

Addendum for Gortler chapter 23

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Despite the title of the chapter 23 in Gortler ("Animation: not even an introduction"), the chapter is actually a pretty good overview of computer animation. However, it fails to mention three important methods that I would like to add to the presentation: expressions, path scripting and inverse kinematics (IK).

Expressions, also referred to as "scripting", means using some sort of mathematical expression or a scripting language to make an object to perform a certain motion, like a swinging back and forth with time, a rotation around an axis or even some more complicated motion like a noise-based pseudo-random jittering. Expressions are useful for many situations, in particular for periodic motions, things that depend on other animations, and secondary animations where you don't need detailed control on a frame by frame basis.

Path scripting means making objects follow a path. The path is often a parametric cubic curve, e.g. a Bézier curve. The advantage of using an explicit curve rather than a sequence of keyframed positions is that the entire path of motion is visible to the animator, which enables both large scale overview and control of fine detail. In some applications, like when animating a vehicle driving along a road or a camera moving along an imaginary walk-through of a scene, path scripting is the obvious choice.

Inverse kinematics (IK for short) is a convenient tool when animating hierarchical structures with joints, "bones". Forward kinematics animation of e.g. an arm means specifying the angles for the shoulder and elbow joints and then computing the position of the hand. Using inverse kinematics, you instead specify the position of the hand and make the computer solve equations for you to compute the corresponding joint angles. This is much more similar to how human and animal brains work when planning movement. IK saves a lot of time and makes the result a lot better in many cases involving character animation, but it can be very useful also for animating jointed mechanical contraptions.