

Web3D Design Printing and Scanning Working Group

Presentation to Web3D Consortium Meeting

August 3, 2020

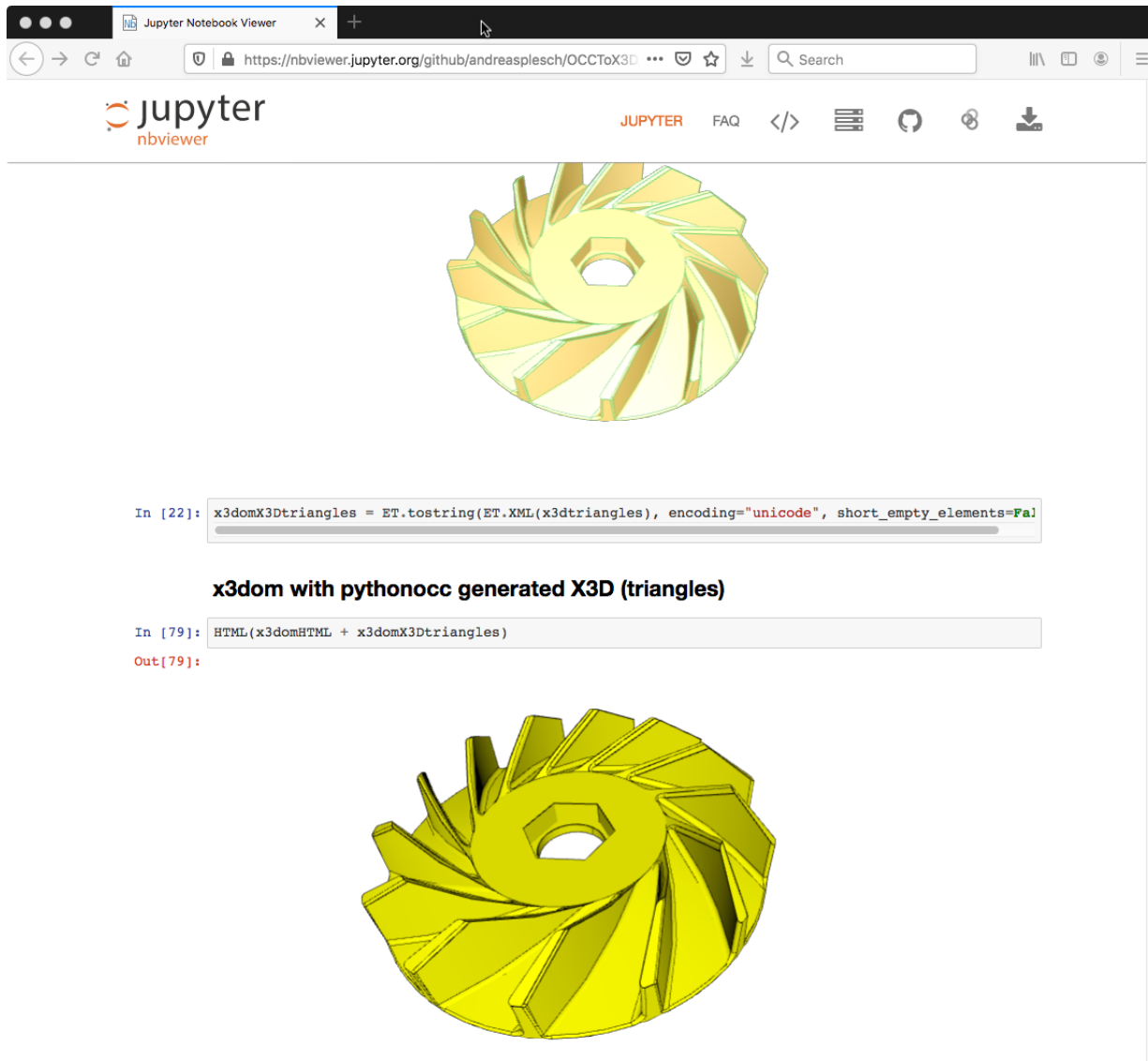
Vince Marchetti
DPS WG CoChair
vmarchetti@kshell.com

Developments in X3D standard for CAD visualization

1. Application of Open Cascade to enabling STEP to X3D tools
 - Open Cascade a geometry toolkit in C++ with an open-source core distribution
 - Open Cascade has STEP file import modules and export modules in several formats including X3D
 - pythonocc is a Python language binding to Open Cascade, allows the geometric computations performed by Open Cascade code to be executed in Python scripts : enabling fast flexible and simplified application development.

Jupyter Notebook

published by Andreas Plesch



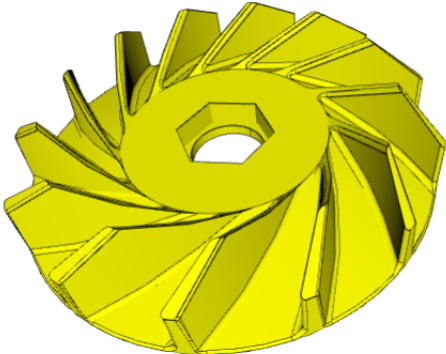
The screenshot shows a Jupyter Notebook viewer interface. The browser address bar displays `https://nbviewer.jupyter.org/github/andreasplesch/OCCToX3D`. The notebook content includes:

```
In [22]: x3domX3Dtriangles = ET.tostring(ET.XML(x3dtriangles), encoding="unicode", short_empty_elements=False)
```

x3dom with pythonocc generated X3D (triangles)

```
In [79]: HTML(x3domHTML + x3domX3Dtriangles)
```

Out[79]:



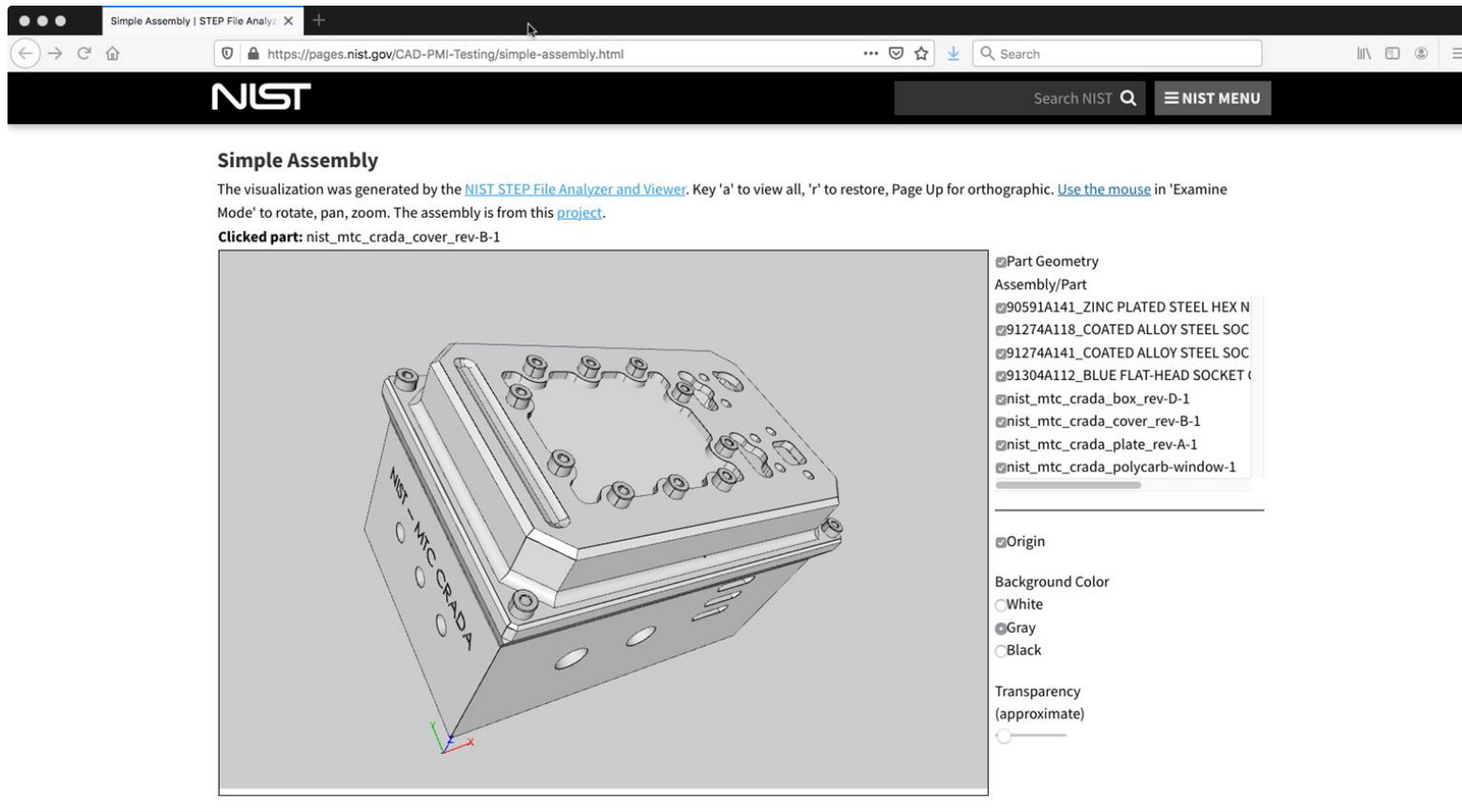
[Jupyter](#) notebook system enables Python scripting in a web-based deployment. It has become prominent in scientific computation, engineering analysis, and machine learning applications.

Open Cascade and the [pythonocc](#) binding enables reading STEP files into a notebook environment and preparing an X3D scenegraph for rendering in the notebook with X3DOM.

The [Python X3D Package](#) will allow for additional authoring of a scene presenting product geometry and PMI imported from STEP

NIST Simple Assembly

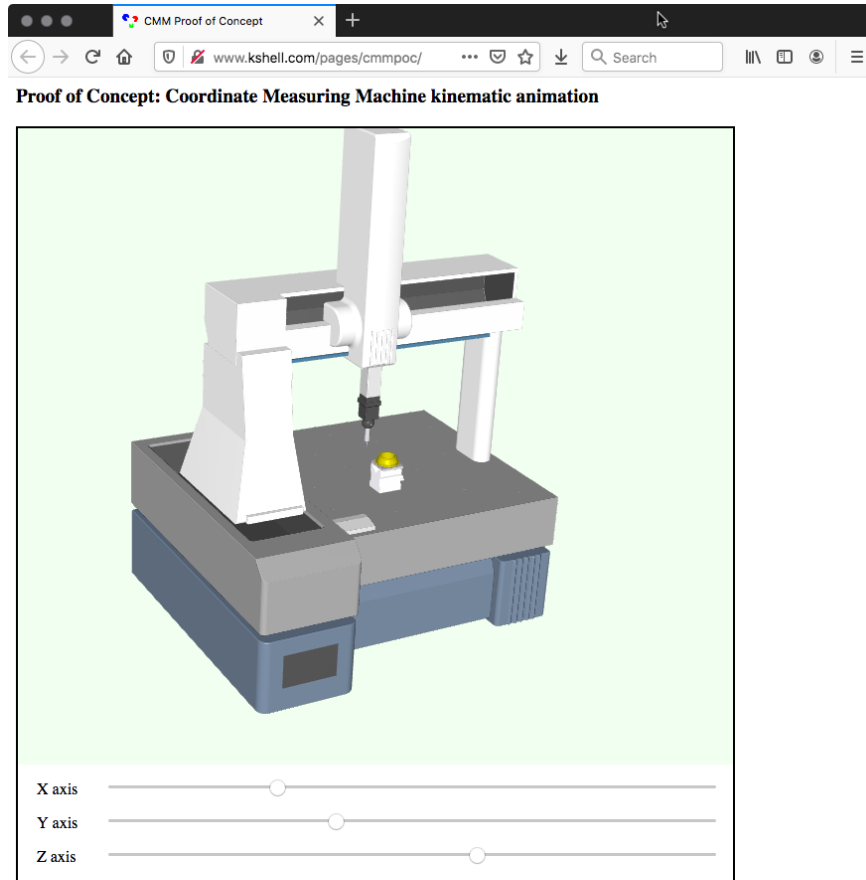
Prepared by NIST STEP File Analyzer and Viewer



Conversion from input STEP to X3D scenegraph is performed using Open Cascade C++ libraries directly (no Python intermediary)

User interactivity implemented with HTML 5 working with X3DOM rendering of X3D scene.

CMM Twin



CMM 3D model based on [GrabCad upload](#) by user [ghanshyam makwana](#).
Rendered in webpage with [X3DOM](#) viewer
X3D model and HTML5 content by Vincent Marchetti, email: vmarchetti@kshell.com
December 10 2018

Position of probe tip in this demo is determined by HTML 5 slider inputs, but could be performed in a web page by any Javascript accessible function, including connection to a remote socket

CMM model originated in a STEP file, with kinematic motion added "by-hand", but could be specified using kinematic capability of AP-242