

Course Outline

Learning Maya Character Rigging and Animation

This instructor led course teaches artists and technical directors methods for setting up, organizing and animating characters in Maya.

Course outcomes

After successfully completing the Character Animation in Maya course the student will be able to:

- Create Joints and IK (Inverse Kinematic) controlled joints to animate surface geometry that has been bound to these joints.
- Create character control attributes for Animator friendly interfaces to the character posing process.
- Organize the character for easier control and modification.
- Animate a character with and without image plane reference
- Animate a character using the Trax Editor.
- Create character automation for secondary motion and skinning effects.
- Create facial animation with blend shape deformation.
- Create lip-sync animation based on a sound track.
- Utilize Smooth and Rigid skinning methods for character skinning.
- Manipulate skinned surfaces with Flexors and Influence objects.

CURRICULUM

The curriculum breakdown shows:

Part 1. Skeleton Building

Beginning with an Introduction to the course and organization of data and other instructional material, the first step of the process of character setup is the creation of the framework from which the character will be operated from.

Concepts covered:

- Class data and courseware organization
- General concepts of Maya and procedural animation
- User Interface specific to Animation windows
- Joint creation and placement
- Joint creation options
- Joint hierarchy

Exercise :

Using the provided character model the student begins building the joint hierarchy to form the legs, back, neck, and head.

Part2. Inverse Kinematics and Hierarchical Control of the Character's Legs and Feet

Forward and Inverse kinematics as they pertain to Maya and in relation to building character control methods are explored in this section. Inverse kinematics and hierarchical layers are used with Set Driven Key to create an automated foot control.

Concepts covered:

- Inverse vrs Forward Kinematics
- Preferred angle
- IK attributes

Open Enrollment Training Course Outline part 3. Arms and Back

Layered animation with transform hierarchy

Set Driven Key

Selection handles

Exercise :

Inverse Kinematics are applied to the legs and a foot control system is created using Set Driven Key to animate a heretical foot setup.

Part 3. Arms and Back

This section creates Arms that provide realistic wrist twist and IK control of the arm. The characters back is setup with Spline IK which provides a flexible back with as few control points as possible.

Concepts covered:

Using the IK end effector

Rotate Plane Solver

Local Joint Orientation

Pole Vector Constraints

Spline IK

CV Cluster Controls

Added control attributes

Connection Editor

Exercise :

The character's arms and back is setup for control with Rotate Plane solved IK for the arms and Spline IK for the back.

Concepts covered:

Spline IK

CV Cluster Controls

Added control attributes

Connection Editor

Exercise:

Spline IK is applied to the joints in Melvin's back. The spline curve is deformed with Clusters and attributes are added to the back for added control from a central selection point.

Part 2. Animating a Walk Cycle

This section introduces the character node and consolidates the control points into one location. The purpose of character setup is to provide the animator with an easy and fun to use "marionette". Testing the character is best performed by setting keyframes and animating the "rig".

Concepts covered:

Character Sets

Low Resolution Stand-ins

Expression based automated control.

Channel Control

Clamped Keyframe Interpolation

Keyframing techniques

Graph Editor

Working with Animation Curves and buffered curves

Exporting Animation as a Trax Clip.

Exercise:

The character is organized to provide easy control and keyframing. Students animate the character to generate a walk cycle, then export the animation as a Trax Clip.

Part 1. Hands

With this section a more in depth look at joints and joint orientation is explored. Local Rotation Axis and joint relationships to one another is evaluated and manipulated. The joints that make up the hand are created as well as the means to control them efficiently established.

Concepts covered:

- Auto Joint Orientation
- Local Rotation Axis
- Hand control and joint positioning
- Locator control points with added attributes
- Set Driven Key for remote control of the fingers

Exercise:

Hand joints are created and controlled from attributes added to a centralized control point that drive individual finger bend and the wrist orientation.

Part 2. Smooth Skinning

This method of skinning provides the animator with more choices for configuring the character for realistic skin deformation. This section explores Smooth Skinning techniques and controlling the behavior of the skin weighting with Artisan.

Concepts covered:

- Smooth Skin deformation options
- Smooth and Rigid Skinning comparisons
- Max # Influences
- Hierarchy and proximity influence
- Painting skin weighting with Artisan
- Skeleton construction strategies

Exercise:

The character geometry is bound to the skeleton using SmoothSkin binding. Artisan is used to control the weighting of joint influences on the bound skin during posing. A posing script is used to pose the character in extreme positions.

Part 1. Influence Objects

This lesson focuses on techniques for controlling SmoothSkin behavior with influence objects. Influence objects can be almost any type of object that moves with the character as joint children or as Set Driven Key controlled objects. These objects then help the skin to follow or bulge along with a perceived internal structure like bones or muscles.

Concepts covered:

- Creating and adding influence objects
- Animating influence object shape and weight
- Editing influence options
- Using Influence Objects on a component level
- Corrective influence and anti deformation

Exercise:

Influence objects are created and added to the skinned character to aid in smooth skin deformation. Set Driven Key is used to control position and shape of influence objects with relation to joint rotation. Influence objects are created from nurbs curves and geometry to help spread deformation and maintain volume.

Part 2. Kick the Can

This section takes the newly skinned character and tests the setup to this point by animating the character kicking a can. Reference footage is used in an image plane as a posing guide, and the Trax editor is used to edit the animation.

Concepts covered:

- Image plane based motion study
- Posing based on reference
- Blocking, breakdown and in-between keyframing techniques
- Optimization techniques for faster posing
- Exporting and importing Trax clips.
- Splitting and blending Trax clips.

Exercise:

An image plane is created and reference images are imported into the motion plane. A simple expression is applied to maintain a frame by frame correlation between the timeline and the reference imagery. The character is animated to match the reference footage. This is a very quick way to create very convincing movement with few keyframes. Posing workflow is at the heart of this exercise. The animation is then converted to, and edited with, Trax Clips.

Rigid Skinning

Rigid Skinning is the skinning method employed originally with Maya. This method creates a skin cluster that by default belongs to only one joint and follows this joint based on its weighting. This is a very fast and efficient skinning method that lends itself to many applications where distributed skin influences are not required. Flexors are employed as secondary skin deformers that help the skin deform at joints and bones more realistically.

Concepts covered:

- Binding skin directly and indirectly
- Editing membership
- Creating a skinning partition and character set organization
- Painting weights with Artisan

Exercise:

A skinning partition is created and sets of the character skinning elements are put into this partition using the Relationship Editor. These elements are used to then skin the character. This method enables a very complex character made of direct and indirect skinning groups to be bound and unbound with little headache. Membership and weighting are then applied to the skinned character to fine tune deformation.

Flexors

Flexors are deformers that are specifically designed for use as joint driven skin modifiers. Flexors come in flavors that follow the basic deformers in Maya. Lattice, Sculpt, and cluster flexors can be applied to a joint to aid in the deformation of the bound skin creating bulging, creasing and smoothing.

Concepts covered:

- Lattice flexors for muscle bulge, joint crease and clothing control
- Sculpt flexors for creating under skin structure

Cluster flexors for creasing smoothness
Flexor attributes
Set Driven Keyed flexor components

Exercise:

These exercises apply flexors to various parts of the character exploring the options and strategies for making more convincing skin movement during animation. Set Driven Key is employed when flexor attributes are not provided with the joint flexor nodes.

Facial Animation

Facial animation is explored in these sections. Facial setup as well as strategies for combining blendshape deformation onto joint driven skin are discussed. Target based facial poses, as used in the Alias Wavefront production of Bingo, is employed. Methods for building these targets as well as other facial animation techniques are explored. Trax is used to produce a palette of facial poses for easy facial animation.

Concepts covered:

BlendShape deformation
Deformation order
Lip sync animation
Wire deformer
Multi surface blendshape targets
Creating Trax Poses.

Exercise:

Blendshape deformation is applied with imported targets. A new target is created and posed then added to the existing blendshape. Lip sync animation is created based on imported sound files using basic keyframe animation and the Trax Editor.

Part 1. Attaching character limbs

The end of the class is dedicated to pulling character elements together. Merging new character components into existing character animation is an important part of the production process.

Concepts covered:

Point and orient constraining joints
Geometry substitution
Transferring skin point membership

Exercise:

In this section the character's head is replaced with a new head simulating the process of updating a character or providing a closeup hero head.

Part 2. Appendix discussion

The Character Animation in Maya class also contains an appendix section that is populated with odds and ends of different techniques for solving typical character related problems. As time permits these sections can be used as the basis for discussion or exploration based on student interest.

Concepts covered:

Clothing animation with wire deformers
Foot setups
Secondary Motion techniques
Additional facial setup techniques

Exercise:

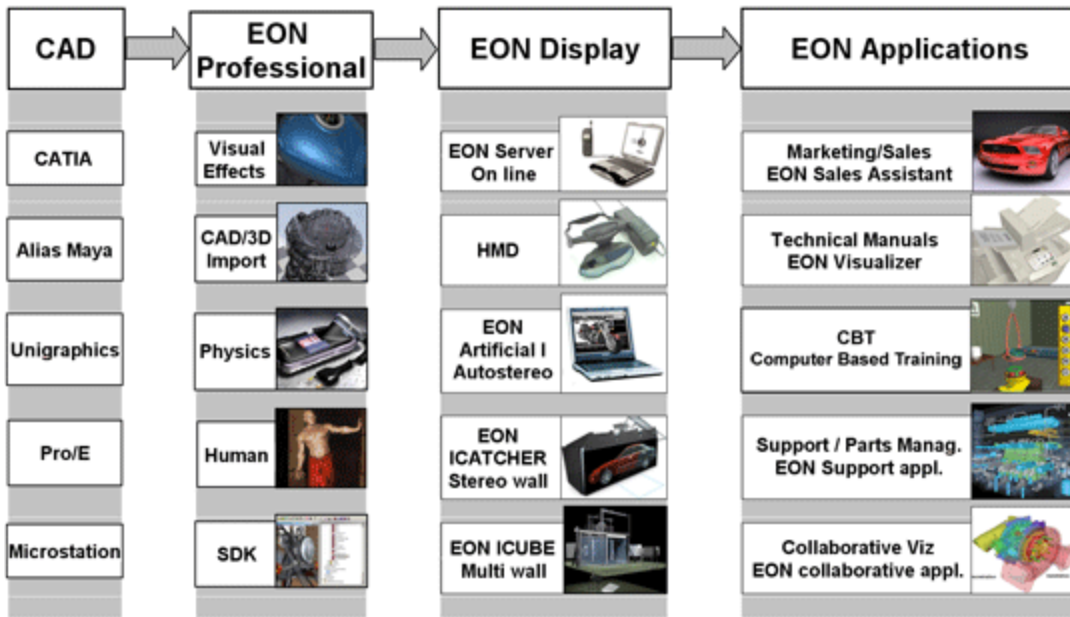
The appendix contains several step by step setup and animation techniques. A tongue with splineIK, eyelids using clusters with offset pivots, reverse foot and a simple foot are just a few examples.

Foundation

What is EON Software?

EON is a family of products for creating and publishing interactive software content based on 3D rich media. The EON product suite brings the power and versatility of advanced, high-end simulation technology to the PC platform and the Internet.

Learn about the Process of Creating EON content.



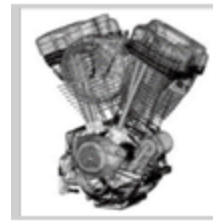
Click on the products below that you are interested in learning more about. View demos and examples of product solutions by clicking on examples below.

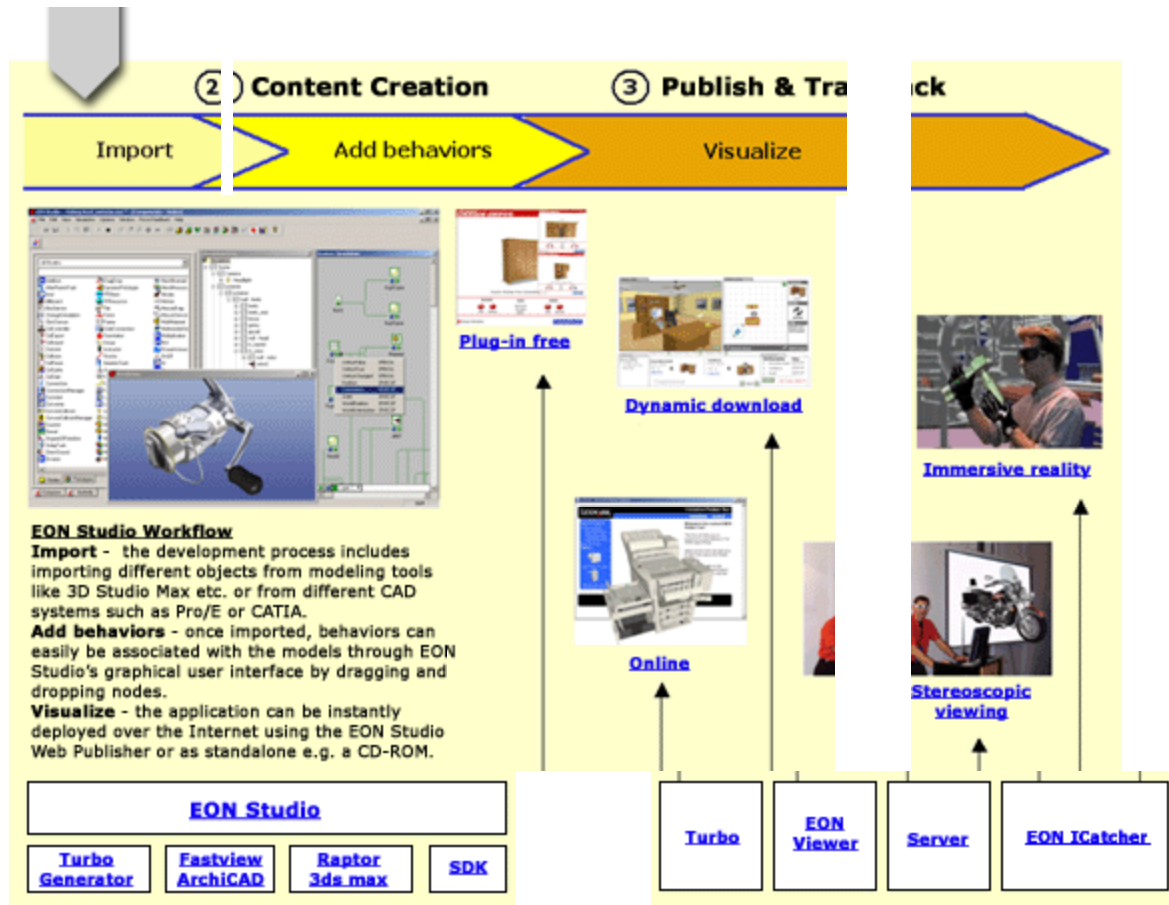


① Data Capture

3D models can be created with wide range of tools. The most common way is 3D modelling softwares like 3D Studio Max or CAD systems such as CATIA or Pro/E.

Other solutions for creating models are laser scanning or image based solutions using images taken from different angles processed to create a true 3D model.





EON's Unique Advantages

- **GUI based web publisher** that makes it easier to embed EON simulations with rich communication to web pages.
- **High rendering quality** - we can today offer a superb visual quality, by using technology developed by ourselves such as environment mapping, shading, reflections, shadows, etc.
- **Dynamic Loading** of any EON content over the web minimizing wait time for download as well as structuring large object databases for web-delivery (**EON Server**).
- **Easy to integrate** with other standard software, like multimedia tools, development tools, web browsers, etc. as EON is based on Microsoft COM standard .
- **Cluster visualization (multi-channel)** support for Concave Reality System.
- **Supports** a great number of **import formats (see list below)**.
- **User interactivity** EON includes many different ways to describe logic in a simulation - visual programming, or scripting (J-script or VB-script) or C++ development (**EON SDK**).
- Support for **advanced display and user interaction** with **Concave Reality System™**, **Immersive Reality System™** and **Desktop Reality System™**.
- **Multi-user** server based support.
- Functionality and parts of simulations can easily be **reused to significantly speed up the development process** by the use of EON Prototypes.
- Built-in **pre-treatment of 3-D data**, to reach highest possible performance with a limited computer capacity.
- **Scalability** - from Web distribution to multi-channel stereo.

- **Progressive picture quality improvements** when the scene is immobile using anti-aliasing and other techniques.
- Free **ActiveX** control for distribution of content on the Internet.
- Component based and compact **web player**.
- Highly compressed file-format with support for **Subdivision surfaces**.
- Built in **support for OpenGL** (software and hardware) **and Direct 3D**.
- **EONXtra** with Lingo support for use of EON content with Macromedia Director and Shockwave.
- Support for **advanced assembly features**.
- **Rich training focused features** such as instructor node.
- **Event-driven** simulation engine
- **Alpha blending** (opaque) textures and surfaces
- **Full-screen** mode
- **Multiple viewports** with user-definable configurations supports symmetrical, asymmetrical and orthographic viewports
- **Panorama** backdrop image
- **Text** output
- **Levels-of-detail** support
- **Synthesized speech and speech recognition** (command and control) Microsoft Agent and Game Commander

EON currently has import filters for the following formats

VRML 2.0 (including support for key-frame import)
3D Studio (.3ds)
Lightwave (.lw)
OpenFlight (.flt)
Alias Triangle (.tri)
DXF ASCII/Binary (.dxf)
IGES v5.3 (.igs, .iges)
Pro/Engineer .SLP (.slp)
SoftImage (.hrc, .dsc)
Stereo Lithography .STL (.stl)
TrueSpace (.cob, .scn)
USGS DEM (.dem)
WaveFront (.obj)