

NASA KSC/Intern Abstract - 7/2018

Rapid Model Import Tool (RMIT)

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Our project is about developing a tool to implement conversion of 3D Computer Aided Design (CAD) models produced with software such as Delmia, 3DS Max, or Maya, into a size and format compatible with the Unity 3D environment. RMIT will be used to aid KSC engineering personnel in the design, development, testing, operations, and training on spacecraft, launch vehicles, facilities, and ground support equipment. For our project, we are using Blender, a free/open-source 3D graphics software, with the goal of developing, testing, and deploying a 3D CAD model converter tool.

I worked on using Blender to import 3D CAD models exported from CATIA software into Collada file format. The Collada file format has file extension DAE. Importing the Collada DAE file as is into Blender, generates dots and dashes. In 3DS Max, there is an existing OpenCollada plugin and with that plugin, 3DS Max can import the DAE file successfully. But, Blender does not seem to have an OpenCollada plugin, so I worked on writing a new OpenCollada plugin for Blender. Since 3DS Max was able to display the image, I looked into comparing differences between the original DAE file and the DAE file exported from 3DS Max using the OpenCollada plugin. As Collada documents describing digital assets are XML files with file extension DAE, Collada files contains XML tags, making them easily modifiable.

After some research, it appears that Blender does not like primitive 2D tags like **tristrips** and **trifans**. Changing those tags to **polygons** slightly improved the image, but the pieces were exploded. I found after further research comparing differences between the original file and the file exported from 3DS Max that the values inside the translate tags in the original file are scaled down by a factor of 25.4 in the exported file from 3DS Max, representing the millimeters to inches conversion (1 inch = 25.4 millimeters). After scaling down values inside all of the translate tags by 25.4, the exploded pieces stuck back in, but the image needed further improvement.

I have been able to create a new plugin in Blender that takes the original DAE file, replaces the primitive 2D tags **tristrips** and **trifans** with **polygons**, scales down the values inside the translate tags by a factor of 25.4, and saves the changes into a temporary DAE file. After the temporary DAE file is imported into Blender, the temp file is then deleted, keeping the original DAE file intact.

Starting with a DAE file that is exported using the NASA Enterprise Visualization Application (NEVA), a Collada exporter, from CATIA gives better results. NEVA is a Design Visualization product that is used for exporting 3D models from CATIA. With NEVA, the up axis is defined in the top-level node if navigation gravity is enabled. With that file, just replacing the primitive tags **tristrips** and **trifans** with **polygons** in yields a much improved image in Blender. As we identify more differences between the original DAE file and the DAE file exported from 3DS Max, this plugin can be improved further. Our goal is to have a model that is formatted and sized for import into Unity, and we are trying out different 3D programs to see which will work best.