Web 3D 2024 Industrial Application

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Title of Presentation: Meeting the Apparel/ Footwear Industries challenges with interoperability, animation chaining and Blender imports

Duration: 20 minutes

Application domain: An organization such as an apparel brand and their suppliers or between organizations

Industry Use Case: Apparel/ Footwear Industries

Abstract: (724 words)

The apparel industry poses many challenges in using 3D. The data used for design of apparel is very different than the data used for the animation industry even though the renderings and humanoids created look very similar. For example – in mocap or animation, the individual’s privacy rights are not a consideration as no individual is involved, however, in the apparel/ footwear industries, the data from an individual can be involved and as such privacy and security are important considerations.

In the apparel/ footwear industries, the dataflow usually requires at least a minimum three different software applications before the final product to the customer is released. For example, person is scanned via a phone app, the garment may be designed in software such as Clo, Browzwear, RomansCAD at the brands, the humanoid animated in Cinema4D at a 3rd party, patterns generated in software such as Lectra or RomansCAD by the manufacturer and saved as DXF file for cutting machines, and final data stored in HAnim. The requirements for apparel industry include interoperability and this can start in metadata. The basic background information as to the coordinate system and the unit of measure are very critical.

Different software have different default binding poses and rigs which can impact the validity of the data from one export / import cycle to the next. If a binding rig in one software is not acceptable in another, data can be lost as it not imported to the next software in the dataflow. This data will not be transmitted along to the next software that is being used.

The apparel / footwear industries required the interaction of the humanoid with the coveroid. This means simplified versions of transmitting the weighting of the humanoid to the coveroid while maintaining the collision detection of the coveroid with the humanoid is essential. The ability to stack coveroids on top of one another (such as modeling wearing a coat over clothes or socks and shoes) and properly modeling their physical and reflective properties is essential.

Skin weighting for garments has the common technique of having the humanoid mesh be a continuous geometric object. Making sure that the anchor points, feature points, landmarks can all interact with this continuous geometric object directly is a gap that needs to be addressed. The work done this year will allow for a foundation for future HAnim capabilities.

Since Blender is a commonly used program for design and animation, importing models from X3D and X3DV into Blender is important.  Various scenarios have been tested over the past year.

* Importing joints as bones works well.
* Importing joints as bones plus skin works (skinned), except for some deformation of skin.  The skin mostly does the right thing (except for certain models).
* Testing segment and site geometry animations (skeletal) derived from Jin (a humanoid model from Examples website) , and none of the animations work due to issues with rotations (rotation around the wrong point/center).  However, there is no issue with skin or bones. It was discovered that using local matrices worked better than world matrices in extremely simple cases, especially involving rotations.
* Simple examples of center-based rotation, not involving Joints as bones, fails.  This might be a limitation of Blender.  Python code will be generated to test this outside of an addon.  There are examples of rotations of mesh attached to empties, but none that were known with an external, specified center.
* Bones implement head and tail joint center.  Empties have a location.  Simple examples of setting a location are needed, as setting it segment and site Jin skeleton extends the example too much.

Additional testing is required. Once the correct skin deformations can be established, these examples will be made available on the Examples website.

One of the tasks that will help for future animation of complex scenes is the simplification of animation chaining into animation concatenation. This will allow for XML to JavaScript to produce a concatenation XML and attach take files (which read file into the app instead of text-editor and then merge scenegraphs) In the future, a GUI on top of code to make this easier should be a goal. This is important for body mesh files that have around 15K -25K vertices

Future goals include animating sites or displacers with weights, animation with physically and visually correct fabric and to find or create data for clothes.