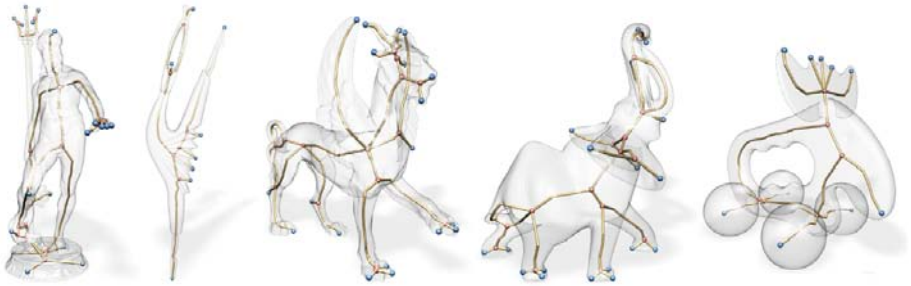
EE 4702-2 (Spring 2012) 3D Graphical Modeling

Course Webpage: http://www.ece.lsu.edu/xinli/teaching/EE4700Spring2012.htm



Instructor: Dr. **Xin (Shane) Li** (URL: www.ece.lsu.edu/xinli Email: xinli@lsu.edu)

Course Description:

- An introductory course to 3D computer graphics, on how to represent, model, and render 3D models and scenes;
- Good math background and programming skills could easily follow it.

Prerequisites:

- Calculus and linear algebra (vectors, matrices, …)
- Programming experience: homework and projects require substantial programming effort
  (You are expected to know C/C++ programming and standard data structures)

Contents:

1. Basic computer graphics pipeline, basic OpenGL programming;
2. Basic 3D geometry; 2D and 3D Transformations, Projections;
3. Basic graphics modeling system, Graphics User Interface design, build your own GUI,
4. [Mesh Representation] – most popular representation in computer graphics
   - Representing objects using triangle meshes, Half-edge Data Structure;
   - Computing geometric properties on triangle meshes (areas, curvature, geodesic curves)
5. [Spatial-Partitioning Representation] – efficient Boolean (union, intersect) operations
   - Representing objects using regular grids, Quad-tree (2D) and Oct-tree (3D);
   - Efficient inter-object collision detection using hierarchical oct-tree
6. [Parametric Representation] – industry CAD standard
   - Representing objects using splines;
   - Shape editing: Efficient free-form deformation
7. [Medial Representation] – for gamers and animators
   - Representing objects using its skeleton (skeletonization and mesh skinning)
   - Skeleton-driven Animation
8. Other representations and their applications;
9. Selective graphics topics;

Homework and exams:

1. Four homework assignments (10+10+10+10);
2. A course project (with a midterm and final presentation), you will pick the topic and team up for it (10+10+15);
3. Final Exam (25).

Textbook: (not required, slides will be provided)

OpenGL programming: “The OpenGL programming Guide”: http://www.opengl.org/documentation/red_book/