Real-Time Character Animation Techniques

Introduction

The Techniques and problems involved in the production of realistic human synthesis and motion.
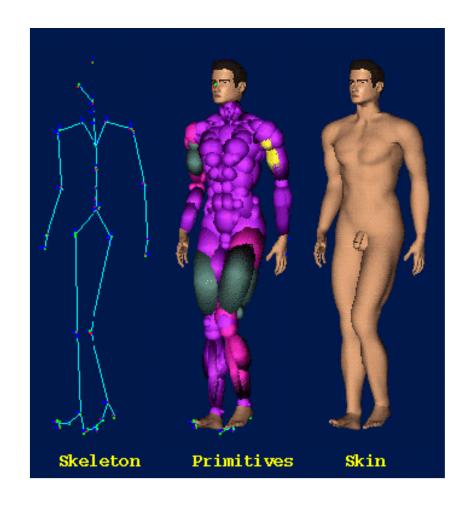
Section 2 of this paper deals with the layered modelling approach for Virtual character construction.

Section 3 presents the different techniques that are used within computer animation.

Layared modeling

The animator divides the simulation model into a number of discrete layers, each with its own physical and geometric properties

Skeleton   Primitives   Skin
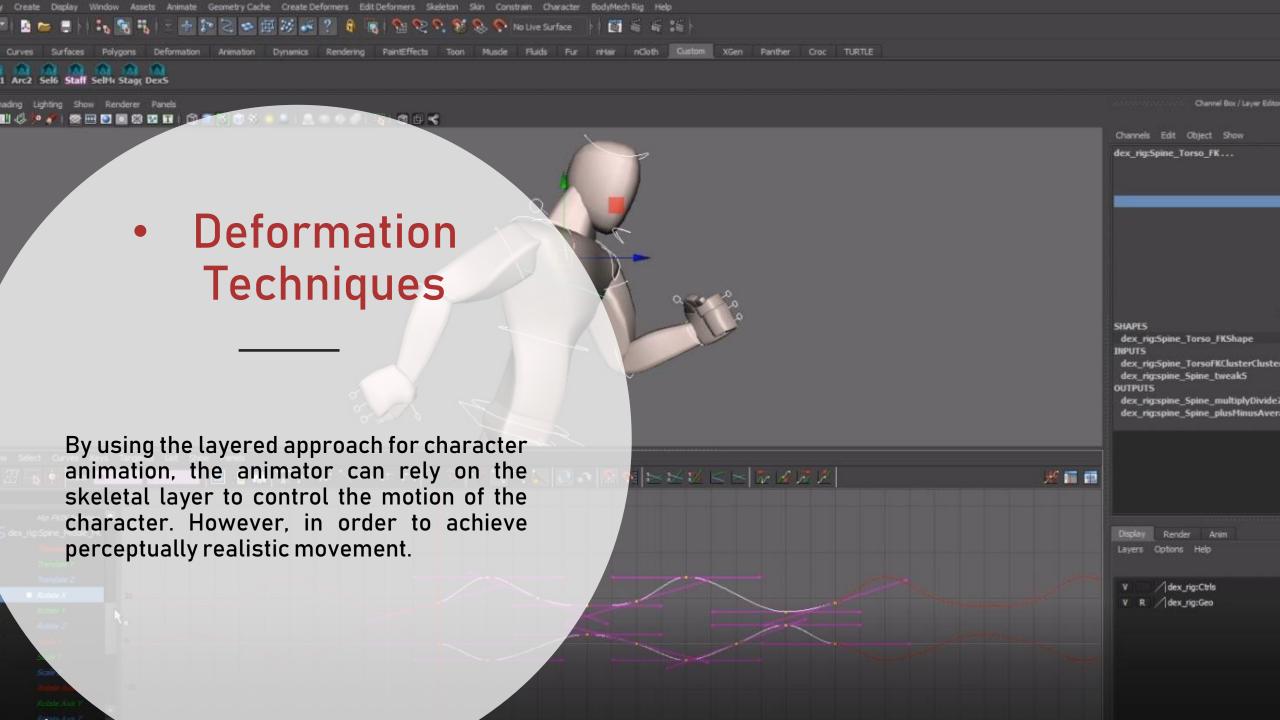
Model Representation

The number of layers used for real-time character animation is generally constrained by the underlying hardware's computational ability.

Where initially 2-layered (skeleton and muscle) and 3-layered (skeleton, muscle and skin) models prevailed, the ongoing improvement in processing.
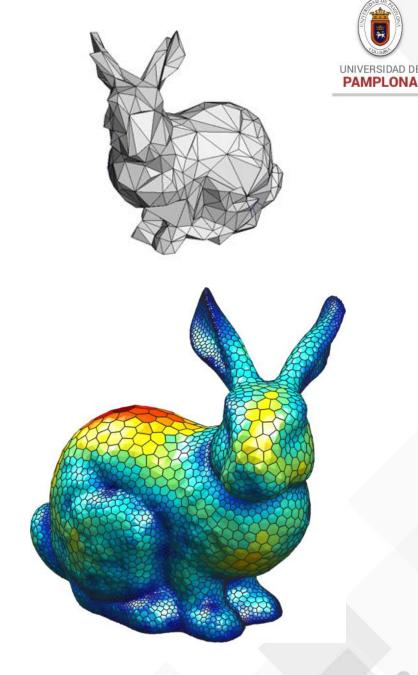
Curves   Surfaces   Polygons   Deformation   Animation   Dynamics   Rendering   PaintEffects   Toon   Muscle   Fluids   Fur   nHair   nCloth   Custom   XGen   Panther   Croc   TURTLE

Arc2   Sel6   **Staff**   SelM   Stag   DexS

• **Deformation Techniques**

By using the layered approach for character animation, the animator can rely on the skeletal layer to control the motion of the character. However, in order to achieve perceptually realistic movement.

Channel Box / Layer Edito

Channels   Edit   Object   Show

dex_rig:Spine_Torso_FK...

SHAPES
  dex_rig:Spine_Torso_FKShape
INPUTS
  dex_rig:Spine_TorsoFKClusterCluste
  dex_rig:spine_Spine_tweak5
OUTPUTS
  dex_rig:spine_Spine_multiplyDivide
  dex_rig:spine_Spine_plusMinusAver

Display   Render   Anim

Layers   Options   Help

V   /dex_rig:Ctrls
V   R   /dex_rig:Geo

❖Joint Dependant Local Deformations (JLD)

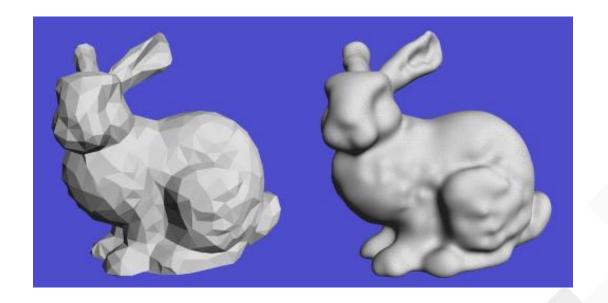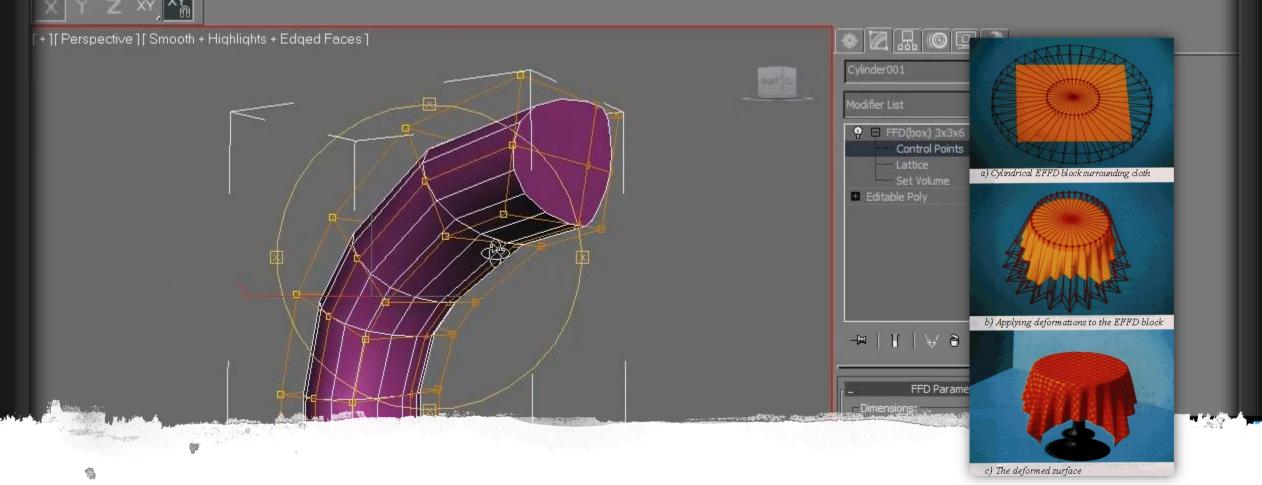This animation technique, which uses a polygonal mesh skin digitised from a sculpture.

❖Implicit Surfaces

Qualities:

- ability to represent continuous surfaces allows the virtual character to possess smooth joints, a quality which is not readily achievable using other methods

- can be used to handle collision detection and response as well as unwanted blending between the primitives in the character hierarchy.

X Y Z XY XY

Cylinder001

Modifier List

FFD(box) 3x3x6
— Control Points
— Lattice
— Set Volume
Editable Poly

FFD Parame

Dimensions:

a) Cylindrical EFFD block surrounding cloth

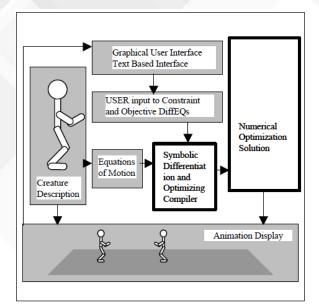b) Applying deformations to the EFFD block

c) The deformed surface

❖ Free Form Deformations

The unique quality of this approach is that instead of applying deformations to the object directly, the object is embedded in a space that is then deformed using Bezier theory.

- # Basic Techniques

The more traditional method of animating an articulated figure in computer graphics involves specifying each particular part at certain key locations in space, and then using some interpolation technique to animate the inbetween frames for the motion in question

- **Constraint Based Methods**

Constraints over the entire motion are considered simultaneously in order to find the optimal motions. This essentially treats the problem of automatic motion generation as a trajectory optimisation problem.

Motion Control

Some alternate approaches to those previously discussed are based on attempts to find control algorithms for models rather than desired motion trajectories.