X3D Web Graphics Potential for Federal Virtual Worlds

An X3D report card!

Federal Consortium for Virtual Worlds (FCVW)

12-14 May 2010

Don Brutzman

Naval Postgraduate School

Monterey California USA

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X3D

Topics for this talk

Machinima background is relevant

Summary of VRML, XML, Web3D, X3D

Report card: comprehensive X3D features for virtual world production

Looking ahead

Earlier report card: Machinima

Machinima defined

Machinima = Machine + Cinema

- Moviemaking in 3D virtual environment
- Most often used in video games
- Contrast with traditional animation
  - HO Chee Yue, Dream Axis Singapore

Can consider as use case for Virtual Worlds

Machinima an established technique

Machinima - Wikipedia, the free encyclopedia - Mozilla Firefox

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http://en.wikipedia.org/wiki/Machinima

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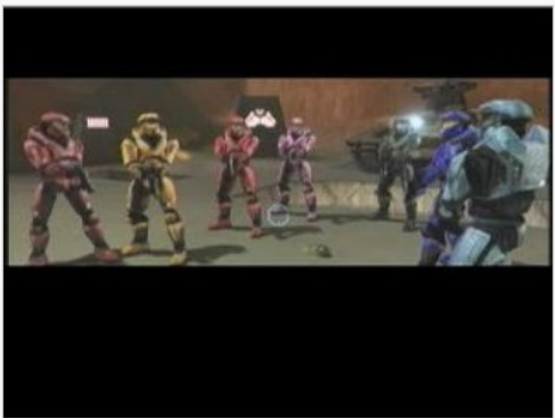article   discussion   edit this page   history   move   watch

Machinima

From Wikipedia, the free encyclopedia that anyone can edit

For the website of the same name, see Machinima.com.

Machinima (pronounced /məˈʃiːnimə/ or /məˈʃɪnimə/) is the use of real-time graphics rendering engines, mostly three-dimensional (3-D), to generate computer animation. The term also refers to works that incorporate this animation technique. Machinima-based artists, sometimes called **machinimists** or **machinimators**, are fan laborers and often use graphics engines from video games, a practice that arose from the animated software introductions of the 1980s demoscene, Disney Interactive Studios' 1992 video game *Stunt Island*, and 1990s recordings of gameplay in first-person shooter (FPS) video games, such as id Software's *Doom* and *Quake*. Originally, these recordings documented speedruns —attempts to complete a level as quickly as possible—and multiplayer matches. The addition of storylines to these films created "*Quake* movies". The more general term *machinima*, a misspelled portmanteau of *machine cinema*, arose when the concept spread beyond the *Quake* series to other games and software. After this generalization, machinima appeared in mainstream media, including television series and advertisements.

Machinima has advantages and disadvantages when compared to other styles of filmmaking. Its relative simplicity over traditional frame-based animation limits control and range of expression. Its real-time nature favors speed, cost saving, and flexibility over the higher quality of pre-rendered computer animation. Virtual acting is less expensive, dangerous, and physically restricted than live action. Machinima can be filmed by relying on in-game artificial intelligence (AI) or by controlling characters and cameras through digital puppetry. Scenes can be precisely scripted, and can be manipulated during post-production using video editing techniques. Editing, custom software, and creative cinematography may address technical limitations. Game companies have provided software for and have encouraged machinima, but the widespread use of digital assets from copyrighted games has resulted in complex, unresolved legal issues.

A scene from Rooster Teeth Productions' popular machinima series *Red vs. Blue: The Blood Gulch Chronicles*

navigation
- Main page
- Contents
- Featured content
- Current events
- Random article

search

Go   Search

interaction
- About Wikipedia
- Community portal
- Recent changes
- Contact Wikipedia
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- What links here
- Related changes
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Machinima motivation

Build and play repeatable, interactive stories

Unlock lots of great work by Web3D partners

"Right now I just build 3D models, but what I really want to do is direct!"

… not so different for larger Virtual Worlds

X3D report card for virtual worlds

Technical capabilities

X3D features for virtual world production

A ▶ Creation of 3D models

B+ ▶ Format conversion

B+ ▶ Model animation

C ▶ Humanoid animation

B+ ▶ Camera control

A ▶ Lighting control

B ▶ Audio and aural spatialization

C ▶ Networked behavior streaming

B ▶ Geospatial earth models

A ▶ Extensibility, repeatability, reuse

Creation of 3D models

A

Available

- Many modeling tools (see Showcase DVD)
- Complete course on X3D graphics modeling
- *X3D for Web Authors* by Don Brutzman, Len Daly
- Slides, examples, authoring tool, course videos

Needed

- Even broader adoption and error-free export of X3D by existing industry tools

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Player support for X3D components

File   Edit   View   History   Bookmarks   Split   Tools   Help

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

page | discussion | view source | history

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
- Join the Consortium

search

[Go]   [Search]

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

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: X3D Resources: Applications, Players, Plugins, Tool support for X3D components 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 and versions	H3DViewer	BS Contact, BS Contact Geo, BS Contact Stereo	FreeWRL/FreeX3D	Heilan	InstantPlayer	Octaga Player	OpenVRML	SwirlX3D	Vivaty	Xj3D
	v2.1	v7.2	v1.22.7	v0.15	beta 7	v2.3	v0.17.9	v2.1.7	v1.0 build 900	1.0
X3D Conformance Certification	none	Interchange Profile	Interchange Profile	none	none	none	none	none	Interchange Profile	Interchange Profile
File Encodings										
- XML (.x3d)	yes	yes	yes	yes	yes	yes	?	yes	yes	yes
- ClassicVRML (.x3dv)	yes	yes	yes	no	yes	yes	yes	yes	yes	yes
- Compressed Binary Encoding (.x3db)	no	no	no	no	partial	no	no	no	no	yes
- VRML 97 (v2.0) (.wrl)	yes	yes	yes	?	yes	yes	yes	?	?	yes
- VRML 1 (v1.0) (.wrl)	no	?	yes	?	?	?	?	?	?	?
X3D component list										
CAD geometry	no	yes	no	no	yes	yes	partial	yes	no	yes
Core	yes	yes	yes	partial (not Proto)	yes	yes	yes	yes	yes	yes

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Tool support for X3D components

page | discussion | view source | history

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

search

[Go] [Search]

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

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Related pages: X3D Resources: Authoring Software and Player support for X3D components

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- **level #** which component level number (1-4) is supported (found at end of each component specification)
- **no**   no support provided
- **?**   unknown, need status report

Tools, versions, and X3D Conformance Certification	Authoring tools				Conversion tools		
	BS Editor	SwirlX3D Editor	Vivaty Studio	X3D-Edit	Okino Polytrans	SwirlX3D Translator	Xj3D Filter Chain
	v7.1	v2.1.7	v1.0 build 900	v3.2			v2.0
	none	none	Interchange Profile	Interchange Profile	none	none	Interchange Profile
File Encodings							
- XML (.x3d)	yes	yes	yes	yes	yes	yes	yes
- ClassicVRML (.x3dv)	yes	yes	yes	yes	yes	yes	yes
- Compressed Binary Encoding (.x3db)	no	no	no	yes	no	no	yes
X3D component list							
CAD geometry	yes	yes	no	yes	yes	yes	yes
Core	yes	yes	yes	yes	yes	yes	yes
Cube map environmental texturing	yes	no	partial	partial	no	no	no
Distributed interactive simulation (DIS)	no	no	no	yes	no	no	yes
Environmental effects	yes	yes	yes	yes	yes	yes	yes
Environmental sensor	yes	yes	yes	yes	no	yes	yes

X3D Plugfest

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

search

[Go] [Search]

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

X3D Plugfest

The goal of the X3D Plugfest is to foster interoperability between X3D players. This is a regular event that brings content authors, authoring tool vendors and browser implementers together to work on interoperability issues. Consistent quality for X3D content helps everyone.

The X3D Plugfest was held at the Web3D Consortium Members Meeting, Wednesday 4 March 2009, at the NASA Ames research facility in Moffett Field, California.

Related links include

- Plugfest 2008 Content
- Player support for X3D components
- Tool support for X3D components

Contents [hide]
1 2009 Plugfest Content - June 2009 - Fraunhofer IGD, Darmstadt, Germany
2 2009 Plugfest Content - March 2009 - Nasa Ames, California
3 2009 Plugfest - March 2009 - Results
4 Instructions to Submitters

2009 Plugfest Content - June 2009 - Fraunhofer IGD, Darmstadt, Germany

X3D Scenes, X3D Viewers	Updated	Author	Content Description	Problem Description	Content Releasability
"Web3D Timeline (aka X3D Timeline)"	25 May 2009	Anita Havele, Web3D Consortium	Outreach examples for Web3D Consortium	Prototype interoperability between browsers	Public
"simpleShader.zip"	26 May 2009	John Stewart, CRC Canada	GLSL Shader test that uses a modified "toon" shader; light intensity on Spheres is shown where the color is dependent on intensity; the intensity bounding values are passed into the shader	Should display on hardware supporting GLSL shaders; Spheres will be "ringed". On non-GLSL systems, Spheres will be a uniformly shaded light blue	Public
Media:UrlInProtoTest.zip	12 June 2009	Patrick Dähne, Fraunhofer IGD	The X3D spec does not specify how to resolve relative URLs in EXTERNPROTOs. Some X3D Browsers resolve them relative to the EXTERNPROTO declaration, some to the EXTERNPROTO instantiation.	Open the file "UrlInProtoTest.wrl" in different browsers. Some will show yellow textured boxes, and some will show cyan textured boxes. Which behaviour is correct?	Public

2009 Plugfest Content - March 2009 - Nasa Ames, California

X3D Scenes, X3D Viewers	Updated	Author	Content Description	Problem Description	Content Releasability
HelloWorld.x3d	21 February 2009	Don Brutzman, NPS	Hello World simple scene (example image)	Quality of Sphere geometry, Text alignment, default X3D navigation mode is EXAMINE	Public

Model animation

B+

Available

• Rich suite of interpolators and sequencers for animating any aspect of X3D scene graph

• Scripting: Javascript, Java

• Shader and physics support is specified, now emerging

• Portable, can be embedded in any scene

Needed

• Keep building custom animation prototypes

Humanoid animation

Available

- Interchangeable body skeletons, skinning
- Most humanoid models are *ad hoc* anyway

Needed

- Alternative skeletons
- Interoperable behaviors
- Facial animation and motion capture export
- Better tool support and body libraries
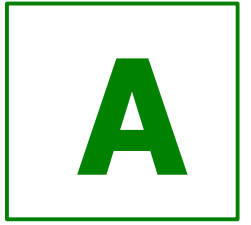
Camera control

B+

Available

- Viewpoints, viewpoint groups, adaptive
- Consistent animation methodology
- Intuitive, consistent user navigation

Needed

- Directly adjustable camera properties
- More implementations multiscreen, stereo
- Apply cinematic concepts as widgets

Lighting control

A

Available

- At least 8 lights at any time
- Consistent animation methodology
- Fully editable real-time lighting model

Needed

- Higher-fidelity lighting effects

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X3D

Audio and spatial auralization

Available

- Support for multiple audio formats
  - Proprietary technology cannot be required on Web
  - Support allowed for other formats (though results become less portable)
- Real-time stereo spatialization works well

Needed

- Voice over IP (VOIP) protocol
- Streaming audio and video formats
- High-fidelity spatial auralization

Networked behavior streaming

C

Available

- IEEE Distributed Interactive Simulation (DIS) Protocol, open-source implementations

- Application-specific network socket connections via Java in Script node

- Server-side techniques

Needed

- Virtual world streaming protocol(s) that everyone can agree on

Geospatial earth models   B

Available

- Multiple models, datasets to 17 LOD levels
- Repeatable examples down to 1m resolution
- Satisfactorily handles diverse input formats

Needed

- Full globe coverage, openly available online
- Mashup multiple sources of imagery, terrain

Extensibility, repeatability, reuse   **A**

Available

- Inline nodes, multiple-value url arrays
- Prototyping for customization
- Libraries of cool extensions
- The X in X3D is extensibility!

Needed

- Broader plugin deployment, finish X3D binary
- Continued experience by more authors

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Overall technical grade: **B**

Future prospects, getting involved

Publishing, distributing over Web is a big arena

Technical progress continues steadily

Can federal partners control their destiny?

We hope you join us!
- Membership in Web3D Consortium
- Mailing lists, working groups, meetings etc.

Join Web3D Consortium!

Membership Levels, Dues and Benefits:

	Directing	Organizational	Professional
DUES			
Dues: Large	$15,000	$9,500	
Dues: Standard	$5,500	$3,500	$100
Dues: Small Academic/Student	$5,500	$1,500	$50
APPLICATION PROCEDURE			
Signed Member Agreement	Yes	Yes	Yes
Membership Approval Needed	By Board	None	None
PARTICIPATION BENEFITS			
Seat on Board	Yes - if desired	By election	By election
Working Group Participation	Yes	Yes	Yes
Vote in working groups	One Vote	One Vote	No
Vote on Bylaws change	Yes	Yes	No
Waiver of Adopters Fees	Yes	Yes	No

http://www.web3d.org/membership/join

Anita Havele, Executive Director

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Questions and Discussion

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Contact

Don Brutzman

brutzman@nps.edu

http://web.nps.navy.mil/~brutzman

Code USW/Br, Naval Postgraduate School
Monterey California 93943-5000 USA
1.831.656.2149 voice
1.831.656.7599   fax