



WEB3D 2020

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X3D4 Modeling Support for User Experience (UX)

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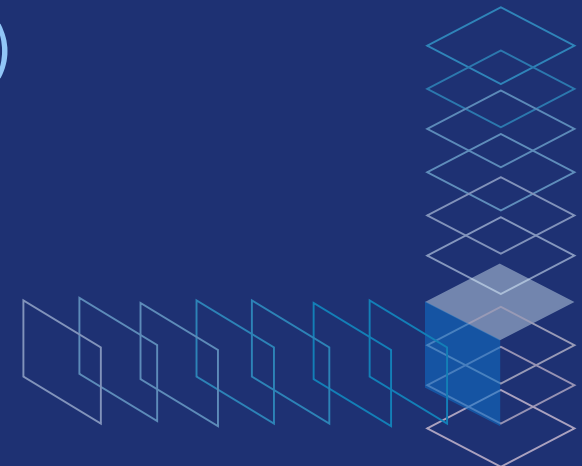
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X3D4 Modeling Support for User Experience (UX)

Motivation	Any content for anyone anywhere
Animation	Making things move, on demand
HTML5 + X3D	International standards, playing well together
Interaction	Getting users involved, first person
Navigation	Users going where you want, not getting lost
Network	Reaching out and retrieving...
Measurement	You get what you measure
Resources	How to learn more and get involved

User Interface not the same as *User Experience*

Wikipedia: [User Interface \(UI\)](#)

"**User interface** is the space where interactions between humans and machines occur. The goal of this interaction is to allow effective operation and control of the machine from the human end, whilst the machine simultaneously feeds back information that aids the operators [decision-making](#) process. [...] Generally, the goal of [user interface design](#) is to produce a user interface which makes it easy, efficient, and enjoyable (user-friendly) to operate a machine in the way which produces the desired result (i.e. maximum [usability](#)). This generally means that the operator needs to provide minimal input to achieve the desired output, and also that the machine minimizes undesired outputs to the user."

Wikipedia: [User Experience \(UX\)](#)

User experience (UX or UE) is a person's emotions and attitudes about using a particular [product, system](#) or service. It includes the practical, experiential, [affective](#), meaningful, and valuable aspects of [human-computer interaction](#) and product ownership. Additionally, it includes a person's perceptions of system aspects such as [utility](#), [ease of use](#), and [efficiency](#). User experience may be subjective in nature to the degree that it is about individual perception and thought with respect to a product or system. User experience varies dynamically, constantly modifying over time due to changing usage circumstances. Simplified, user experience is about how a *user* interacts with, and *experiences*, a product.

Motivation: usable 3D on Web

UI → UX

- We all spend a lot of time reinventing basics – UI, UX are pretty squishy!
- HTML5 and Web standards solve many problems
- X3D provides 3D capabilities in a cross-platform way, compatibly
- Can we rise above low-level challenges of using 3D models effectively?
 - Avoid difficulty of all experts “lost” with every other expert’s models
 - Overcome interface impediments to reach design thinking and experience
 - Competence is prerequisite for excellence. Get up to where we really need to be...
- Workshop is a good opportunity to "establish a shared playing field" using Web and 3D for effective ongoing UX design work together.

Animation

- All data in an X3D model is strongly and carefully typed, plus
- Animation mechanisms exist for all data types, so therefore...

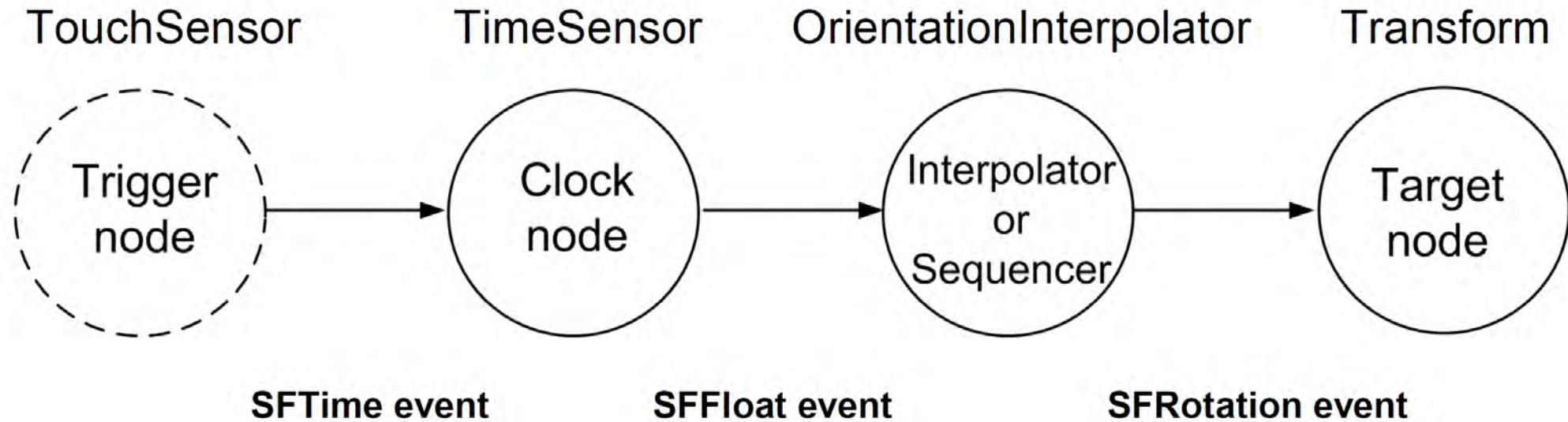
Anything within any X3D models can be animated!

X3D features include

- User-selectable triggering events to start animation chains
- Native scripting, or HTML5 scripting, or a mix of both
- Extensibility: pass events via Anchor IMPORT/EXPORT or prototypes

Animation chain for this example

HelloX3dAuthorsAnimationChain.x3d
is our detailed animation-chain example



touchTime => startTime

value_changed => rotation

fraction_changed => set_fraction

HTML5 with X3D

- HTML is the world's interface. No really!
- Many ways to build, modify, use HTML understood by ~ everyone.
- X3D version 4 designed to play well together with HTML, or apart.
 - X3D Background transparency allows fitting in, or floating over, HTML page
- JavaScript = EcmaScript is common scripting language for each
- Device independent, interactive content is designed to be portable

Two actively supported X3D4 players available in open-source JavaScript

- X ITE can render models to an X3D canvas within HTML page
- X3DOM can mix X3D model elements within HTML page elements

Interaction: selection and dragging

- Device independence: X3D is agnostic about mouse, touchpad, wand, keyboard, laser tracker, et cetera.
 - X3D Architecture Specification [Annex G, Recommended navigation behaviours](#)
- X3D [TouchSensor](#): reports user [isOver](#) geometry, selection [isActive](#)
- [CylinderSensor](#), [PlaneSensor](#), [SphereSensor](#), [ProximitySensor](#), [VisibilitySensor](#)
 - User selects and drags, sensor provides geometry of interaction grabbing
 - Can be applied to any polygonal geometry, including transparent shapes
 - User proximity to given volume, or ability to see given object, can also be event trigger
- Implemented, under consideration: MultiTouchSensor

Navigation: user travel without getting lost

Viewpoint nodes are number one mode of user navigation.

- Viewpoint design is communication channel between author, users.
- Be generous! Think about where user wants to be, why, what's there.
- description field tells users where – and can answer “why do I care?”
- nearDistance, farDistance facilitate visibility if viewing very large scenes

ViewpointGroup can collect (and optionally hide) sets of viewpoints

NavigationInfo type field changes modality of interface interactions

- EXAMINE, WALK, FLY, LOOKAT, EXPLORE, TURNTABLE, LOOKAROUND
- Simplified connections for matching NavigationInfo to Viewpoint

Networked nodes have url field

Uniform Resource Locator (Identifier) for any Web resource

- Anchor, Inline, ImageTexture, MovieTexture, Script, Shaders, Metadata, etc.
- Ordered list of addresses: local versus online versions of an asset
- description field: author communicates to user “what is this, really?”
- load field: deferred loading of any asset, controlled by user/animation
- refresh field: time interval in seconds to reload an asset

- parameter field matches HTML target: launch content in another tab

LoadSensor watchList field: report when content is fully loaded

Interactive network nodes: Anchor and Inline

Anchor node

- User can “select” any 3D content, just like HTML page can select text
- Like Viewpoint node, has three alternatives:
 - Navigate to another viewpoint within current scene
 - Load (and then user travels to) another X3D world
 - Launch content into current tab (replacing current world) or another tab

Inline node

- Loads X3D model into current scene, allows composition and growth
- IMPORT, EXPORT for passing events into, out of the other model

Measurement

Self-fulfilling prophecy: “You get what you measure”

- Surprise corollary: “You get what you inspect, not what you expect”
- Important to understand that the act of measurement defines terms of reference, which in turn lead to feedback loops and cycle of change
- Hamming joke about losing keys in parking lot, coming back at night...

Next steps are important. HTML sites can do this, so why not X3D?

- Configuring Web servers such as web3d.siggraph.org
- Experimental Logger capability for X3D SAI Browser interface
- “Walking the walk” that leads to informed, deliberate design thinking.

Assets and Getting Involved

- [X3D Tooltips](#) describe, link references for every element, attribute
- [X3D Resources](#) documents tons of resources for X3D and VRML97 including numerous converters for publishing any 3D as X3D
- [X3D Scene Authoring Hints](#) collect authoring guidelines, best practices
- [X3D Validator](#) performs comprehensive Quality Assurance (QA) testing

- [Web3DUX Working Group](#) mission: establish best practices and standardized capabilities that support rich user experiences (UX), intuitive navigation, effective interaction techniques for a variety of 3D Web technologies.
- Together let's build design-driven 3D user experience (UX) ecosystem.



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