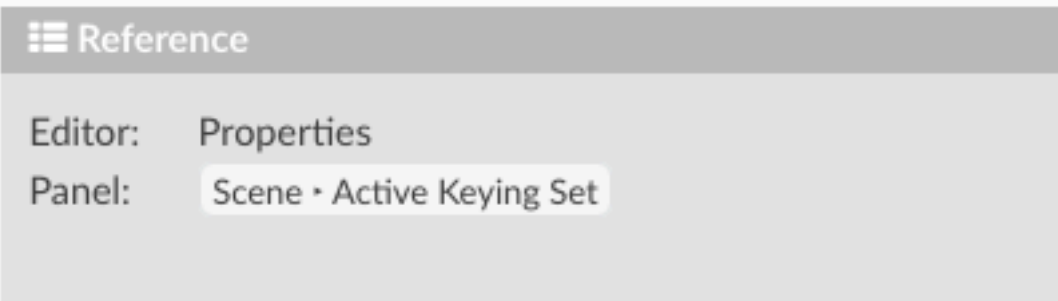
This panel is used to add properties to the active keying set.
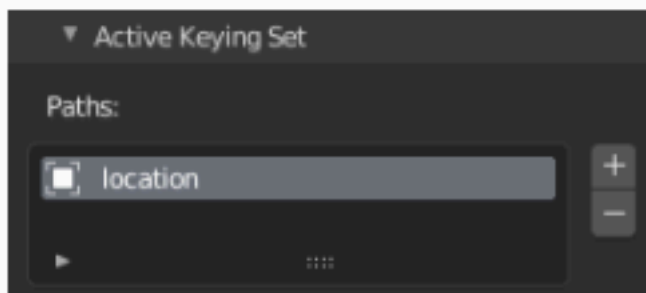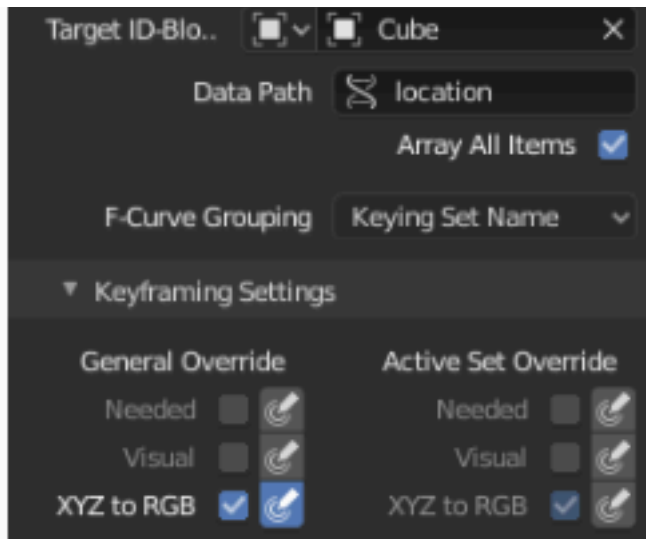
The Active Keying Set panel.

Paths
A collection of paths in a List View each with a *Data Path* to a property to add to the active keying set.

Add [+]
Adds an empty path.

Target ID-Block
Set the ID Type and the *Object IDs* data path for the property.

Data Path
Set the rest of the Data Path for the property.

Array All Items
Use *All Items* from the Data Path or select the array index for a specific property.

F-Curve Grouping
This controls what group to add the channels to.

Keying Set Name, None, Named Group

Adding Properties

<table>
<tr><td colspan="2">☰ Reference</td></tr>
<tr><td>Menu:</td><td>Context menu ‣ Add All/Single to Keying Set</td></tr>
<tr><td>Shortcut:</td><td>K</td></tr>
</table>

Some ways to add properties to keying sets.

RMB the property in the *User Interface*, then select *Add Single to Keying Set* or *Add All to Keying Set*. This will add the properties to the active keying set, or to a new keying set if none exist.

Hover the mouse over the properties, then press K , to add *Add All to Keying Set*.

Whole Character Keying Set

The built-in *Whole Character* keying set is made to keyframe all properties that are likely to get animated in a character rig. It was also implicitly used by the Old Pose Library system.

In order to determine which bones to add keys for, and which bones to skip, the keying set uses the bone names. The following bone name prefixes will be skipped:

"COR", "DEF", "GEO", "MCH", "ORG", "VIS"

Next, we will watch a video tutorial (about tutorials)...

https1://www.youtube.com/watch?v=9yc92Hp1MTc

From Blendor.org <YouTube> This will be a great resource for your going forward:
https1://www.youtube.com/playlist?list=PLa1F2ddGya_-UvuAqHAksYnB0qL9yWDO6

Homework - watch these (short)videos (Blender Tutorials)

Left Mouse x6

Next Week we will dig deeper into blender,
No BONEs about it…