Third Party Software Libraries Used In Past Authoring Tool Projects

For an extensive list of additional computer graphics research software see:
http://www.dgp.toronto.edu/~rms/links.html
For an extensive list of other C++ libraries see:
https://wiki.nikiv.dev/programming-languages/cpp/cpp-libraries

C++ Libraries

- OpenCV – Image Processing
  - http://opencv.org/downloads.html
- SPH Fluid Simulation (Lagrangian) Fluid Simulation
  - http://www.rchoetzlein.com/eng/graphics/fluids.htm
  - https://github.com/InteractiveComputerGraphics/SPlisHSPlasH
- Grid-based Fluid Simulation (Eulerian)
  - https://github.com/christopherbatty/Fluid3D
  - https://github.com/rlguy/GridFluidSim3D
- CGAL – Computational Geometry Algorithms Library
  - https://www.cgal.org/
- Bullet – Real-time Physics Engine
  - http://bulletphysics.org/wordpress/
  - http://www.bulletphysics.org/mediawiki-1.5.8/index.php/Download
  - http://code.google.com/p/bullet/downloads/list
- 3Delight Studio Pro – Maya Renderman Plugin
  - http://www.3delight.com/en/index.php?page=3DSP_download
- Power Crust – Medial Axis and Point Set-based Mesh Generation
  - http://www.cs.ucdavis.edu/~amenta/powercrust.html
- Small Pt – Path Tracer
  - http://kevinbeason.com/smallpt/
- Vector/Matrix Library – Graphics Gems IV
  - https://www.cs.cmu.edu/~ph/gem4.html
- cyHairFile.h – Loads/saves hair files
  - http://www.cemyuksel.com/cyCodeBase/docs/cy_hair_file_8h.html
- SDFgen – Signed Distance Function Generator (Level Set implicit surface)
  - https://github.com/christopherbatty/SDFGen
  - http://www.ohloh.net/p/sdfgen
  - https://cs.uwaterloo.ca/~c2batty/
- AMPL – Optimization Solver
  - http://www.ampl.com/DOWNLOADS/
- TETGEN – Tetrahedron Generator

  - http://wias-berlin.de/software/tetgen/

- libigl - A simple C++ geometry processing library
  - https://libigl.github.io/
- tinyobj – obj file loader
  - https://github.com/tinyobjloader/tinyobjloader
- Dear imGUI - graphical user interface library for C++
  - https://github.com/ocornut/imgui
- Stb library - Simple library for loading image into Imgui
  - https://github.com/nothings/stb
- VegaFEM – Finite Element Library
  - http://run.usc.edu/vega/
- IPOPT, NLOPT – Non-linear Optimization Libraries
  - http://ab-initio.mit.edu/wiki/index.php/NLopt
  - https://projects.coin-or.org/Ipopt
- ADOL-C – Numerical Differentiation Library
  - http://www.autodiff.org/?module=Tools&tool=ADOL-C
  - https://projects.coin-or.org/ADOL-C
- CLMG – Image Processing Library
  - http://cimg.sourceforge.net/
- DevIL – OpenGL Image / Screen Shot Capture Library
  - http://openil.sourceforge.net/
- Voro++ - A 3D Voronoi cell software library
  - http://math.lbl.gov/voro++/
- OGRE – Open Source 3D Graphics Engine
  - http://www.ogre3d.org/
- Armadillo: C++ linear algebra library
  - http://arma.sourceforge.net/
- El Topo - Explicit Surface Tracking Library
  - http://www.cs.ubc.ca/labs/imager/tr/2009/eltopo/eltopo.html
- BLAS (Basic Linear Algebra Subprograms)
  - http://www.netlib.org/blas/
- LargeModalDeformationFactory.cpp – GitHub
  - https://github.com/starseeker/VegaFEM-cmake/blob/master/src/util/largeModalDeformationFactory/largeModalDeformationFactory.cpp
- Mosek Optimization Solver
  - https://mosek.com/

- Marching Cube method by Paul Bourke
  - http://paulbourke.net/geometry/polygonise/
- Shave and a Haircut : Hair simulation Maya Plugin
  - http://www.joealter.com/shave.htm
- CImg Library - C++ Template Image Processing Toolkit
  - http://cimg.sourceforge.net/
- tree.hh: an STL-like C++ tree class
  - http://tree.phi-sci.com/
- OpenVDB – hierarchical data structure and a suite of tools for the efficient storage and manipulation of sparse volumetric data discretized on three-dimensional grids
  - https://www.openvdb.org/
- SPlisHSPlasH – open source library for particle-based SPH simulation of fluids
  - https://animation.rwth-aachen.de/software/splishsplash/
- FluidsV.2 – open source particle-based SPH simulation of fluids
  - https://rchoetzlein.com/eng/graphics/fluids.htm
- LibiGL – geometry processing library
  - https://libigl.github.io
- OpenGL Mathematics Library (GLM)
  - https://github.com/g-truc/glm
- Geogram - A programming library of geometric algorithms (including Voronoi diagrams and Delaunay triangulation
  - http://alice.loria.fr/software/geogram/doc/html/index.html
- Eigen Math Library
  - https://eigen.tuxfamily.org/index.php?title=Main_Page
- OptumLib – lightweight C++ library of numerical optimization methods for nonlinear functions
  - https://www.kthohr.com/optimlib.html
- Mosek Optimization Library - C++ tools for formulating and solving linear or conic optimization problems
  - https://www.mosek.com/
- Gurobi Optimization Library
  - https://www.gurobi.com/
- Dlib - C++ toolkit containing machine learning algorithms and tools
  - http://dlib.net/ml.html
- Magick++ - C++ API to the ImageMagick image-processing library

  - https://imagemagick.org/Magick++/
  - https://imagemagick.org/index.php

- Point Cloud Mesher WOF- 3D points to/from 3D mesh
  - https://www.geom.at/products/wof-point-cloud-mesher/

Python Libraries

- SciPy – Python-based Scientific Computing Library
  - http://www.scipy.org/
- NumPy – Python-based Math Library
  - http://www.numpy.org/
- PyMesh – Python-based geometry processing library
  - https://github.com/PyMesh/PyMesh
- Shapely - Python package for manipulation and analysis of planar geometric objects.
  - https://pypi.org/project/shapely/
- SVGWrite - A Python library to create SVG drawings
  - https://pypi.org/project/svgwrite/
- Matplotlib – Library for creating static, animated, and interactive visualizations in Python.
  - https://matplotlib.org/
- perlin-noise - Python library we used to add noise to line style in split operator
  - https://pypi.org/project/perlin-noise/
- OpenFace - a Python and Torch implementation of face recognition with deep neural networks
  - https://cmusatyalab.github.io/openface/

Other

- Inkscape - Vector graphics software we used to convert the SVGs to PNGs
  - https://inkscape.org/
- Ebsynth - video synthesis software provided by the author of Stylize Video by Example paper
  - https://ebsynth.com/
- BiSeNet - is a neural-based segmentation model
  - https://paperswithcode.com/paper/bisenet-bilateral-segmentation-network-for
- Some useful Houdini nodes

- Grain Source node – converts geometry into particles https://www.sidefx.com/docs/houdini/nodes/sop/grainsource.html
- IsoOffset node – converts geometry into signed distance function (SDF) https://www.sidefx.com/docs/houdini/nodes/sop/isooffset.html