

OpenTissue

The STL of Physics-Based Animation.

A Huge Library in Constant Motion.

The OpenTissue Profile

- OpenTissue is generic algorithms and data structures for rapid development of interactive modeling and simulation.
- Free for commercial use, open source under the ZLib License.

Features - Dynamics

- **Multibody dynamics:**
 - Velocity-based complementary formulation.
 - Impulse-based simulation.
- **Fluids:**
 - Shallow Water Equations.
 - Smoothed Particle Hydrodynamic.
- **Deformable models:**
 - Co-rotational Linear Finite Element Method.
 - Elastically Deformable Models.

Features - Kinematics

- Non-linear optimization-based inverse kinematics:
 - Multiple goals and end effectors.
 - Robust toward jittering.
- Support for key-frame animation and motion blending.
- Linear and spherical blend skinning on CPU and GPU.

Features - Collision Detection

- Generic components with multiple usages.
- Several different types of CD:
 - Spatial Hashing (both broad and narrow phase).
 - Bounding Volume Hierarchies (CUDA version pending).
 - Specialized GJK (robust geometric sub-solver and an improved outer loop).
 - Continuous CD based on conservative advancement.
 - Geometric Primitives.

Features - Others

- High-level abstraction library for large scale equation solving and optimization problems.
- Generic B-spline library: arbitrary dimensions and order, support non-uniform knot-values.
- Mesh Libraries:
 - Tetrahedral Mesh, half-edge data structure, and face indexed arrays.
 - Advanced geometric operations: Convex Hull, Constrained Delaunay Triangulation.
- And much, much more.

The Past

- Very rich on features.
- Advanced programming paradigms – heavy usage of templates.
- Large code base resulted in lot of maintenance.
- Many third-party dependencies made it hard to install.
- Documentation quality-level varied.

The Road to the Future

- We have constituted a strategic decisions board.
- We have introduced a review process to enhance code quality.
- We have introduced unit-testing to assure stability and robustness of code.
- We have shifted to Cmake to better support cross-platform development.
- We have re-factored the internal structure of OpenTissue to make concepts more clear.
- We have introduced a wiki with timely information.

Just around the Corner

- We are changing deployment and distribution.
- Reduction in third party dependencies.
- Online Doxygen documentation of API.
- Sub-libraries will be distributed as stand-alone libraries.
- Clear separation of OpenTissue functionality.
- Ogre3D, Qt integration examples will be added.
- Templates will still be around, but a major clean-up is in progress to prevent over-use.

Milestones

- May 2009: First phase of deployment changes finished. Still one big library, but a clean chunk.
- August 2009: Second phase of deployment: Stand-alone transition, the big chunk is broken down into stand-alone libraries.
- November 2009: Official binary releases of selected stand-alone libs can be downloaded from the OpenTissue web-site.

Contact Us

www.opentissue.org