Introduction to Computer Graphics CS 174A: Assignment 1 – Part 2

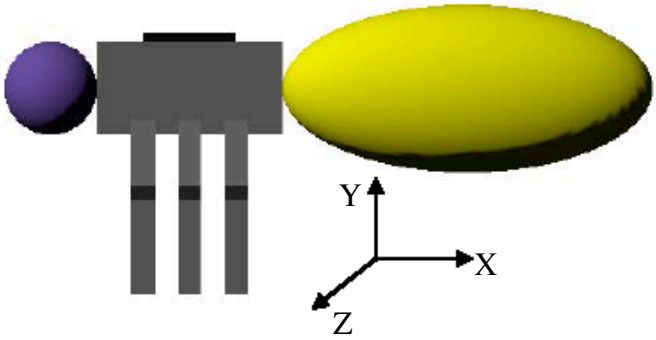
Weight: 10 % Due: Apr 22, 2014, 12pm
Points: 30
Collaboration: None permitted. If you discuss this assignment with others, you should submit their names along with the assignment material. Reverse engineering the sample executable and using code from previous offerings of the course constitute plagiarism and are strictly prohibited. We will use automated tools to check for plagiarism.

Submission: Follow the instructions below carefully to avoid point reductions.
Submit via CourseWeb a zipped file (UID_OS.zip — e.g: 313939200_linux.zip) that includes the source files and a README file. Also include other files necessary for building the project (makefile, Visual Studio files, Xcode files, etc.). The README file should describe which parts of the requirements are fulfilled and which parts are partially fulfilled, as well as key settings you feel are necessary for the grader to successfully build your project. Please remove the executable and object files to reduce the zip file size. (1 Point)

Write a program in OpengGL that draws the scene shown in the sample executable. Use the template code in template1.zip, which is provided on the course website. For drawing objects, use only the procedures provided, drawCube() and drawSphere(); do NOT use glutSolidSphere() or glutSolidCube() or any other built-in cube and sphere drawing functions. For transformation, use only the procedures provided, Translate(), RotateX(), RotateY(), RotateZ() and Scale(); do NOT use glTranslate(), glRotate() and glScale() or other built-in transformation.

(a) Implement the composite RotateXYZ(thetaX, thetaY and thetaZ) procedure in Angel/mat.h without using any elementary transformations; RotateXYZ rotates first around X, then around Y and finally around Z. (4 Point)
(b) Fix the vertices[8] and colorcube() in shape.cpp. They are used to draw a cube. (1 Point)
(c) You must use a hierarchical approach to model the complex objects. (5 Points)
(d) Model a static ground plane. (1 Point)
(e) Model a tree that has a trunk made of 8 parts and a sphere for foliage. (2 Points)
(f) The tree must visibly sway as shown by the sample executable. (2 Points)
(g) You must rotate objects around the correct point; i.e., where they touch the parent object. *Trunk parts rotate around the middle of the bottom face. (4 Points)*
(h) Animate the wings and legs of the wasp. You may use the same value for more than one angle. The wasp's main axis is X. All moving body parts must rotate around the X-axis. *(5 Points)*
(i) The wasp flies in a circle around the vertical axis, and it should always be aligned with *the tangent of the circle. (3 Points)*
(j) The wasp must move up and down. (2 Points)
(k) You need NOT match the exact motion or dimensions of the sample code; however, your scene must be qualitatively and visually similar to the one provided.

Hints:
(a) Create a function drawLeg() and use it for all the legs.
(b) Call your drawing function in display(). Use the TIME variable.
(c) Functions of the form f(t) = a + b*sin(w*t) are useful for modeling periodic motion.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