



Intro to 3D Animation Using Blender

Class Instructor: Anthony Weathersby

Class Objectives

- A primer in the areas of 3D modeling and materials
- An introduction to Blender and Blender's toolset

Course Introduction

- Students will become familiar with 3D space and navigating a 3D-oriented program
- Students will understand the animation pipeline - core concepts of modeling, animation, rendering and materials in Blender

What is Blender?

- Free open-source program, that is powerful with a lot of options and flexibility
- Used by a lot of indie commercials and film companies - widely international, especially outside of United States
- Available at blender.org, which also hosts communities, tutorials, samples and other resources for Blender

Lesson 1 - Modeling and Materials

Objectives

- Introduction to Blender and showing what you can achieve using Blender
- Learn how to navigate Blender enough to take an object and manipulate it to model a 3D object (television set)

Moving Around in Blender

When you first open Blender, you will see several different panels.

- 3D View - the main panel in the center where most work is done
- Outliner - upper right panel, an outline of the different objects in the 3D View
- Properties - lower right panel
- Timeline - bottom panel, similar to a sequence in video editing, a timeline of your animation

Each panel can be changed to show something else by clicking on the drop-down menu on upper left of the panel.

In the 3D View panel), you will see several objects:

- Cube Mesh - a basic beginning shape
- Three arrows (blue, green and red) on the object showing directional controls
- Three arrows (blue, green and red) in the bottom left of the panel showing you the direction of the X, Y, and Z axis; notice how the positions of the axes change as you move around in 3D space
- Camera - a wireframe pyramid shape
- Light - a light source for the scene, a dot surrounded by two dotted circle lines on a stick

Changing Views in the 3D View Panel

- Panning view (hold down middle mouse button or scroll wheel)
- Shifting the entire screen (hold down shift and middle mouse button)
- Zooming (up and down on the mouse scroll wheel)
- Using NUMPAD shortcuts to reset the view to predefined viewpoints
 - NUMPAD 1 - Front
 - NUMPAD 3 - Left side
 - Ctrl+NUMPAD 3 - Right side
 - NUMPAD 7 - Top
 - Ctrl+NUMPAD 7 - Bottom
 - NUMPAD 0 - Camera view (what the camera sees)
 - NUMPAD 5 - toggles between orthographic and perspective views
 - Orthographic - objects remain the same size independent of their distance, making it easier to draw and judge proportions
 - Perspective - view with perspective, similar to how we actually see objects, farther objects appear smaller

Changing Modes

In the bottom left of the 3D View panel is a drop-down menu to change modes.

- Object Mode - the basic view
- Edit Mode - to be used to edit an object

- Pose Mode - to be used in animation

Methods to Display Objects

Next to the mode menu is another drop-down menu that can change the way objects are displayed.

- Solid
- Wireframe

Selecting Objects

- Right-click to select an object
- Shift-right-click to select multiple objects
- Select or deselect all objects by pressing A

Moving and Transforming Objects

At the bottom of the 3D View panel are the 3D manipulator widgets. Make sure the widgets are in view by pressing the three-pronged blue, green and red icon.

To move an object:

1. Right-click to select the object
2. Select the translate manipulator widget (G)
3. Move your mouse to position the object
4. Left-click to place it or right-click to reset it back to its original position

To move an object along one of the axes:

1. Right-click to select the object
2. Left-click and drag on one of the axis arrows inside the object

To Rotate an object:

1. Right-click to select the object
2. Select the Rotate manipulator widget (R)
3. Left-click and drag along one of the colored axes in the sphere inside the object

To scale an object:

1. Right-click to select the object
2. Press S to select the Scale manipulator
3. Drag the mouse back and forth to change the scale

4. Left-click to set the scale

To scale and object along one of the axes:

1. Right-click to select the object
2. Select the Scale manipulator
3. Left-click along one of the axes and drag to adjust the scale

Undo and Redo

- Cmd-Z to undo an action
- Cmd-Shift-Z to redo

Modeling a 3D Object Based on a 2D Reference Image

In this exercise, we will model a television set based on the O in the Denver Open Media logo.

1. Switch to the Front Ortho view mode by using NUMPAD 1 and 5; the view should be confirmed by the words Front Ortho in the upper left of the 3D View panel
2. From the Finder, drag and drop the DOM color logo.jpg file on to the 3D View panel
3. Switch to Wireframe view
4. Using the red O in the logo as reference, move (G) and scale (S) the object to cover up the red O in the logo
5. Switch to Edit Mode
6. Select Add Loop Cut and Slide tool in the tools menu on the left
7. Add four loop cuts to the inside of the object to match the inside of the O
 - a. To add a loop cut, select the Add Loop Cut and Slide tool in the tool menu on the left
 - b. Hover the mouse over a side or the top or bottom of an object to create either a vertical or horizontal cut (you will see a purple line)
 - c. Left-click
 - d. With the line now yellow, position the cut and left-click again to place the actual cut
 - e. A cut around the entire 3D object is created; you can see this by changing your views (be sure to return to front view before making more cuts)
8. Add four more loop cuts to create four vertices around the corner of the inside of the O
9. Change the selection mode Vertex select; in Edit Mode, you can use the select modes to the right of the 3D manipulator widgets to select a Vertex, Edge or Face of an object
10. Right-click, right-click and drag, and left-click to move the vertices to round out the corners to match the "TV screen" on the O of the reference image
11. Change back to Solid view
12. Change selection mode to Face
13. Shift-right-click to select the nine pieces that comprise the center screen
14. Press NUMPAD 3 to change to side view

15. Change to Wireframe view
16. Press Add: Extrude Region in the tool menu
17. Slide the mouse back and left-click to place the screen back into the body of the TV
18. Change back to Solid view
19. In the Properties panel, click on the wrench icon, click on Add Modifier, and select the Subdivision Surfaces option
 - a. You can round out the corners of the object by adding to the View and Render buttons
 - b. Higher View values may slow down computer performance
20. Select all of the surfaces (A) and Select Shading: Smooth in the tools
21. Switch back to Object mode
22. Select the Material button in the Properties panel
23. Click on the minus button to remove any existing applied materials
24. Click on New
25. Click on the white bar below Diffuse; use the eyedropper to sample red from the DOM logo
26. Make adjustments to the Intensity sliders in Diffuse Specular to change the color's intensity and how light is reflected
27. Switch back to Edit mode
28. Select the nine panels of the TV's screen
29. Click on New in the Material panel
30. Click on the white bar below Diffuse; use the eyedropper to sample the grey from the DOM logo
31. Make adjustments to the Intensity sliders in Diffuse Specular to change the color's intensity and how light is reflected
32. Click on the Assign button in the Material menu
33. Click back to Object mode

Save Your File

1. Select File-Save As
2. Navigate to the Desktop by clicking on the folders in the center area of the screen
3. Give the file a name in the space above
4. Click on the Save As Blender File button in the upper right

Lesson 2 - Animation and Rendering

Bringing Your TV into the Doughboy Sequence

1. Open the Blender master scene from the class assets (filename blender_class_master_scene.blend)
2. Import the TV that you modeled by selecting File-Append and navigating to the file of your modeled TV

3. Select Object and Cube
4. Click on the Link/Append from Library button
5. Select File-Save As and give your file a new name

Objectives

- Animate a prop and character within a scene
- Learn keyframe animation via the interface in Blender for animation
- Learn how to render finished animations

Manipulating the Doughboy

- Right-click on one of the controls on the doughboy (i.e., the green loop around its wrist); notice it changes into Pose Mode
- Press G and move the mouse to manipulate the body part; left-click to reposition the body part
- Press R to rotate the body part

Preparing the Scene

- Hide the cyclorama by selecting it and selecting Object-Hide-Hide Selected
- Scale (S) the TV to the size of the doughboy's head
- While switching between the front and side views, and position the TV in front of doughboy's chest
- Manipulate the hands and arms to make it look like the doughboy is holding the TV
- Parent the TV to the box carry control (bone)
 - Right-click to select the TV
 - Shift-right-click to select the box carry control (the last object you select will be the parent object in the relationship)
 - Select Post-Parent-Set-Bone
 - Select Bone
 - Select the box carry control and move it; notice that the hands and TV move together
- Change the Properties panel to the Dope Sheet

Creating a Basic Animation

1. Move the green playhead to the desired starting frame in the timeline
2. Select all parts of the doughboy (A), insert a keyframe (I), and select LocRotScale; notice that all of the body parts get added to the Dope Sheet, along with keyframes (yellow diamonds)
3. Click on the red record button below the timeline (Automatic keyframe insertion for Objects and Bones)
4. Move the playhead forward in the timeline for the desired length of the animation

5. Move parts of the doughboy (i.e., raise the box carry control); notice that keyframes are automatically added to the parts of the body that you manipulate
6. Skim the playhead in the timeline to see your animation

Adjusting Keyframes

Keyframes can be selected and moved in the Dope Sheet to stretch out or shorten animations.

1. Right-click to select a keyframe
2. Click G and move the mouse to move the keyframe
3. Left-click to reposition the keyframe

Rendering

1. Change to the Properties panel
2. Click on the Render (camera) icon
3. Change the Render Presets to the desired size
4. Under Output, navigate to where you want the file saved
5. Change the File Format to H.264
6. Click on the large Animation button on the top of the Render panel