

X3D Graphics for Web Authors

X3D-Edit Authoring Tool

3 August 2012

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X3D-Edit Motivation

Provide a simple, excellent authoring tool for X3D

Teach X3D to anyone who can author HTML

Unlock all of the great work by Web3D partners

Learn by doing, and help further X3D progress

Teaching Goals

This work presents Extensible 3D (X3D) Graphics, the open, royalty-free, international standard for 3D graphics on the Web

Book and slideset goals include

- Show Web authors experienced with HTML and XML how to build and connect X3D models
- Teach students principles of Web-capable 3D graphics
- Serve as a ready-reference book for X3D experts

Explain broad principles and specific details of X3D for anyone learning how to build 3D models

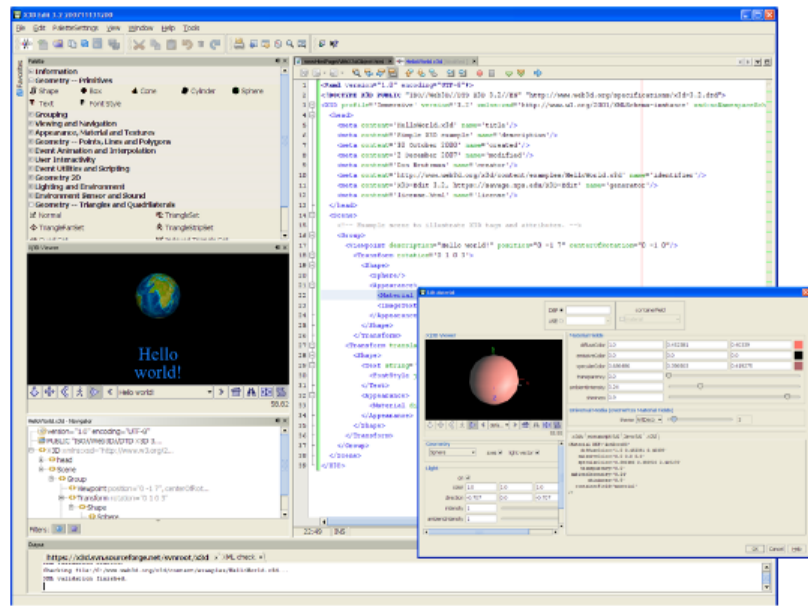


X3D-Edit Authoring Tool for Extensible 3D (X3D) Graphics



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X3D-Edit is an Extensible 3D (X3D) Graphics authoring tool for simple error-free editing, authoring and validation of X3D scenes.



Overview

Download: <https://savage.nps.edu/X3D-Edit>

The X3D-Edit 3.2 Authoring Tool for [Extensible 3D \(X3D\) Graphics](#) supports the creation, checking, display and publication of X3D scenes. It is written in open-source Java and XML using the [Netbeans](#) platform, making it suitable both as a standalone application and as a plugin module for the Netbeans integrated development environment (IDE).

X3D-Edit features include direct editing of X3D scenes using the XML (.x3d) encoding, embedded visualization of scenes using the [Xj3D](#) viewer, XML validation against X3D DTDs and Schemas, drag-and-drop palette for X3D nodes, popup panels for node editing, and extensive help resources. Planned features include ClassicVRML and X3D compressed binary encoding support, encryption and digital-signature authentication using XML Security standards, and additional X3D scene authoring support.

new.html Page/Vtk/X3dObject.html HelloWorld.x3d Modified

```

1 <?xml version="1.0" encoding="UTF-8"?>
2 <!DOCTYPE X3D PUBLIC "ISO//Web3D//DTD X3D 3.2//EN" "http://www.web3d.org/specifications/x3d-3.2.dtd">
3 <X3D profile='Immersive' version='3.2' xmlns:xsd='http://www.w3.org/2001/XMLSchema-instance' xsd:noNamespaceSch
4 <head>
5   <meta content='HelloWorld.x3d' name='title'/>
6   <meta content='Simple X3D example' name='description'/>
7   <meta content='3D October 2000' name='created'/>
8   <meta content='2 December 2007' name='modified'/>
9   <meta content='Don Brutzman' name='creator'/>
10  <meta content='http://www.web3d.org/x3d/content/examples/HelloWorld.x3d' name='identifier'/>
11  <meta content='X3D-Edit 3.2, https://savage.nps.edu/X3D-Edit' name='generator'/>
12  <meta content='license.html' name='license'/>
13 </head>
14 <Scene>
15   <!-- Example scene to illustrate X3D tags and attributes. -->
16 <Group>
17   <Viewpoint description="Hello world!" position="0 -1 7" centerOfRotation="0 -1 0"/>
18   <Transform rotation="0 1 0 3">
19     <Shape>
20       <Sphere/>
21     </Shape>
22     <Material>
23       <ImageTexture/>
24     </Material>
25   </Transform>
26 </Group>
27 <Transform translate="0 0 0">
28   <Shape>
29     <Text string='
30       <FontStyle name='serif' size='24' color='blue'>
31         Hello world!
32       </Text>
33     </Shape>
34   </Transform>
35 </Scene>
36 </X3D>

```

3D Viewer

59.82

HelloWorld.x3d - Navigator

- version="1.0" encoding="UTF-8"
- PUBLIC "ISO//Web3D//DTD X3D 3.2//EN" "http://www.w3.org/2001/XMLSchema-instance" xsd:noNamespaceSchemaLocation="http://www.w3.org/2001/XMLSchema-instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema-instance"
- X3D xmlns:xsd="http://www.w3.org/2001/XMLSchema-instance" xsd:noNamespaceSchemaLocation="http://www.w3.org/2001/XMLSchema-instance"
- head
 - Scene
 - Group
 - Viewpoint position="0 -1 7", centerOfRotation="0 -1 0"
 - Transform rotation="0 1 0 3"
 - Shape
 - Sphere

Filters: [] []

Output

```

https://x3d.svn.sourceforge.net/svnroot/x3d x'XML check x'
Checking file: C:/www.web3d.org/x3d/content/examples/HelloWorld.x3d...
XML validation finished.

```

22:49 INS

Edit Material

DEF: [] containerField: []

USE: [] material: []

Material Fields

diffuseColor	1.0	0.452381	0.40339
emissiveColor	0.0	0.0	0.0
specularColor	0.686486	0.396903	0.419275
transparency	0.0		
ambientIntensity	0.24		
shininess	0.9		

Universal Media (overrides Material Fields)

theme: ArtDeco []

3

Geometry

Sphere [] axes [] light vector []

Light

on []

color: 1.0 1.0 1.0

direction: -0.707 0.0 -0.707

intensity: []

ambientIntensity: []

Material Fields (XML):

```

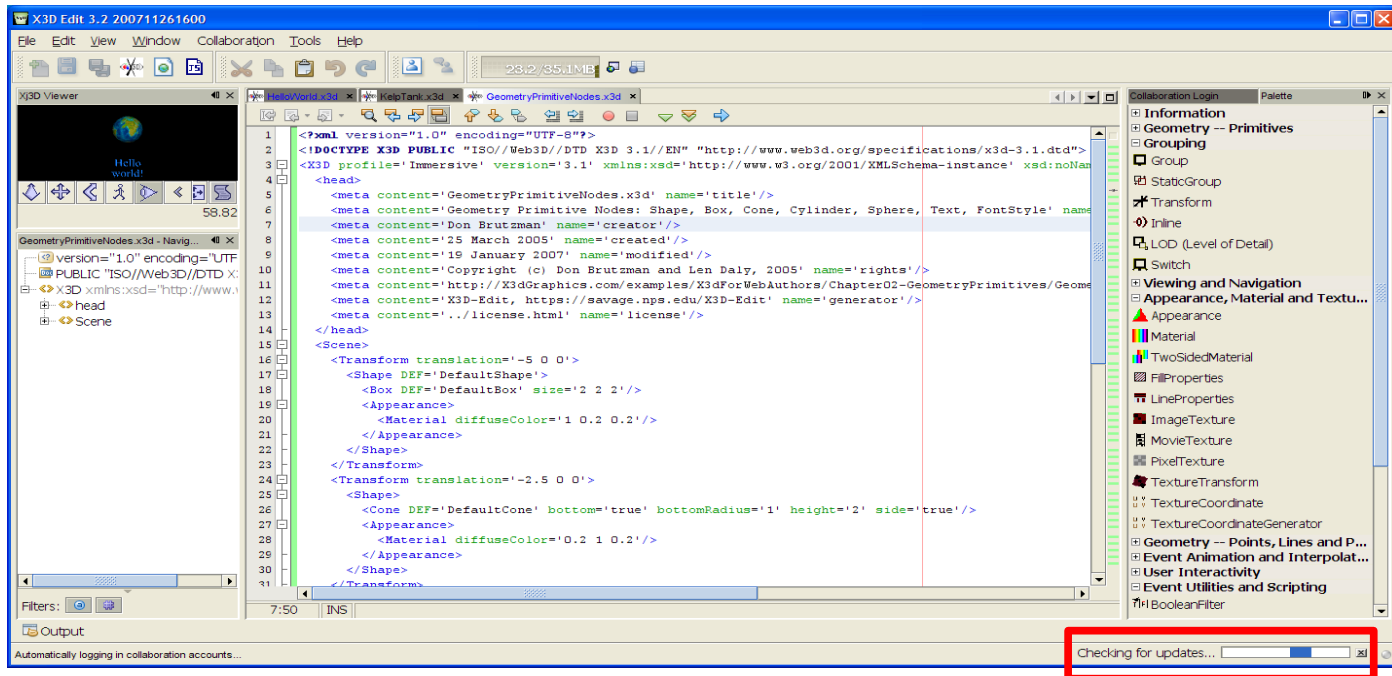
.x3d | ecmscript SAJ | Java SAJ | x3d |
<Material DEF='ArtDeco03'
  diffuseColor='1.0 0.452381 0.40339'
  emissiveColor='0.0 0.0 0.0'
  specularColor='0.686486 0.396903 0.419275'
  transparency='0.0'
  ambientIntensity='0.24'
  shininess='0.9'
  containerField='material'
/>

```

OK Cancel Help

X3D-Edit updates

Icon in lower-left corner of screen indicates when updates are available for automatic installation



Plugin available: click

X3D Showcase DVD



Contents

- Viewers
- Examples
- Content Creation Tools
- Case Studies
- Resources
- Join Web3D Consortium

Features

The **Web3D Consortium** develops royalty-free open standards like Extensible 3D (X3D) Graphics. X3D is used for communicating 3D on the Web between applications, platforms and web services.

Web3D members are delighted to present our *X3D Showcase*, which is a DVD filled with introductory resources. X3D can help you accomplish your real-time 3D graphics challenges.

- **X3D Viewers** for X3D content can display scenes on every major platform, running in your web browser and on mobile devices.
- **Examples** show innovative X3D content from our member developers demonstrating the diverse use of X3D.
- **Content Creation Suite** tools help your initial ideas become interactive 3D content, ready for deployment on the Web.
- **X3D Case Studies** showcase how X3D is used by many different industries for many diverse uses (or try the **online version**).
- **X3D News and Events** provide X3D-related news stories, code samples, tutorials and X3D-based implementations for developers and the X3D user communities (or try the **online version**).
- **On-line X3D Podcasts (2008, 2007)** videos show and tell more about our innovative X3D content developers.
- **Web3D 2009 Symposium** is the 14th International Conference on 3D Web Technology. The **Call for Participation** lists topic areas of interest. It will be held 16-17 June 2009 at Fraunhofer Institute for Computer Graphics, Darmstadt, Germany.
- **X3D for Web Authors** is a textbook by Don Brutzman and Leonard Daly that provides complete detail how X3D works, helping you learn to build your own projects.

The Web3D Consortium thanks the many individuals listed in the **Showcase Credits** and **Contributor Credits**.

Availability: X3D Showcase DVD

Production thanks!

- *Web3D*: Anita Havele
- *University of Sao Paolo*: Mario Nagamura, Marcia Kondo, Marcio Cabral, Olavo Belloc, Marcelo Zuffo
- *Naval Postgraduate School*: Byoungyun Yoo, Jeff Weekley, Don Brutzman

Sourceforge version control
for easy updating

Features

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X3D Examples Archives

X3D for Web Authors 244 models

- Textbook on how to design and build X3D scenes

Basic 653 models

- Diverse scenes illustrating various X3D capabilities

Conformance NIST 732 models

- Strictly defined test examples for correct operation

VRML 2.0 Sourcebook 269 models

- Textbook on VRML97, examples converted to X3D

Savage 1181 models

- Open-source military models and tools



X3D Examples download panel, X3D-Edit

Download Example Archives

X3D for Web Authors Examples
A wide variety of basic examples are provided that show how to design and build X3D scenes. These are explained in the book X3D for Web Authors.

Basic Examples
The Basic Examples archive provide provides numerous scenes illustrating a broad variety of X3D capabilities.

ConformanceNIST Test Suite Examples
The ConformanceNIST Test Suite Examples were authored by National Institute of Standards and Technology (NIST) to provide a complete test set for the Virtual Reality Modeling Language (VRML97). They were automatically converted into X3D and provide approximate coverage for the X3D Immersive Profile.

VRML 2.0 Sourcebook X3D Examples
The VRML 2.0 Sourcebook is an outstanding textbook covering the Virtual Reality Modeling Language (VRML) 97. These were the first examples converted into X3D.

Savage X3D Examples
NPS Scenario Authoring and Visualization for Advanced Graphical Environments (SAVAGE) library is an open-source set of X3D models and prototype tools used for defense simulation.

Local download directory: ... C:\



Contents Search

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 - Creating and Managing Collaboration Accounts
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Using the IDE Help System

[See Also](#)

Click any entry in the Contents tab to view the topic in the right pane of the Help viewer.

Searching the Online Help

To perform a full-text search of all IDE help topics, click the Search tab and type a keyword in the Find text box.

Using the Index

Click any entry in the Index tab to view the topic. To search the index, enter a term in the search field and press Enter. Press Enter multiple times to cycle through all occurrences of the term in the index.

Getting Help for IDE Dialogs and Windows

Press F1 in any part of the IDE to open a help topic that is specific to the task you are doing or where you are in the IDE.

Tutorials and Additional Documentation

For general information about the IDE, see the Getting Started section of the online help. Tutorials and other documentation can be found in the Help menu.

See Also

- [Help Viewer Shortcuts](#)
- [Displaying Help in a Web Browser](#)

[Legal Notices](#)

X3D-Edit Help

Viewing alternatives for X3D

Default built-in viewer is open-source Xj3D

- High performance, implemented using Java OpenGL

Can launch current scene into web browser

- Displays using any of your installed plugins
- “Launch all viewers” simplifies comparison testing

Can also launch into standalone applications

- Configuration panel simplifies download, install

Tool support for X3D components

navigation

- Main Page
- Web3D News
- Upcoming X3D events
- X3D Specifications
- Recent changes
- Random page
- Help
- Join the Consortium

search

toolbox

- What links here
- Related changes
- Upload file
- Special pages
- Printable version
- Permanent link

page discussion edit history delete move protect unwatch

Tool support for X3D components

The [Extensible 3D \(X3D\) Graphics](#) standard has many capabilities. [X3D components](#) are modular collections of nodes that make it easier for software to gradually implement the full range of X3D capabilities.

Authors can also indicate what components are needed in an X3D scene in order to ensure that proper support is provided at run time.

This table records support for the official X3D components by each of the various [X3D authoring tools](#) and [X3D conversion tools](#). It is maintained by the [X3D Working Group](#) and member companies in the [Web3D Consortium](#)

The [X3D Resources](#) page provides lots of additional information about X3D. Please [Contact Web3D](#) if you want to learn more or report an update.

Related pages: [Plug-in and browser compliance](#), [Player support for X3D components](#), [X3D Resources: Authoring Software](#), [X3D Implementations](#), and [X3D Plugfest](#).

Table key

- **yes** all nodes, all fields supported for all levels of this component (though some bugs may be present)
- **partial** some nodes and fields supported
- **level #** which component level number (1-4) is supported (found at end of each component specification)
- **no** no support provided
- **?** unknown, need status report

Types	Authoring tools					Conversion tools		
Tools	BS Editor	SwirlX3D Editor	X3D-Edit	Flux Studio	Vivaty Studio	Okino Polytrans	SwirlX3D Translator	Xj3D Filter Chain
Versions	v7.1	v3.0.0	v3.2	v2.1	v1.0 build 900	v5.0	v3.0.0	v2.0
Profiles	nearly Full Profile	TBD	nearly Full Profile	Immersive Profile	Immersive Profile	Immersive Profile	Immersive Profile	nearly Full Profile
X3D Conformance Certification	none	none	Interchange Profile	Interchange Profile	Interchange Profile	none	none	Interchange Profile

File Encodings

XML (.x3d)	yes	yes	yes	yes	yes	yes	yes	yes
ClassicVRML (.x3dv)	yes	yes	yes	yes	yes	yes	yes	yes
Compressed Binary Encoding (.x3db)	yes	no	yes	no	no	no	no	yes
VRML 97 (v2.0) (.wrl)	?	?	yes	yes	yes	yes	?	yes
VRML 1 (v1.0) (.wrl)	?	?	no	partial	partial	yes	?	no

X3D component list

CAD geometry	yes	yes	yes	no	no	yes	yes	yes
Core	yes	yes	yes	yes	yes	yes	yes	yes
Cube map environmental texturing	yes	no	partial	partial	partial	no	no	no
Distributed interactive simulation (DIS)	no	no	yes	no	no	no	no	yes
Environmental effects	yes	yes	yes	yes	yes	yes	yes	yes
Environmental sensor	yes	yes	yes	yes	yes	no	yes	yes

Right-click to launch external players

The screenshot displays the X3D Editor 3.2 interface. The main window shows an XML file named `PixelTextureInterpolator.js` with the following content:

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE X3D PUBLIC "ISO//Web3D//DTD X3D 3.1//EN" "http://www.web3d.org/ISO9593/2002/ISO15731-2002-11-1.dtd" [ ]>
<X3D profile='Immersive' version='3.1' xmlns:xsd='http://www.w3.org/2001/XMLSchema-instance'>
  <head>
    <meta content='PixelTextureInterpolatorPrototype.x3d' name='title' />
    <meta content='Using a CoordinateInterpolator to modify a PixelTexture' name='description' />
    <meta content='Don Brutzman' name='creator' />
    <meta content='14 April 2008' name='created' />
    <meta content='5 May 2008' name='modified' />
    <meta content='under development' name='warning' />
  </head>
  <scene>
    <!-- ... -->
  </scene>
</X3D>
```

A right-click context menu is open over the XML code. The menu items are:

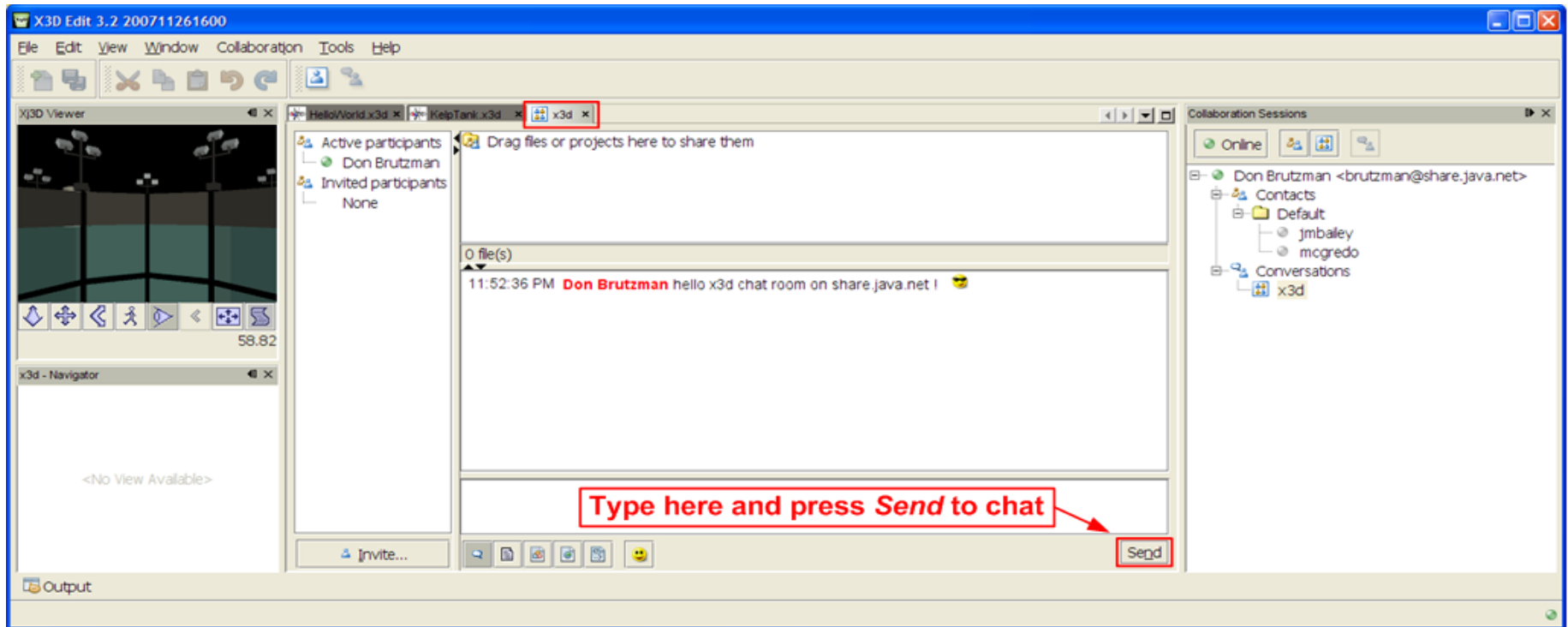
- Refresh Xj3D view
- Reload Xj3D component
- View scene externally in ..** (highlighted with a red box and arrow)
- Select element under cursor
- Edit element under cursor
- Delete element under cursor
- Rename element under cursor
- Split empty element under cursor
- Check source for ROUTE errors, etc.
- Format (Alt+Shift-F)
- View
- Check XML (Alt-F9)
- Validate XML (Alt+Shift-F9)
- XSL Transformation...
- Cut (Ctrl-X)
- Copy (Ctrl-C)
- Paste (Ctrl-V)
- Tools
- Select in

The **View scene externally in ..** sub-menu is also highlighted with a red box and contains the following options:

- Web browser
- Contact viewer
- Flux viewer
- Instant Reality viewer
- Octaga viewer
- Xj3d viewer
- Other viewer (see Tools, Options, Miscellaneous, X3D-Edit)

The interface also shows a Favorites panel on the left with a tree view of project folders, an Xj3D Viewer window displaying a 3D scene, and a Palette on the right with various tool categories.

X3D-Edit collaboration chat



XMPP JID for the chat channel is <xmpp://x3d@muc.share.java.net>
Subscription directions are provided on the installation page

Version control support included

The screenshot displays the X3D Editor 3.2 interface. The 'File' menu is open, and the 'Subversion' option is highlighted. A sub-menu is visible, with 'Commit...' selected. The main editor window shows the XML code for a 'PixelTextureInterpolator' prototype. The 3D viewer shows a colorful cube. The 'Favorites' panel on the left lists various chapters, and the 'Navigator' panel at the bottom shows the current document structure.

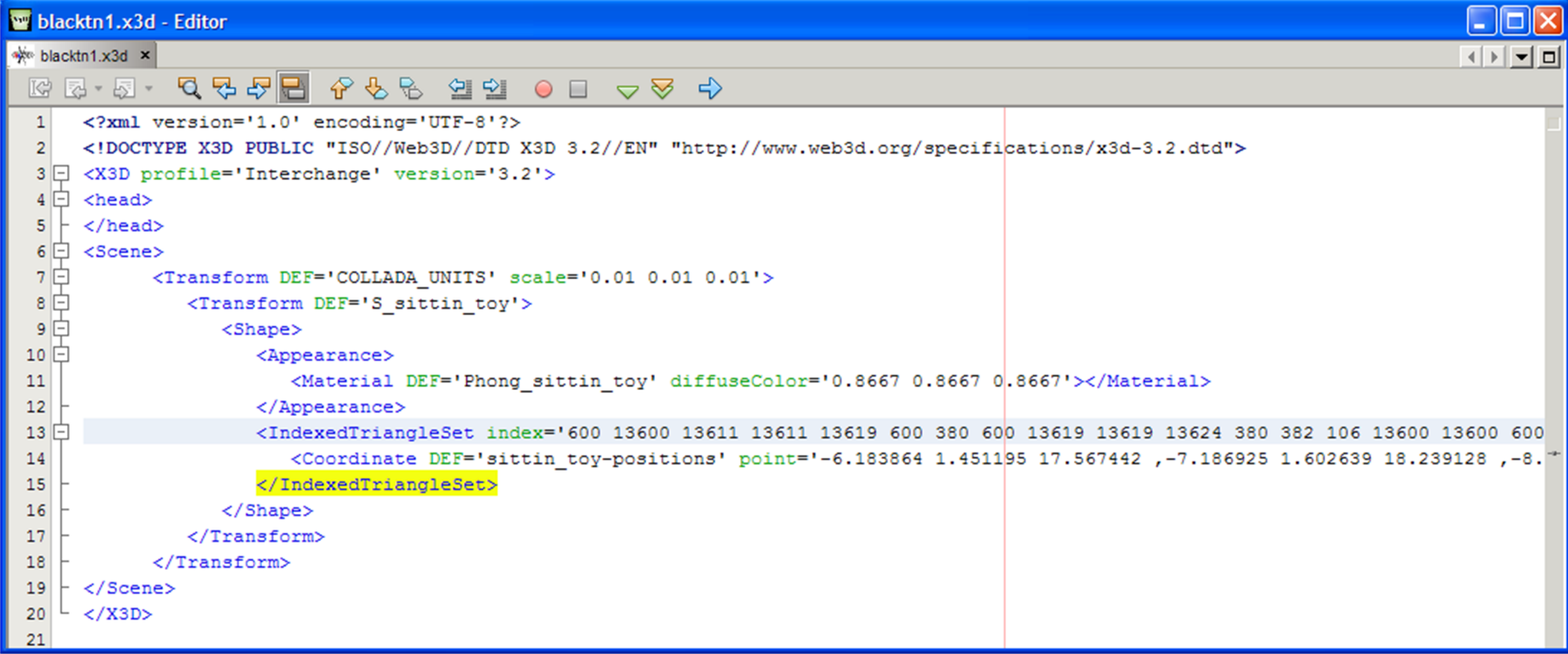
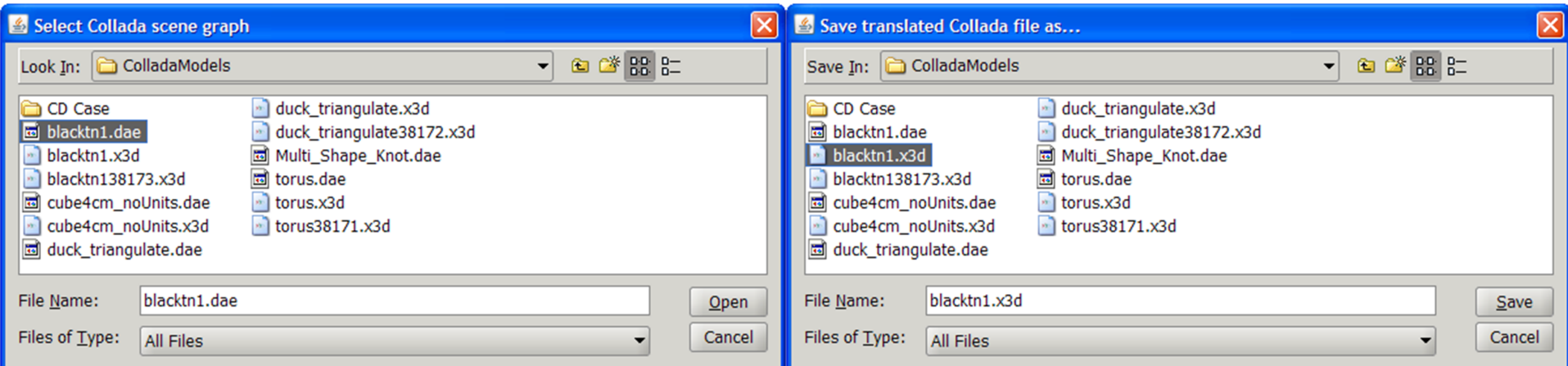
```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<!DOCTYPE X3D PUBLIC "-//Web3D//DTD X3D 3.1.dtd" "http://www.w3.org/2001/XMLSchema-instance" xsd:schemaLocation="http://www.w3.org/2001/XMLSchema-instance http://www.w3.org/2001/XMLSchema-instance" xsd:base="http://www.w3.org/2001/XMLSchema-instance" />
<X3D profile='ImmersiveInteractiveAuthoring' version='3.1' />
<head>
  <meta content='Title' name='title' />
  <meta content='a PixelTexture as an image morph' name='description' />
  <meta content='2D image PixelTexture morph' name='image' />
  <meta content='https://savage.nps.edu/Savage/Tools/TextureInterpolation/TextureInterpolation.html' name='url' />
  <meta content='X3D-Edit, https://savage.nps.edu/X3D-Edit/' name='license' />
  <meta content='../license.html' name='license' />
</head>
<Scene>
  <ProtoDeclare name='PixelTextureInterpolator'>
    <ProtoInterface>
      <field accessType='inputOnly' name='set' />
      <field accessType='initializeOnly' name='key' type='MFString' />
      <field accessType='initializeOnly' name='keyValue' type='MFNode' />
      <field accessType='initializeOnly' name='value_changed' type='SFImage' />
      <field accessType='initializeOnly' name='traceEnabled' type='SFBool' />
    </ProtoInterface>
    <ProtoBody>
      <!-- First node determines node type of image -->
      <Script DEF='ImageInterpolatorScript' class='ImageInterpolatorScript' />
      <field accessType='inputOnly' name='set' />
      <field accessType='initializeOnly' name='key' type='MFString' />
      <field accessType='initializeOnly' name='keyValue' type='MFNode' />
      <!-- initialization nodes (if any) go here -->
    </ProtoBody>
  </ProtoDeclare>
  <Shape>
    <ImageInterpolatorScript />
  </Shape>
</Scene>
</X3D>
```

Collada .dae editing support

The screenshot displays the X3D-Edit 3.2 interface. On the left, a 3D viewport shows a white teddy bear model. A red arrow points from the 'Import as X3D' menu item to the 'Import Collada digital asset exchange (.dae) model...' option. Below the viewport is a hierarchical tree view of the scene's structure, including assets, materials, effects, and geometries. The main window shows the XML code for the scene, which is a Collada DAE file. The code defines a scene with a single geometry named 'sittin_toy' and a mesh with vertices and triangles. The XML is as follows:

```
xml version="1.0" encoding="utf-8"?>
<COLLADA xmlns="http://www.collada.org/2005/11/COLLADASchema" version="1.4.1">
  <asset>
    <created>2008-01-14T16:34:46Z</created>
    <modified>2008-01-14T16:34:46Z</modified>
    <unit meter="0.01" name="centimeters" />
  </asset>
  <library_materials>
    <material id="PMat_sittin_toy">
      <instance_effect url="#Phong_sittin_toy"/>
    </material>
  </library_materials>
  <library_effects>
    <effect id="Phong_sittin_toy">
      <profile_COMMON>
        <technique sid="phong1">
          <phong>
            <emission><color>0 0 0 1.0</color></emission>
            <ambient><color>0 0 0 1.0</color></ambient>
            <diffuse><color>0.8667 0.8667 0.8667 1.0</color></diffuse>
            <specular><color>0 0 0 1.0</color></specular>
            <transparency><float>1.0</float></transparency>
          </phong>
        </technique>
      </profile_COMMON>
    </effect>
  </library_effects>
  <library_geometries>
    <geometry id="sittin_toy" name="sittin_toy">
      <mesh>
        <source id="sittin_toy-positions">
          <float_array id="sittin_toy-positions-array" count="42660">-6.183864 1.451195 17.567442 -7.186925 1.602639 18.239128 -8.380196 1.602639 18.176849 -9.307
        </float_array>
        <technique_common>
          <accessor source="sittin_toy-positions-array" count="14220" stride="3">
            <param name="X" type="float"></param>
            <param name="Y" type="float"></param>
            <param name="Z" type="float"></param>
          </accessor>
        </technique_common>
      </source>
      <vertices id="sittin_toy-vertices">
        <input semantic="POSITION" source="#sittin_toy-positions"/>
      </vertices>
      <triangles count="28416" material="Mat_sittin_toy">
        <input offset="0" semantic="VERTEX" source="#sittin_toy-vertices"/>
        <p>600 13600 13611 13611 13619 600 380 600 13619 13619 13624 380 382 106 13600 13600 600 382 45 382 600 600 380 45 197 601 13623 13623 13622 19
      </triangles>
    </mesh>
  </geometry>
</library_geometries>
<library_visual_scenes>
  <visual_scene id="DefaultScene">
    <node id="S_sittin_toy">
      <instance_geometry url="#sittin_toy">
        <bind_material>
          <instance_material target="#PMat_sittin_toy", sym...
        </bind_material>
      </instance_geometry>
    </node>
  </visual_scene>
</library_visual_scenes>
<scene id="DefaultScene">
  <instance_visual_scene url="#DefaultScene">
  </instance_visual_scene>
</scene>
</COLLADA>
```


Collada .dae import to X3D



Distributed Interactive Simulation (DIS) Protocol

Long-running IEEE protocol used in military modeling + simulation applications

OpenDIS: open source implementations

- Java, C++
- Also DIS-XML that runs under XMPP jabber chat
- Available at Sourceforge
<http://sourceforge.net/projects/open-dis>

Integrate network test environment into X3D-Edit

- In progress
- Goal: aid development, testing of new protocols

DIS Networking Test Panel

The screenshot displays the X3D-Edit 3.2 interface. On the left, a 3D viewer shows a yellow box in a coordinate system with red (X), green (Z), and blue (Y) axes. The center pane contains XML code for an X3D scene, including metadata and an `EspduTransform` element. On the right, the 'DIS ESPDU Test Panel' is visible, featuring sliders for translation (x, y, z) and rotation (phi, theta, psi). Red circles highlight the x-axis translation slider (set to 0) and the theta rotation slider (set to 0). A red arrow points from the x-axis slider to the 3D viewer, and another points from the theta slider to the 3D viewer. Below the XML code, a red-bordered box contains the following text:

Distributed Interactive Simulation (DIS)
Entity State Protocol Data Unit (ESPDU)
Test Panel

Translation along x-axis by -20m, to left
Rotation about y-axis by +20° counter-clockwise

The bottom of the interface shows a 'BoxTestEspduTransform.x3d - Navigator' pane with a tree view of the scene's structure, including `Scene`, `Viewpoint`, `Background`, `EspduTransform`, `Shape`, and `Transform`.

DIS Networking Player-Recorder Panel

The screenshot displays the X3D-Edit 3.2 application window. The interface is divided into several main sections:

- 3D Viewer:** On the left, a 3D coordinate system with X (red), Y (green), and Z (blue) axes is shown. A yellow rectangular object is positioned in the center of the axes.
- Log Window:** A central window titled "DIS Player-Recorder Window" displays a list of entity states, such as "79 ENTITY_STATE 14.211912687", "80 ENTITY_STATE 14.237453643", and "112 ENTITY_STATE 15.950148133".
- Configuration Panels:** On the right, several panels allow for parameter adjustment:
 - PDU Header:** Fields for prot version (6), exercise ID (0), PDU type (1), prot family (1), time stamp (547), pdu length (144), and padding (0).
 - Entity ID:** Fields for ent id (2), sim site id (0), and sim app id (1).
 - Articulation Parameters:** A field for number (0).
 - Entity Type:** A table with columns: kind, domain, country, category, subcategory, specific, extra. All values are 0.
 - Alternative Entity Type:** A table with the same columns as Entity Type, all values are 0.
 - Entity Linear Velocity:** Fields for x, y, and z velocity, all set to 0.0.
 - Entity Location:** Fields for x, y, and z location, with x and y at 0.0 and z at -0.0.
 - Entity Orientation:** A table with columns: psi, theta, phi. Values are -2.631084, 3.5735617, and 2.7488935.
 - Dead Reckoning Parameters:** Fields for algorithm (0) and other (0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0).
 - Entity Marking:** Fields for char set (0 string(hex) 00 00 00 00 00 00 00 00 00 00), capabilities (0), entity appearance (0), force id (0), and marshalled size (144).
 - DIS ESPDU Test Panel:** Sliders for Translation (x, y, z) and Rotation (phi, theta, psi) with scale and range indicators. DIS Settings include address (239.1.2.3), port (62040), site ID (0), application ID (1), and entity ID (2).
- Bottom Panel:** Contains playback controls (Begin, Reverse, Record, Pause, Stop, Play, FF, End, Load, Save) and a status bar showing "31.24".

X3D Earth, Geospatial Component

Editing and authoring support provided

The screenshot displays the X3D-Edit 3.2 application interface. The main window shows XML code for an X3D scene. A green box highlights a comment and an inline node in the code:

```
<!-- a simple Inline node is all that is needed for any scene to use X3D Earth assets, for example: -->  
<Inline url='http://x3d-earth.nps.edu/osmdemo.x3d/'/>
```

The interface includes a file explorer on the left, a 3D viewer at the bottom left showing a globe, and a palette on the right for metadata and structure. At the bottom, a Dilbert comic strip is visible.

Humanoid Animation (H-Anim)

ISO standard for human skeletons, skin

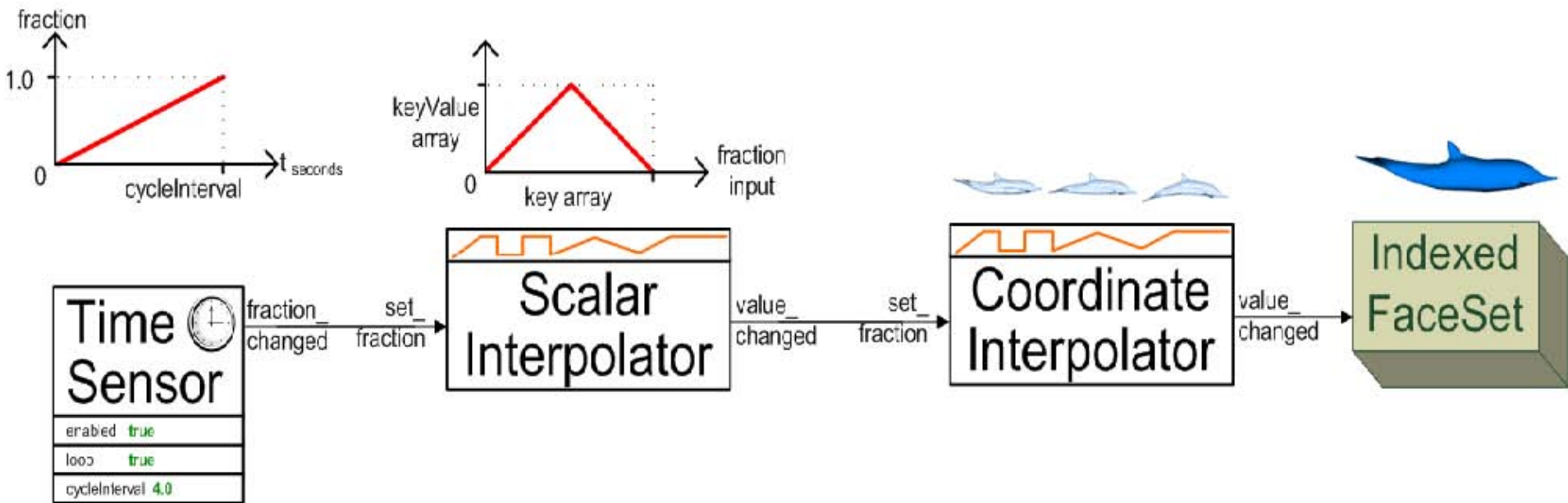
- Supported in X3D-Edit, other tools

Examining support for non-humanoid skeletons

NPS working on composable, reusable behaviors

- From motion capture (Vicon Peak system)?
- From different motion formats?

Tool and example support



Edit CoordinateInterpolator

containerField: children

DEF: MorphInterpolator

USE:

Coordinate lists

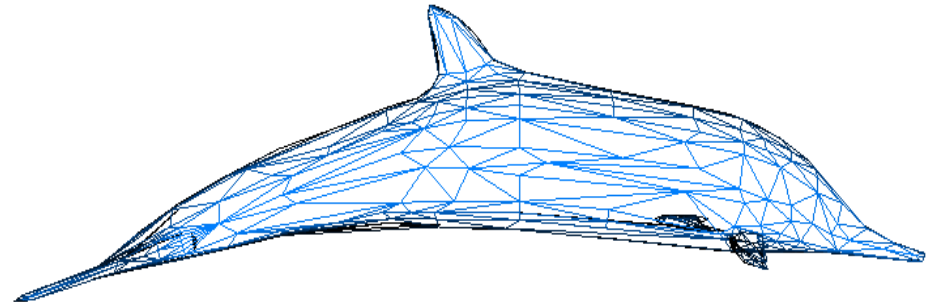
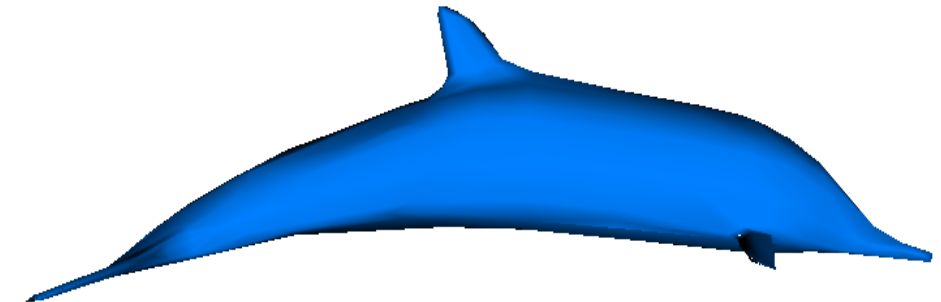
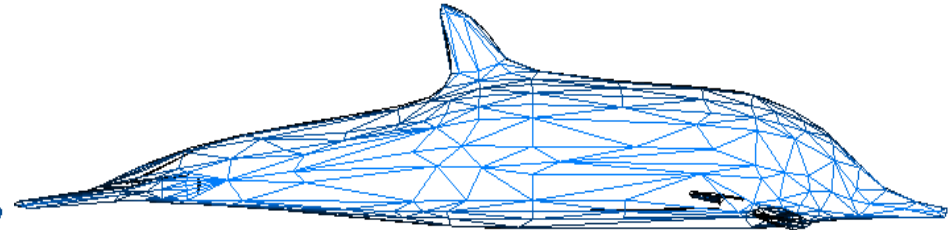
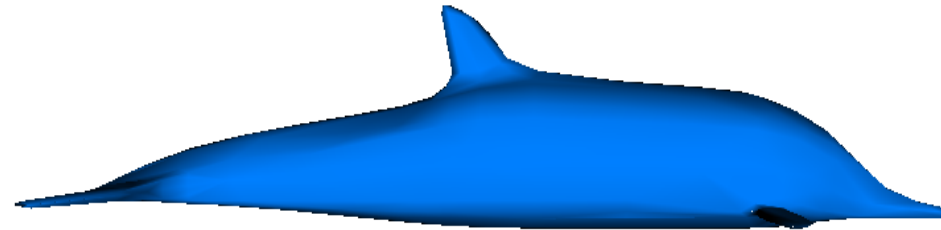
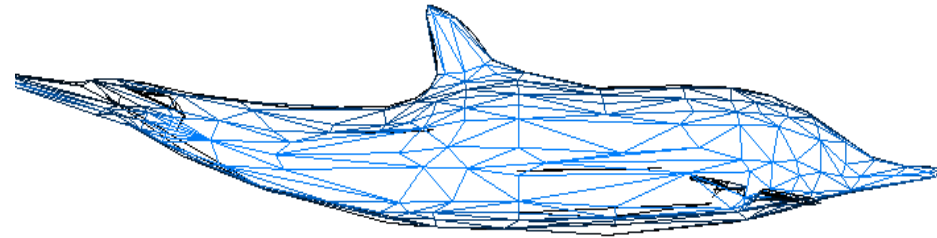
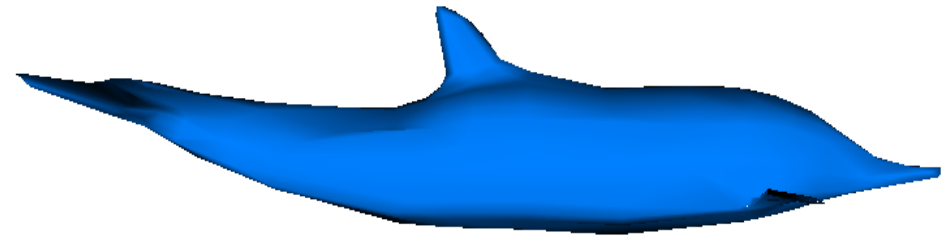
508 coordinate(s) (column triples)

key		0		1		2		3		4		5							
0	0.406	1.049	7.905	0.595	2.957	-10.3...	0.592	2.263	-10.7...	1.246	2.823	5.21	1.352	0.918	5.384	1.336	3.003	-1.028	1.311
0.5	0.406	0.431	7.729	0.595	1.561	-10.4...	0.592	0.769	-10.4...	1.246	2.58	5.322	1.352	0.67	5.216	1.336	3.003	-1.028	1.311
1	0.406	-0.354	7.585	0.595	0.257	-10.3...	0.592	-0.511	-10.1...	1.246	2.012	5.391	1.352	0.121	5.105	1.336	3.003	-1.028	1.311

3 keyed coordinate list(s) (rows)

Creating a morphable dolphin

Chris Lang, Monterey High School



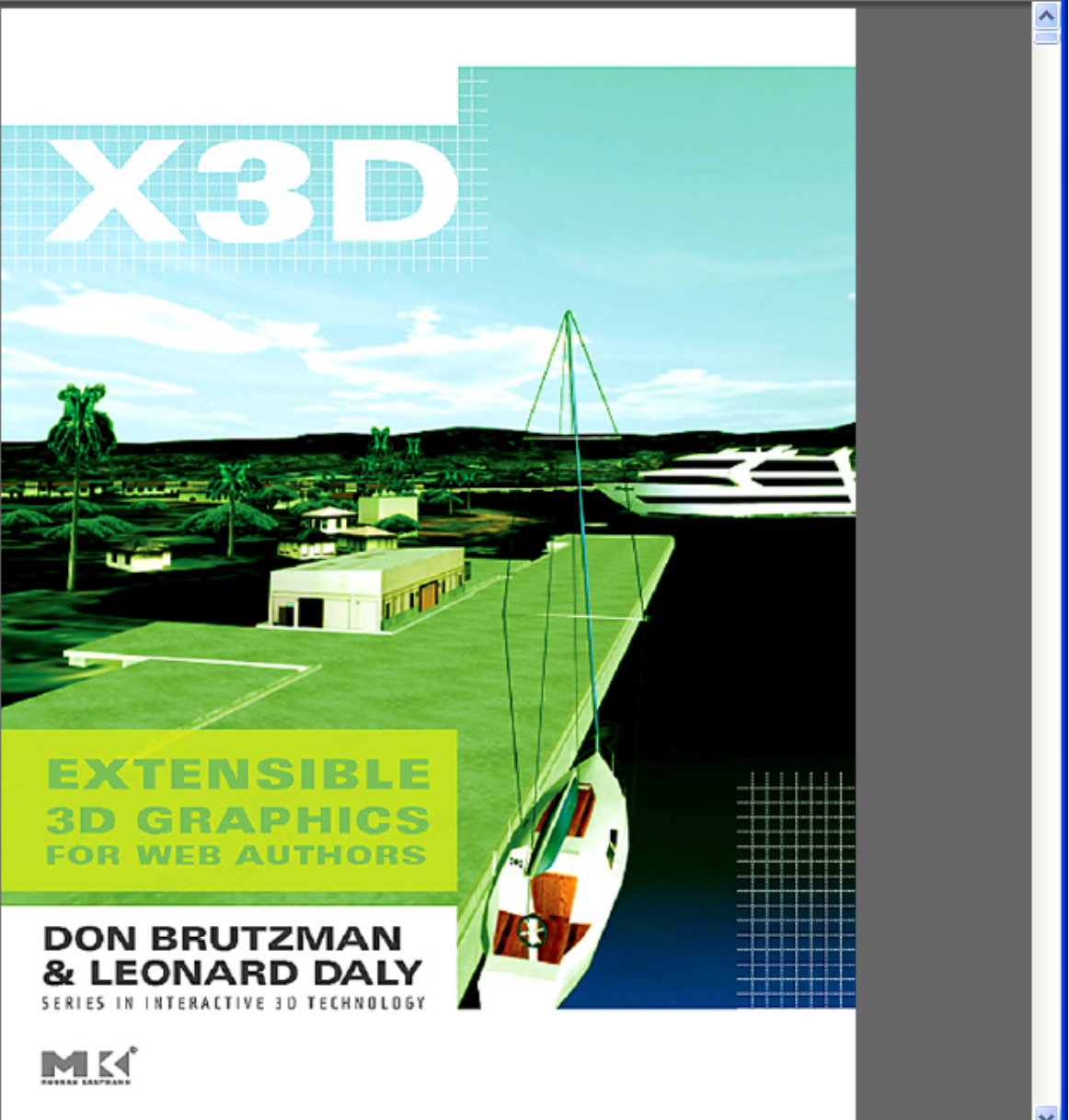
X3D for Web Authors

Textbook, slidesets, examples, videos

<http://x3dGraphics.com>

Bookmarks

- Front Cover
- X3D: Extensible 3D Graphics for Web Authors
- Copyright Page
- Dedication Page
- Contents
- Preface
- Contributor List
- About the Authors
- Chapter 1: Technical Overview
- Chapter 2: Geometry Nodes, Part 1: Primitives
- Chapter 3: Grouping Nodes
- Chapter 4: Viewing and Navigation
- Chapter 5: Appearance, Material, and Textures
- Chapter 6: Geometry Nodes, Part 2: Points, Lines, and Polygons
- Chapter 7: Event Animation and Interpolation
- Chapter 8: User Interactivity Nodes
- Chapter 9: Event Utilities and Scripting
- Chapter 10: Geometry Nodes, Part 3: Geometry2D Nodes





Course Videos: X3D for Web Authors



These video lessons support the textbook [X3D: Extensible 3D Graphics for Web Authors](#), which shows how to build and animate models using X3D.

Primary supporting materials for the book and these video lessons include the [X3D-Edit authoring tool](#), [example scenes](#), and [chapter slidesets](#). Supplementary learning materials include [X3D Resources](#), [X3D Tooltips](#), and [X3D Scene Authoring Hints](#).

These videos were produced as part of two [Naval Postgraduate School \(NPS\) MOVES Institute](#) courses: *Introduction to X3D Graphics* (MV3204) and *Advanced X3D Graphics* (MV4205). The course presenter is book coauthor [Don Brutzman](#).

Chapter	Session	Description	.pdf
Examples			
0	Getting Started	Goals and motivation, installing X3D-Edit authoring tool and example scenes , course introduction	slides
1	Technical Overview 1A	Introduction, historical background, Web3D Consortium , importance of standardization, X3D Specifications and International Organization of Standards (ISO) , intellectual property rights (IPR) and open-source software, interoperability considerations	slides
	Technical Overview 1B	Browsers and players, models versus programming, scene graphs, behaviors and events, profiles and components, document metadata, fields	
	Technical Overview 1C	Importance of consistency, strong data typing, accessType, XML design patterns for X3D, compressed binary encoding, standards liaison organizations	
	Technical Overview 1D	X3D-Edit authoring tool development, functional testing, bug tracking, version control, Netbeans , help system	
2	Geometry Primitives 2A	Shape and geometry nodes, common geometry fields	slides
	Geometry Primitives 2B	Box and Cylinder nodes, X3D Tooltips	
	Geometry Primitives 2C	HelloWorld example, Cone Cylinder and Sphere nodes	
	Geometry Primitives 2D	Text node for flat 2D strings, launching an X3D scene into one or more external players, multiple-field MFString arrays, handling special characters using XML character entities	
	Geometry Primitives 2E	FontStyle node, open-source licenses	
3	Grouping 3A	Grouping node concepts, XML encoding	slides
	Grouping 3B	Inline node, url field	
	Grouping 3C	X3D resources and additional references, Inline node, url fields, level of detail (LOD) node	
	Grouping 3D	Switch node, review grouping node concepts, 3D grid resources	
4	Viewing Navigation 4A	Viewing, navigation, bindable nodes and binding operations example	slides
	Viewing Navigation 4B	Viewpoint node, viewing and navigation	
	Viewing Navigation 4C	NavigationInfo and Anchor nodes, uniform resource locator (url)	
5	Appearance 5A	Material and TwoSidedMaterial nodes, Universal Media materials library	slides
	Appearance 5B	Textures and ImageTexture node, texture coordinates, image copying and flipping to produce a continuously repeating texture, file formats	
	Appearance 5C	MovieTexture and PixelTexture nodes, LineProperties and FillProperties nodes	
	Appearance 5D	PixelTexture node, SFImage data type, PixelTexture image-import tool	
	Appearance 5E	More on PixelTexture node. MovieTexture node	

CGEMS

Computer Graphics Educational Material Source

- SIGGRAPH Education Committee
- Archives for teaching and learning 3D
- <http://cgems.inesc.pt>



Jury award, best submission 2008

- Book, course notes, X3D-Edit tool, examples

Online learning resource: course video podcasts!

Summary

X3D-Edit is useful for learning, producing, improving and extending X3D scenes

Many great resources are available for learning and using X3D

These community capabilities are good for business, educators, individuals

We welcome your active participation in Web3D Consortium

Contact

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http://faculty.nps.edu/brutzman


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Disclaimer

Your fair dealing and other rights are in no way affected by the above.

Open-source license for X3D-Edit software and X3D example scenes

<http://www.web3d.org/x3d/content/examples/license.html>

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X3D Graphics for Web Authors

X3D-Edit Authoring Tool

3 August 2012

Don Brutzman

Naval Postgraduate School (NPS)

brutzman@nps.edu



X3D-Edit Motivation

Provide a simple, excellent authoring tool for X3D

Teach X3D to anyone who can author HTML

Unlock all of the great work by Web3D partners

Learn by doing, and help further X3D progress



Teaching Goals

This work presents Extensible 3D (X3D) Graphics, the open, royalty-free, international standard for 3D graphics on the Web

Book and slideset goals include

- Show Web authors experienced with HTML and XML how to build and connect X3D models
- Teach students principles of Web-capable 3D graphics
- Serve as a ready-reference book for X3D experts

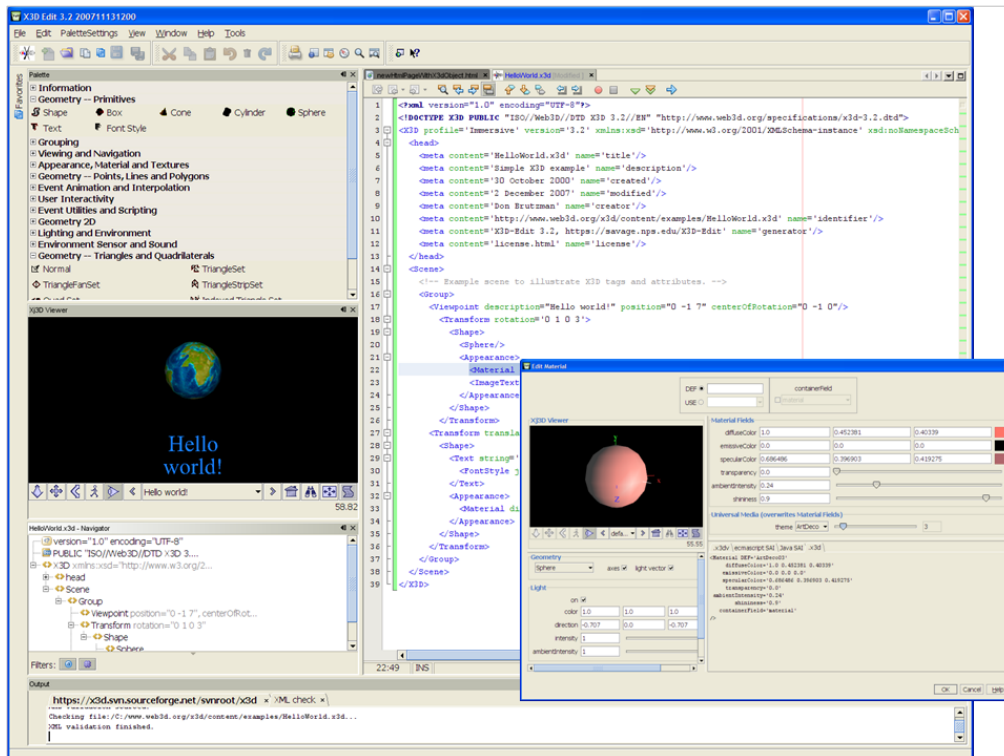
Explain broad principles and specific details of X3D for anyone learning how to build 3D models



Excerpted and adapted from Chapter 1, *X3D Graphics for Web Authors*
<http://x3dGraphics.com>



X3D-Edit home page is online at <https://savage.nps.edu/X3D-Edit>

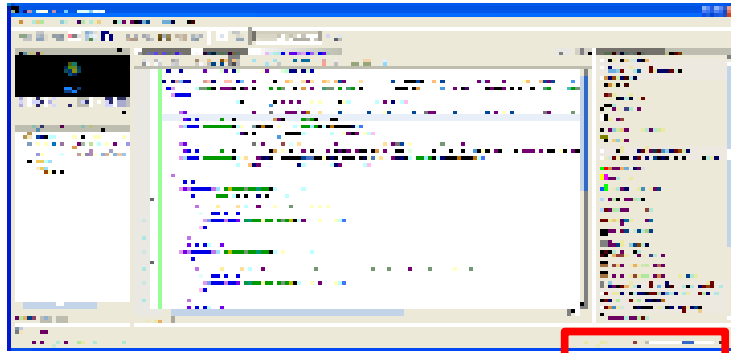


- As the name implies, X3D-Edit is primarily oriented towards editing X3D text. Additional features include:
- Pop-up editors for each node
 - Palette for dragging/dropping new nodes
 - Xj3D scene visualization
 - XML tree view
 - Automatic code completion and element matching
 - Validation and error checking
 - Help system including multilingual tooltips, X3D specifications, examples help and X3D Scene Authoring Hints
 - Automatic updates

<https://savage.nps.edu/X3D-Edit>

X3D-Edit updates

Icon in lower-left corner of screen indicates when updates are available for automatic installation

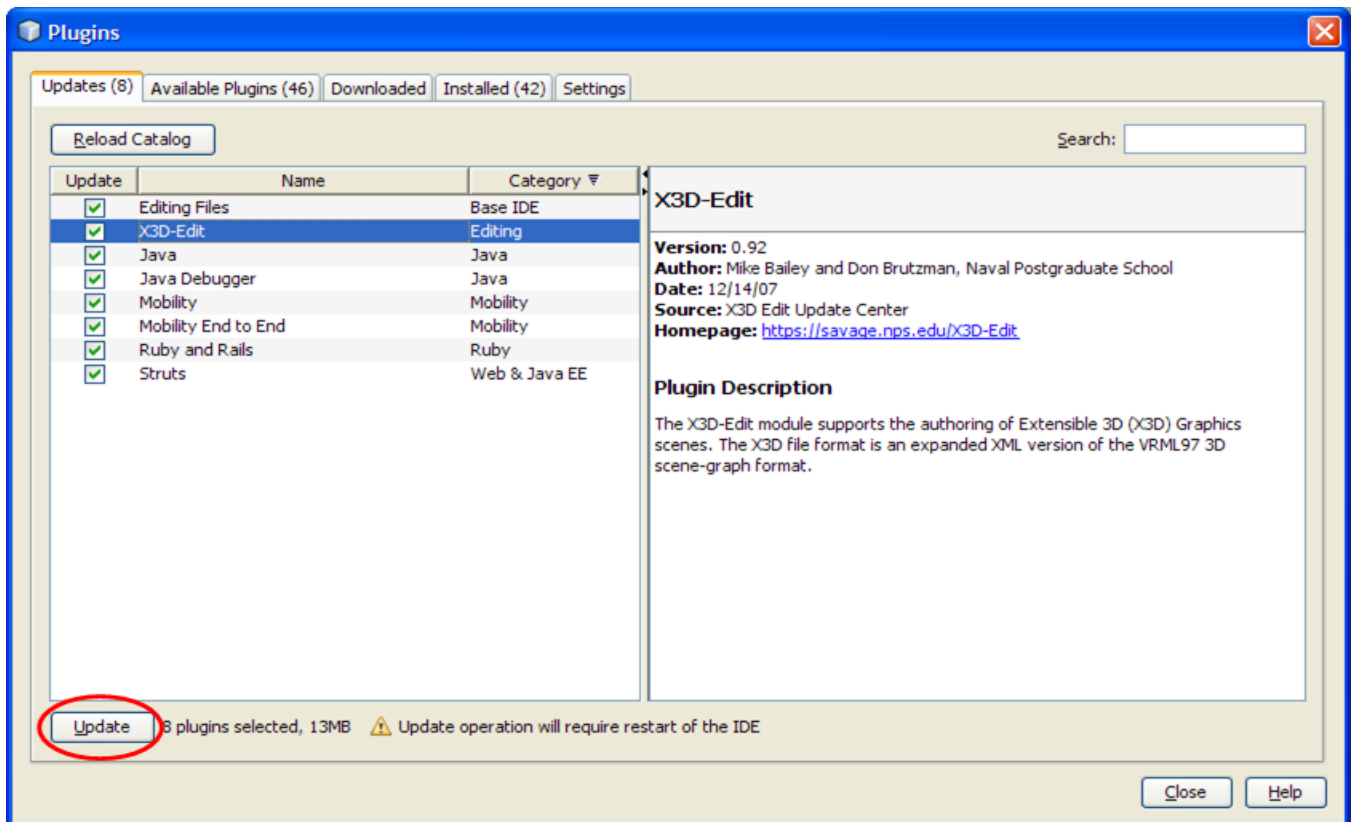


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Plugin available: click



It is also possible to manually trigger an X3D-Edit update, if one is available.
From top menu, select *Tools > Plugins > Updates* and then click the Update button.



X3D Showcase DVD



Contents

- Viewers
- Examples
- Content Creation Tools
- Case Studies
- Resources
- Join Web3D Consortium

Features

The Web3D Consortium develops royalty-free open standards like Extensible 3D (X3D) Graphics. X3D is used for communicating 3D on the Web between applications, platforms and web services.

Web3D members are delighted to present our X3D Showcase, which is a DVD filled with introductory resources. X3D can help you accomplish your real-time 3D graphics challenges.

- **X3D Viewers** for X3D content can display scenes on every major platform, running in your web browser and on mobile devices.
- **Examples** show innovative X3D content from our member developers demonstrating the diverse use of X3D.
- **Content Creation Suite** tools help your initial ideas become interactive 3D content, ready for deployment on the Web.
- **X3D Case Studies** showcase how X3D is used by many different industries for many diverse uses (or try the **online version**).
- **X3D News and Events** provide X3D-related news stories, code samples, tutorials and X3D-based implementations for developers and the X3D user communities (or try the **online version**).
- **On-line X3D Podcasts (2008, 2007)** videos show and tell more about our innovative X3D content developers.
- **Web3D 2009 Symposium** is the 14th International Conference on 3D Web Technology. The **Call for Participation** lists topic areas of interest. It will be held 16-17 June 2009 at Fraunhofer Institute for Computer Graphics, Darmstadt, Germany.
- **X3D for Web Authors** is a textbook by Don Brutzman and Leonard Daly that provides complete detail how X3D works, helping you learn to build your own products.

The Web3D Consortium thanks the many individuals listed in the **Showcase Credits** and **Contributor Credits**.



Availability: X3D Showcase DVD

Production thanks!

- *Web3D*: Anita Havele
- *University of Sao Paolo*: Mario Nagamura, Marcia Kondo, Marcio Cabral, Olavo Belloc, Marcelo Zuffo
- *Naval Postgraduate School*: Byoungyun Yoo, Jeff Weekley, Don Brutzman

Sourceforge version control
for easy updating

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Features

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X3D Examples Archives

X3D for Web Authors 244 models

- Textbook on how to design and build X3D scenes

Basic 653 models

- Diverse scenes illustrating various X3D capabilities

Conformance NIST 732 models

- Strictly defined test examples for correct operation

VRML 2.0 Sourcebook 269 models

- Textbook on VRML97, examples converted to X3D

Savage 1181 models

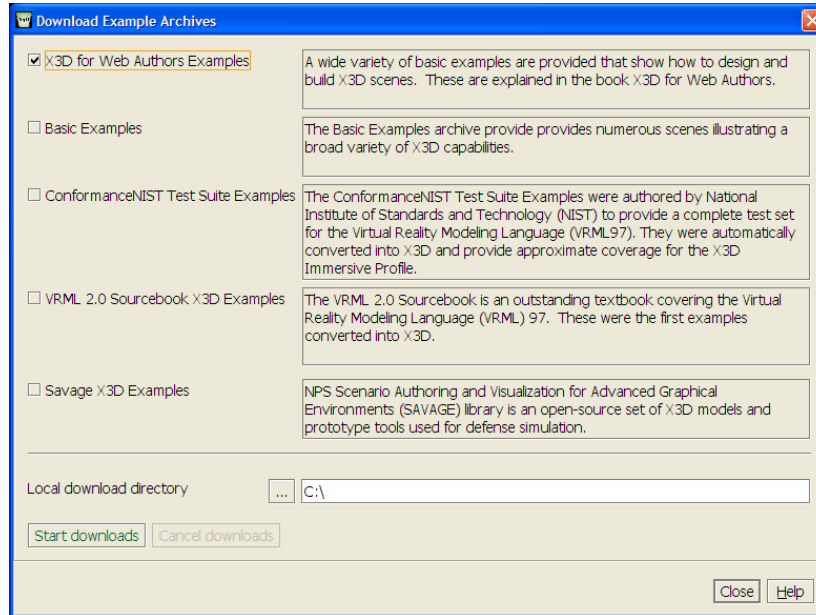
- Open-source military models and tools

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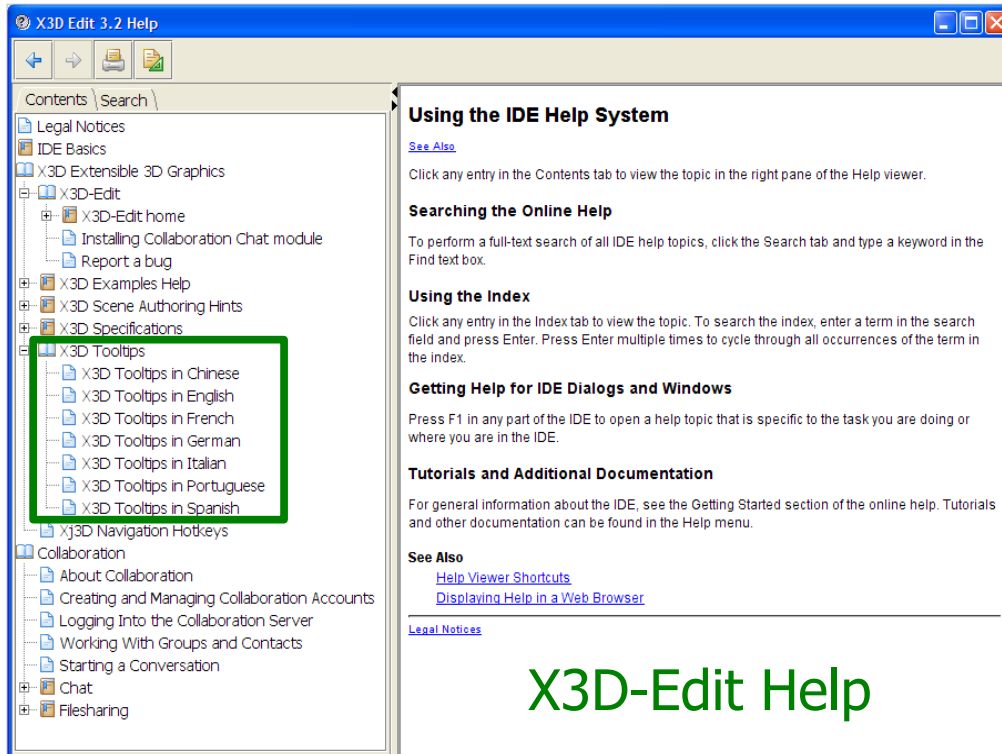
3000+ models available



X3D Examples download panel, X3D-Edit



X3D-Edit includes this download panel. Select the top-level *Examples* menu, then *Download X3D Example Archives*.



F1 or the Help menu launches the JavaHelp system.

Viewing alternatives for X3D

Default built-in viewer is open-source Xj3D

- High performance, implemented using Java OpenGL

Can launch current scene into web browser

- Displays using any of your installed plugins
- “Launch all viewers” simplifies comparison testing

Can also launch into standalone applications

- Configuration panel simplifies download, install



<http://www.xj3d.org>

<http://www.web3d.org/x3d/content/examples/help.html#Applications>

Player support for X3D components

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Public X3D Wiki
Tutorials for X3D
Nodes & Concepts

navigation

- Main Page
- Web3D News
- Upcoming X3D events
- X3D Specifications
- Recent changes
- Random page
- Help
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Go Search

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- Related changes
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- Special pages
- Printable version
- Permanent link

page | discussion | edit | history | delete | move | protect | unwatch

Player support for X3D components

The Extensible 3D (X3D) Graphics standard has many capabilities. X3D components are modular collections of nodes that make it easier for software to gradually implement the full range of X3D capabilities. Authors can also indicate what components are needed in an X3D scene in order to ensure that proper support is provided at run time.

This table records support for the official X3D components by each of the various X3D players. It is maintained by the X3D Working Group and member companies in the Web3D Consortium.

The X3D Resources page provides lots of additional information about X3D. Please Contact Web3D if you want to learn more or report an update.

Related pages: Plug-in and browser compliance, Tool support for X3D components, X3D Resources: Applications, X3D Implementations, and X3D Plugfest.

Table key

- yes all nodes, all fields supported for all levels of this component (though some bugs may be present)
- partial some nodes and fields supported
- level # which component level number (1-4) is supported (found at end of each component specification)
- no no support provided
- ? unknown, need status report

Players	BS Contact Family	FreeWRL, FreeX3D	H3DViewer	InstantPlayer	OctagaVS Player	OpenVRML	SwirlX3D	view3dscene	Xj3D
Versions	v8.0	v1.22.8	v2.1	2.1	v4.0	v0.17.9	v2.1.7	v3.11.0	1.0
Status	Active	Active	Active	Active	Active	Active	Active	Active	Active
X3D Conformance Certification	Interchange Profile	Interchange Profile	none	none	none	none	none	none	Interchange Profile
File Encodings									
XML (x3d)	yes	yes	yes	yes	yes	?	yes	yes	yes
ClassicVRML (x3dv)	yes	yes	yes	yes	yes	yes	yes	yes	yes
Compressed Binary Encoding (x3db)	yes	no	no	partial	no	no	no	no	yes
VRML 97 (v2.0) (.wrl)	yes	yes	yes	yes	yes	yes	?	yes	yes
VRML 1 (v1.0) (.wrl)	no	yes	no	?	?	?	?	yes	?
X3D component list									
CAD geometry	yes	no	no	yes	yes	partial	yes	partial	yes
Core	yes	yes	yes	yes	yes	yes	yes	yes	yes

Accessed 13 December 2008

http://www.web3d.org/x3d/wiki/index.php/Player_support_for_X3D_components

Tool support for X3D components

page | discussion | edit | history | delete | move | protect | unwatch

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Tool support for X3D components

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Table key

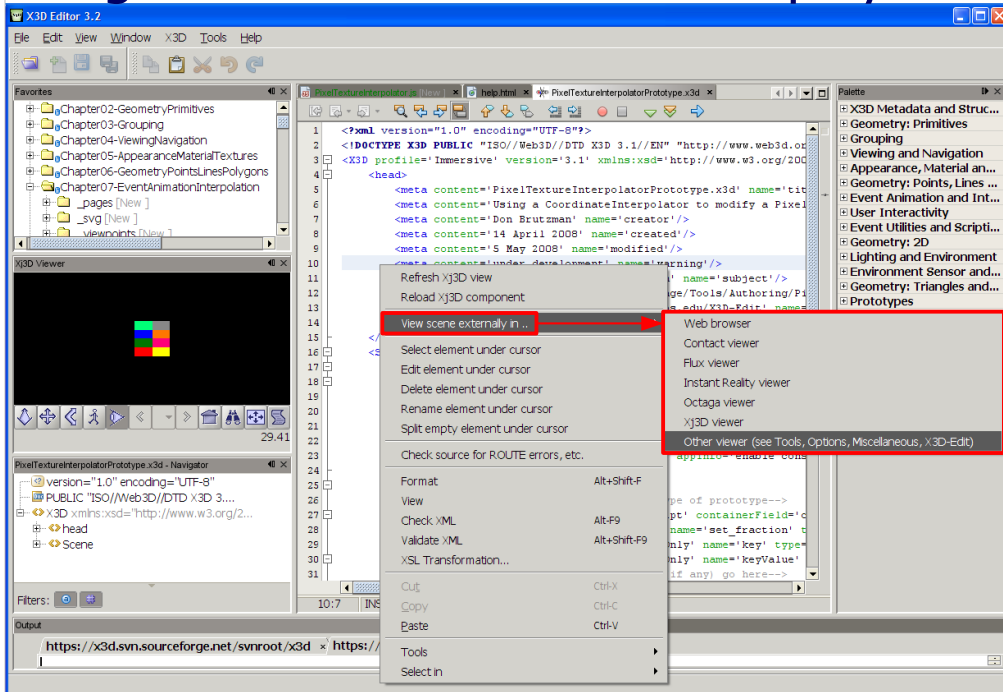
- **yes** all nodes, all fields supported for all levels of this component (though some bugs may be present)
- **partial** some nodes and fields supported
- **level #** which component level number (1-4) is supported (found at end of each component specification)
- **no** no support provided
- **?** unknown, need status report

Types	Authoring tools					Conversion tools			
	BS Editor	SwiirX3D Editor	X3D-Edit	Flux Studio	Vivaty Studio	Okino Polytrans	SwiirX3D Translator	X3D Filter Chain	
Tools									
Versions	v7.1	v3.0.0	v3.2	v2.1	v1.0 build 900	v5.0	v3.0.0	v2.0	
Profiles	nearly Full Profile	TBD	nearly Full Profile	Immersive Profile	Immersive Profile	Immersive Profile	Immersive Profile	nearly Full Profile	
X3D Conformance Certification	none	none	Interchange Profile	Interchange Profile	Interchange Profile	none	none	Interchange Profile	
File Encodings									
XML (X3D)	yes	yes	yes	yes	yes	yes	yes	yes	yes
ClassVRML (x3dv)	yes	yes	yes	yes	yes	yes	yes	yes	yes
Compressed Binary Encoding (x3db)	yes	no	yes	no	no	no	no	no	yes
VRML 97 (v2.0) (wrl)	?	?	yes	yes	yes	yes	?	yes	
VRML 1 (v1.0) (wrl)	?	?	no	partial	partial	yes	?	no	
X3D component list									
CAD geometry	yes	yes	yes	no	no	yes	yes	yes	yes
Core	yes	yes	yes	yes	yes	yes	yes	yes	yes
Cube map environmental texturing	yes	no	partial	partial	partial	no	no	no	no
Distributed interactive simulation (DIS)	no	no	yes	no	no	no	no	no	yes
Environmental effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Environmental sensor	yes	yes	yes	yes	yes	no	yes	yes	yes

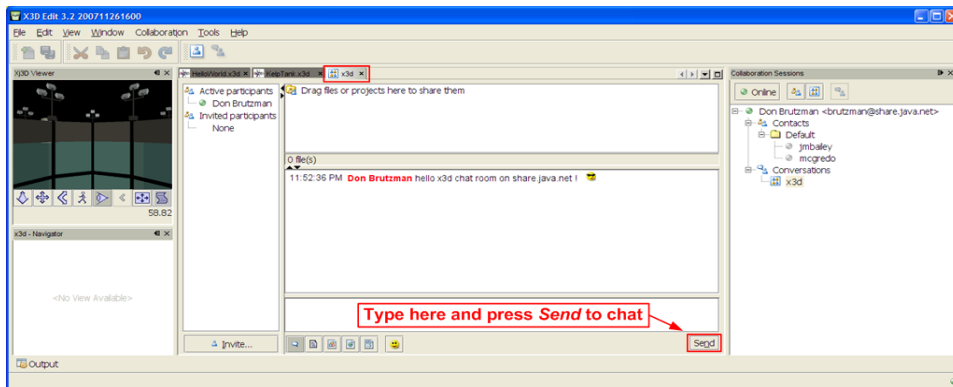
Accessed 13 December 2008

http://www.web3d.org/x3d/wiki/index.php/Tool_support_for_X3D_components

Right-click to launch external players



X3D-Edit collaboration chat



XMPP JID for the chat channel is `xmpp://x3d@muc.share.java.net`

Subscription directions are provided on the installation page

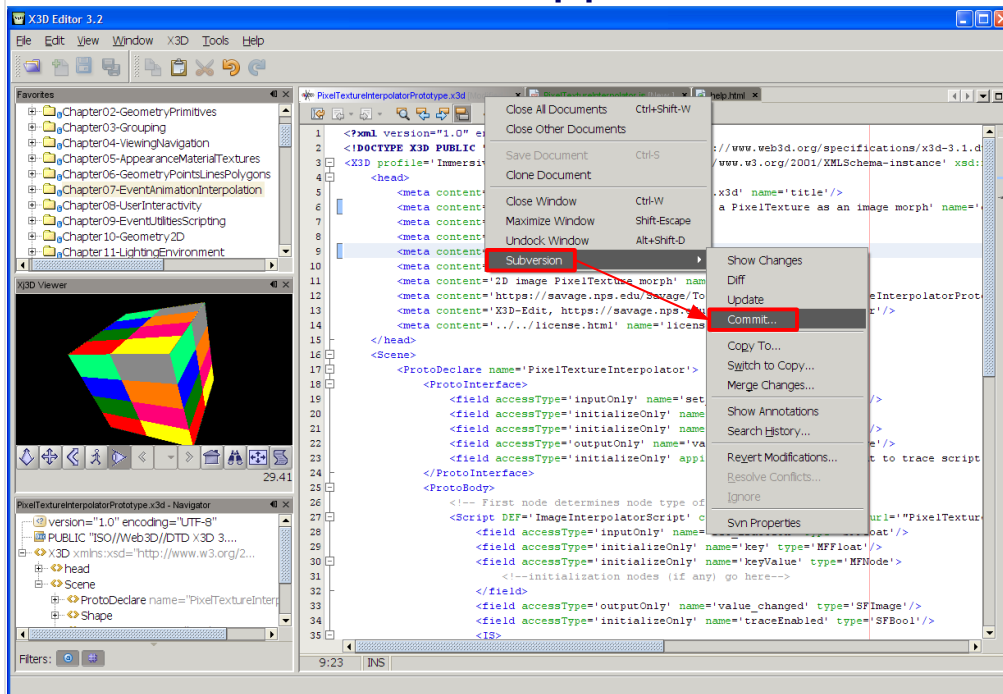
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X3D-Edit collaboration chat installation page available at

- <https://savage.nps.edu/X3D-Edit/XmppChatCollaborationModule.html>

Version control support included

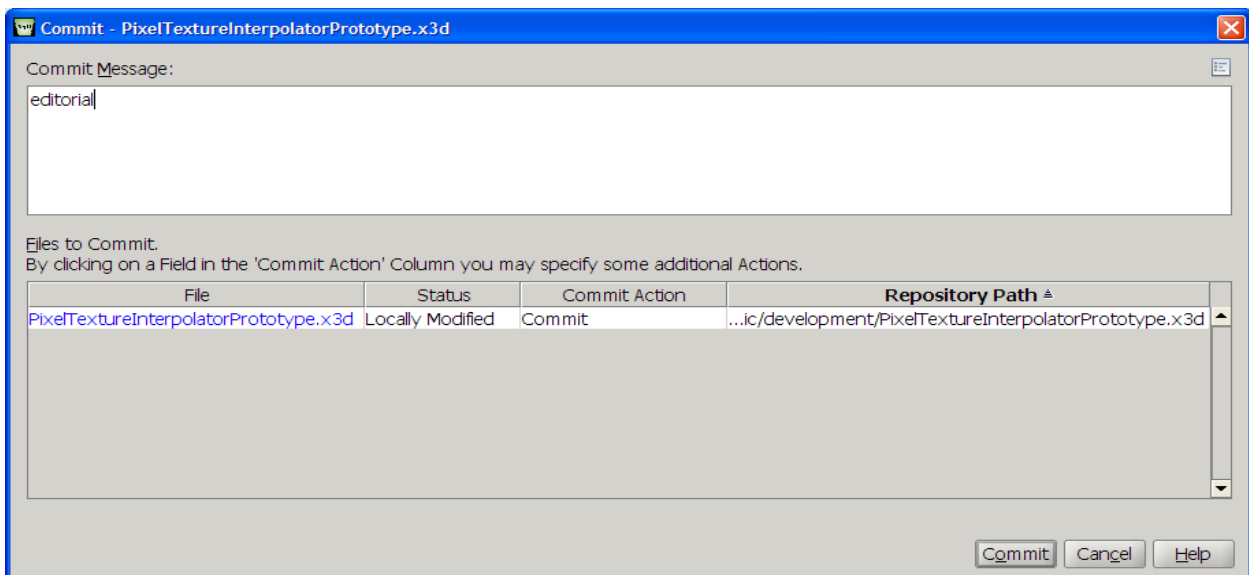


Version control allows multiple authors to share updates and work together.
Prerequisite: you must have the Collabnet subversion client installed.

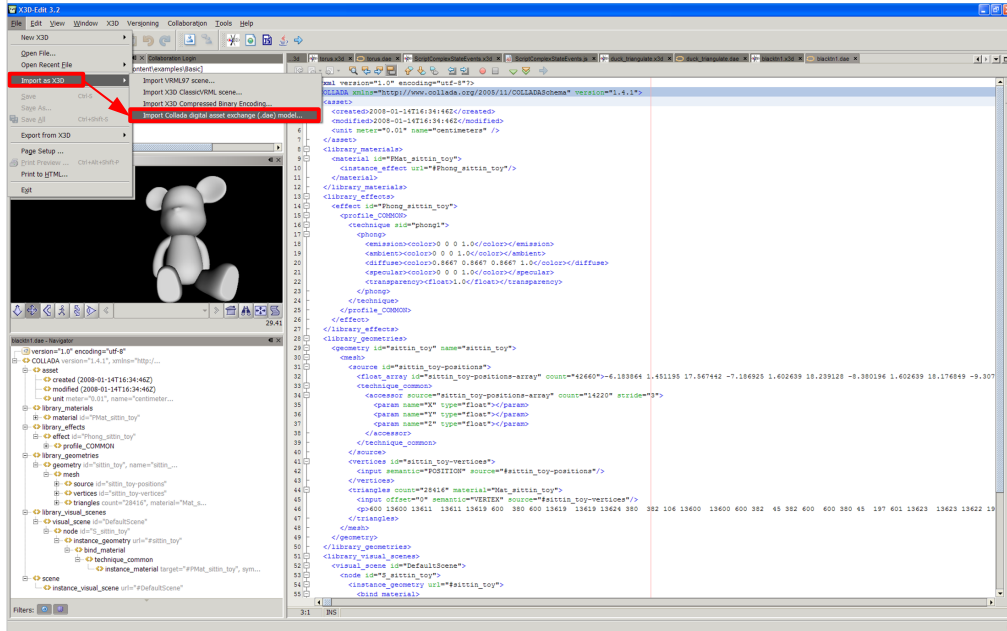
If the file being edited is under version control, the Netbeans platform detects that and offers Subversion or CVS version control (as appropriate) without further setup.

Developers can work with X3D-Edit directly to update, diff (difference compare) and commit any file changes. X3D-Edit 3.2 subversion master source is at

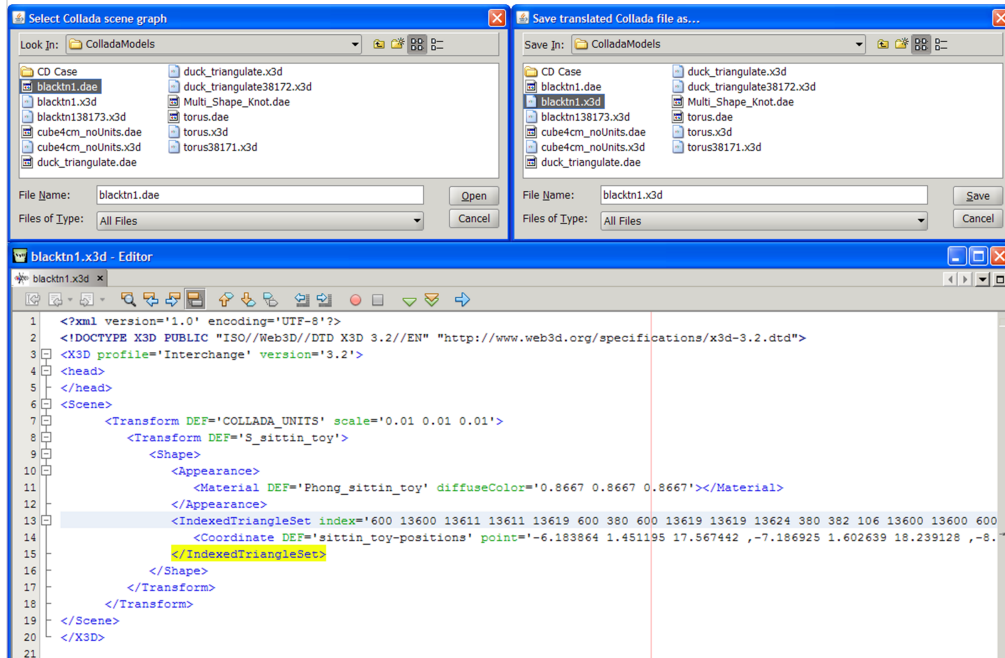
<http://x3d.svn.sourceforge.net/viewvc/x3d/www.web3d.org/x3d/tools/X3dEdit3.2>



Collada .dae editing support



Collada .dae import to X3D



Distributed Interactive Simulation (DIS) Protocol

Long-running IEEE protocol used in military modeling + simulation applications

OpenDIS: open source implementations

- Java, C++
- Also DIS-XML that runs under XMPP jabber chat
- Available at Sourceforge
<http://sourceforge.net/projects/open-dis>

Integrate network test environment into X3D-Edit

- In progress
- Goal: aid development, testing of new protocols



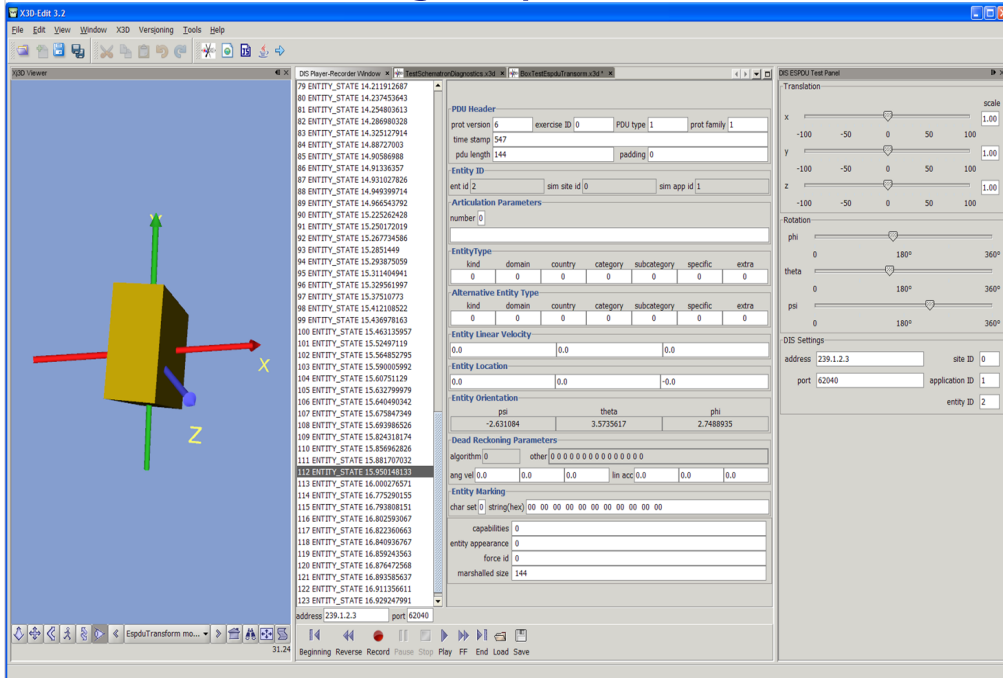
DIS Networking Test Panel

The screenshot displays the X3D-Edit 3.2 interface. On the left, a 3D scene shows a yellow rectangular prism on a coordinate system with X, Y, and Z axes. The central pane contains XML code for a scene, including metadata, a background, and a transform node. The right pane features control panels for Translation (x, y, z) and Rotation (phi, theta, psi), with numerical input fields and sliders. A text box in the center provides specific transformation instructions.

**Distributed Interactive Simulation (DIS)
Entity State Protocol Data Unit (ESPDU)
Test Panel**

Translation along x-axis by -20m, to left
Rotation about y-axis by +20° counter-clockwise

DIS Networking Player-Recorder Panel



X3D Earth, Geospatial Component

Editing and authoring support provided

The screenshot displays the X3D-Edit 3.7 application interface. On the left, a 3D viewer shows a globe. The central pane is a code editor containing X3D XML code. A green box highlights a specific XML snippet:

```
<!-- a simple Inline node is all that is needed for any scene to use X3D Earth assets, for example: -->  
<Inline url='http://x3d-earth.nps.edu/osmdemo.x3d/'/>
```

The right pane shows the 'X3D Metadata and Structure' panel with various categories like 'Scene', 'Metadata', and 'Geometry'. At the bottom, a comic strip strip from Sun Dec 28 00:00:00 PST 2008 is visible, featuring characters and dialogue bubbles.

Humanoid Animation (H-Anim)

ISO standard for human skeletons, skin

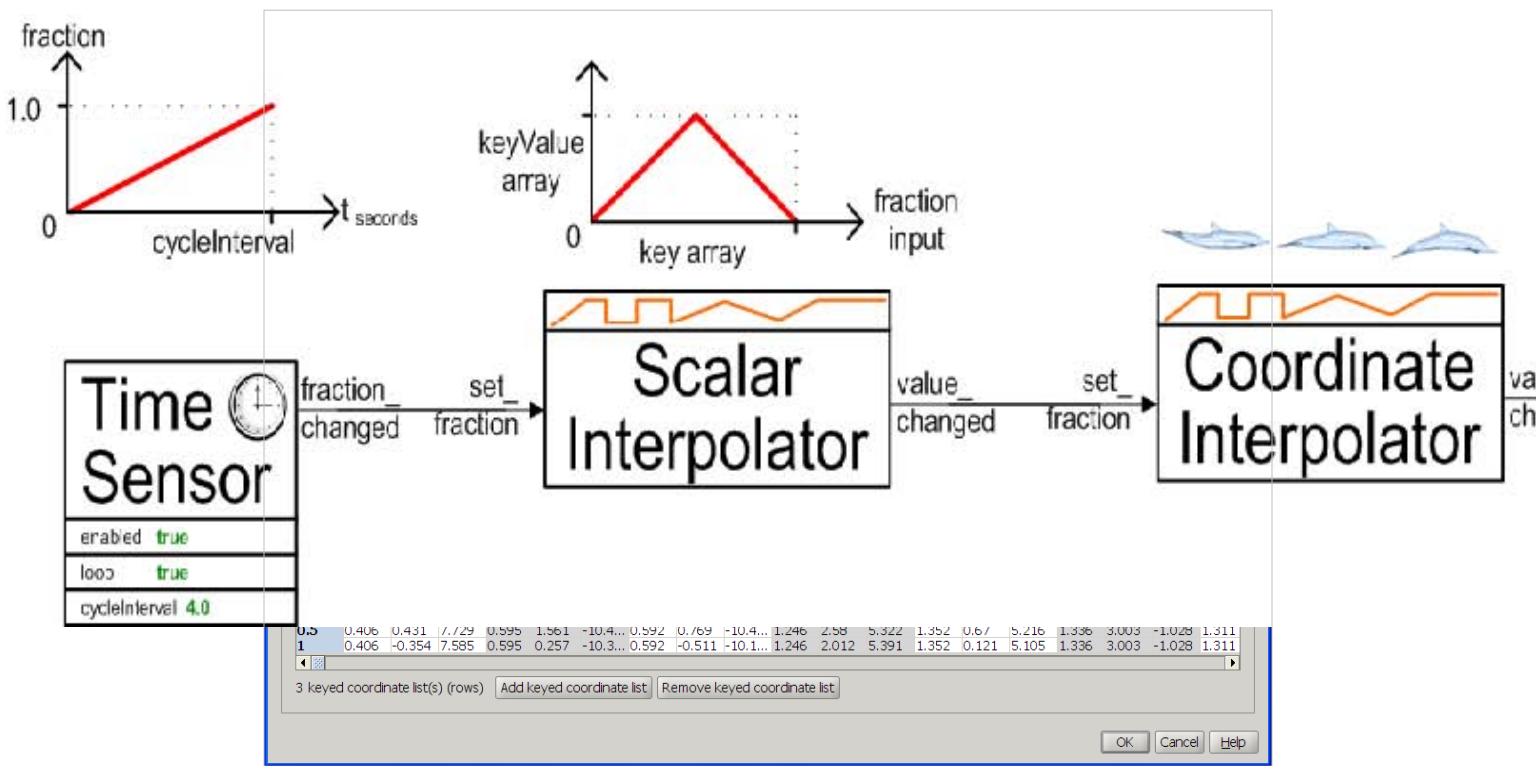
- Supported in X3D-Edit, other tools

Examining support for non-humanoid skeletons

NPS working on composable, reusable behaviors

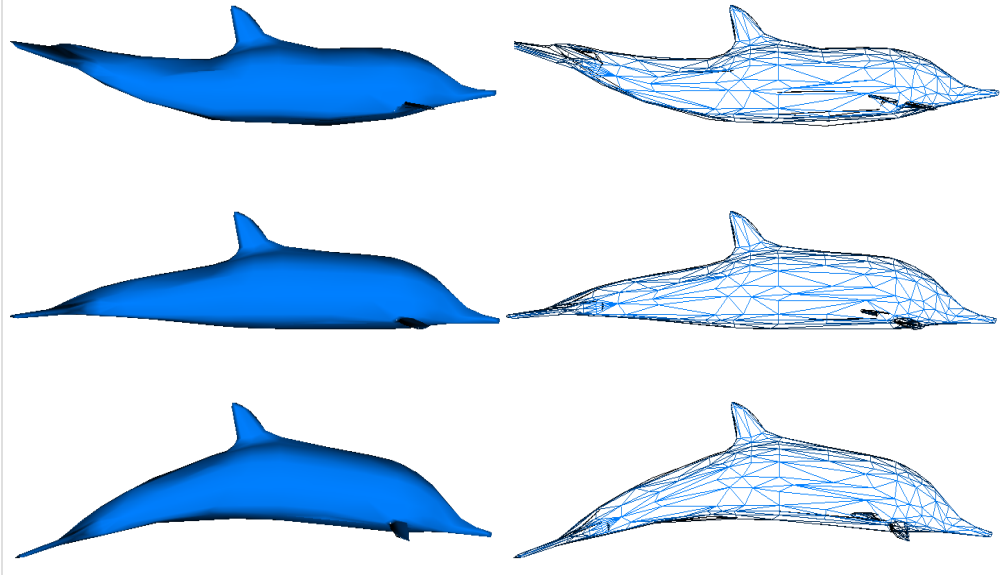
- From motion capture (Vicon Peak system)?
- From different motion formats?





Creating a morphable dolphin

Chris Lang, Monterey High School



<https://savage.nps.edu/Savage/Biologics/Dolphin/DolphinPose02.x3d>

<https://savage.nps.edu/Savage/Biologics/Dolphin/DolphinPose01.x3d>

<https://savage.nps.edu/Savage/Biologics/Dolphin/DolphinPose03.x3d>

X3jD viewer wireframe mode is toggled with key Alt-w

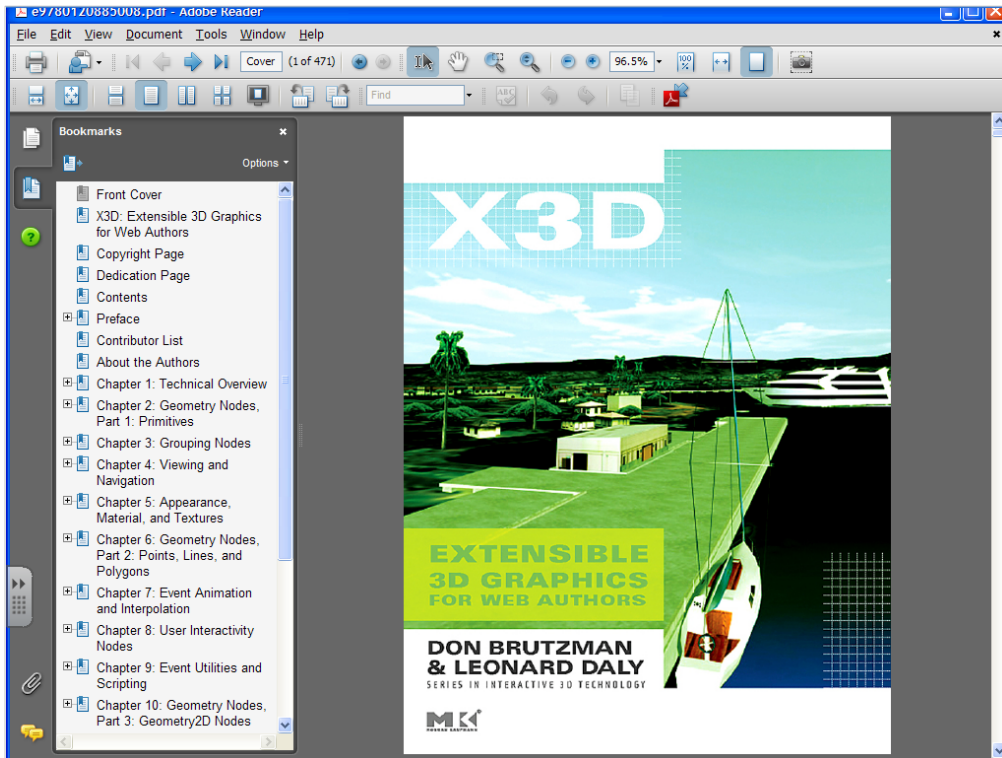
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X3D for Web Authors

Textbook, slidesets, examples, videos

<http://x3dGraphics.com>







Course Videos: X3D for Web Authors



These video lessons support the textbook [X3D: Extensible 3D Graphics for Web Authors](#), which shows how to build and animate models using X3D.


Primary supporting materials for the book and these video lessons include the [X3D-Edit authoring tool](#), [example scenes](#), and [chapter slidesets](#). Supplementary learning materials include [X3D Resources](#), [X3D Tooltips](#), and [X3D Scene Authoring Hints](#).

These videos were produced as part of two [Naval Postgraduate School \(NPS\) MOVES Institute](#) courses: *Introduction to X3D Graphics* (MV3204) and *Advanced X3D Graphics* (MV4205). The course presenter is book coauthor [Don Brutzman](#).

Chapter Examples	Session	Description	.pdf
0	Getting Started	Goals and motivation, installing X3D-Edit authoring tool and example scenes , course introduction	slides
1	Technical Overview 1A	Introduction, historical background, Web3D Consortium , importance of standardization, X3D Specifications and International Organization of Standards (ISO) , intellectual property rights (IPR) and open-source software, interoperability considerations	slides
	Technical Overview 1B	Browsers and players, models versus programming, scene graphs, behaviors and events, profiles and components, document metadata, fields	
	Technical Overview 1C	Importance of consistency, strong data typing, accessType, XML design patterns for X3D, compressed binary encoding, standards liaison organizations	
	Technical Overview 1D	X3D-Edit authoring tool development, functional testing, bug tracking, version control, Netbeans , help system	
2	Geometry Primitives 2A	Shape and geometry nodes, common geometry fields	slides
	Geometry Primitives 2B	Box and Cylinder nodes, X3D Tooltips	
	Geometry Primitives 2C	HelloWorld example, Cone Cylinder and Sphere nodes	
	Geometry Primitives 2D	Text node for flat 2D strings, launching an X3D scene into one or more external players, multiple-field MFString arrays, handling special characters using XML character entities	
	Geometry Primitives 2E	FontStyle node, open-source licenses	
3	Grouping 3A	Grouping node concepts, XML encoding	slides
	Grouping 3B	Inline node, url field	
	Grouping 3C	X3D resources and additional references, Inline node, url fields, level of detail (LOD) node	
	Grouping 3D	Switch node, review grouping node concepts, 3D grid resources	
4	Viewing Navigation 4A	Viewing, navigation, bindable nodes and binding operations example	slides
	Viewing Navigation 4B	Viewpoint node, viewing and navigation	
	Viewing Navigation 4C	NavigationInfo and Anchor nodes, uniform resource locator (url)	
5	Appearance 5A	Material and TwoSidedMaterial nodes, Universal Media materials library	slides
	Appearance 5B	Textures and ImageTexture node, texture coordinates, image copying and flipping to produce a continuously repeating texture, file formats	
	Appearance 5C	MovieTexture and PixelTexture nodes, LineProperties and FillProperties nodes	
	Appearance 5D	PixelTexture node, SFImage data type, PixelTexture image-import tool	
	Appearance 5E	More on PixelTexture node, MovieTexture node	

CGEMS

Computer Graphics Educational Material Source

- SIGGRAPH Education Committee
- Archives for teaching and learning 3D
- <http://cgems.inesc.pt> 

Jury award, best submission 2008

- Book, course notes, X3D-Edit tool, examples

Online learning resource: course video podcasts!

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Summary

X3D-Edit is useful for learning, producing, improving and extending X3D scenes

Many great resources are available for learning and using X3D

These community capabilities are good for business, educators, individuals

We welcome your active participation in Web3D Consortium



Contact

Don Brutzman

brutzman@nps.edu

<http://faculty.nps.edu/brutzman>

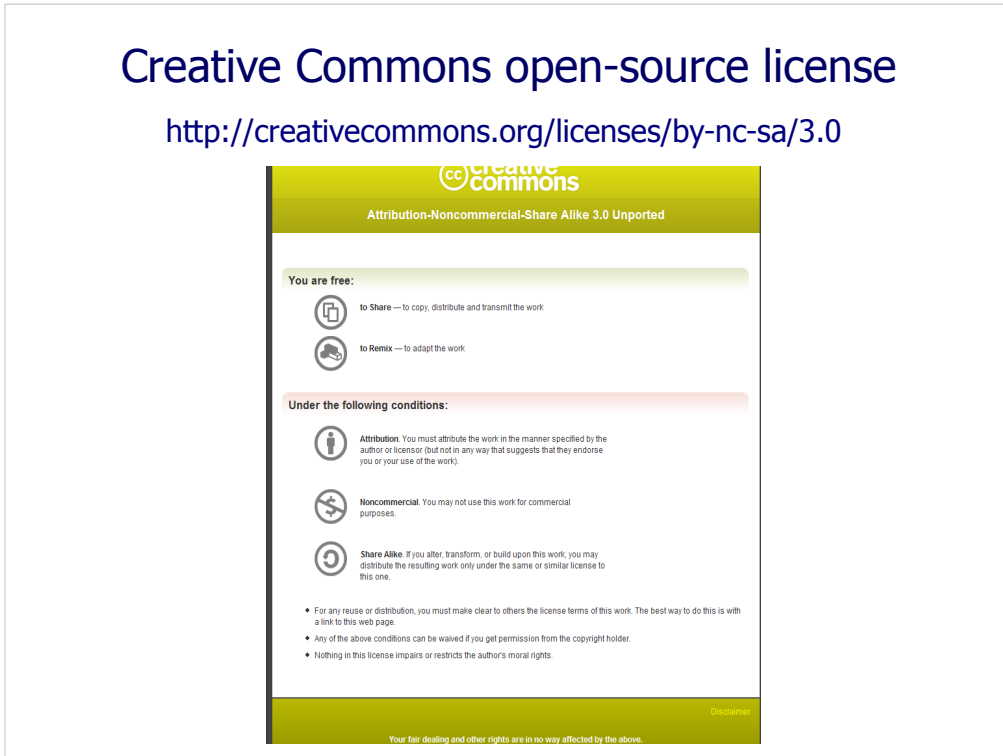
Code USW/Br, Naval Postgraduate School
Monterey California 93943-5000 USA
1.831.656.2149 voice

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Open-source license for X3D-Edit software and X3D example scenes

<http://www.web3d.org/x3d/content/examples/license.html>

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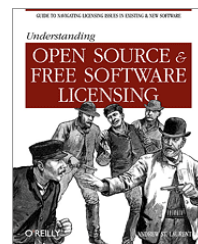
License available at

<http://www.web3d.org/x3d/content/examples/license.txt>

<http://www.web3d.org/x3d/content/examples/license.html>

Good references on open source:

Andrew M. St. Laurent, *Understanding Open Source and Free Software Licensing*, O'Reilly Publishing, Sebastopol California, August 2004. <http://oreilly.com/catalog/9780596005818/index.html>



Herz, J. C., Mark Lucas, John Scott, *Open Technology Development: Roadmap Plan*, Deputy Under Secretary of Defense for Advanced Systems and Concepts, Washington DC, April 2006. <http://handle.dtic.mil/100.2/ADA450769>

