Sketch to Pose in Pixar's Presto Animation System

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Figure 1: *Sketch to Pose on a character from The Good Dinosaur. ©Disney / Pixar. All rights reserved.*

Abstract

Animation rigs for key frame animation typically offer guides for direct manipulation of a model. For example, elbow rotation is conveniently specified by dragging a rotational ring guide. However, these simple guides can be cumbersome and time-consuming to use when posing structures involving multiple joints, such as a prehensile long neck or tail. In this work, we present a convenient interface to pose multiple joints at once by snapping them to a user-drawn stroke.

1 Overview

We created a multiple-joint guide that can be posed via a stroke drawn with the stylus or mouse. The guide depicts the joints with dots, connected by a centerline (Figure 1). This centerline will be transformed to the drawn stroke.

The guide is implicitly generated from the character rig, and appears when the mouse is nearby to indicate which parts of the character are posable. When the guide is visible, the user can draw a stroke to adjust the pose. The center line of the guide is the stroke a user would use to recreate the model's current pose, which makes it easy for a user to start using the tool.

2 Rigging

A rig that represents a long dinosaur neck is similar to one that represents a prehensile tail, but those rigs don't necessarily share interfaces to the animator. The neck can be posed using guides that are similar to bezier control points. The tail is normally posed using joint rotation guides. Ideally we'd like this sketch feature to author values using the same interfaces the animator normally uses, so we need a way to teach the software about the available parameters. This way the animator can switch between this tool and direct manipulation or other animation tools whenever it is convenient.

To make this work we've created special solvers that are aware of the type of rig they are working with. These solvers are primitives that a rigger can apply in the character's rig, and can be used to author relationships that configure the solver. For example, there is a single solver that knows how to work with dinosaur necks and tails. This solver can detect what types of guides are being displayed, and will write only into the same parameters that those guides would use.

3 Sketch Conversion

We experimented with a variety of conversion schemes, but there are three techniques we find most useful. Animators can switch between these to use the method that is most useful for the task at hand.

The simplest method of sketch stroke conversion is to flatten the model into a plane that is parallel to the camera plane that the user sketched in. This plane is located in 3d space where it intersects the first primitive that is being posed.

A more complicated, but more useful method is to move each point of articulation such that it touches the sketch stroke in screen space (2d), while maintaining the same world space (3d) distance from the current camera.

The final style of conversion was inspired by our experiments with flattening the geometry. Users found they were often aligning the camera with the X, Y or Z axis to flatten into a specific plane. With this third approach we show a planar guide on the model to be posed. The guide will be aligned on the model's XY, YZ or XZ plane, and any sketch strokes will be interpreted as being in the guide plane. Guide planes are chosen implicitly by tumbling the camera. For example, if the model is being viewed with a camera that is roughly looking down its X axis, the YZ plane is displayed automatically.

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