

# Math 155B – Topics in Computer Graphics – Spring 2017

## **Project #4– Rotate and animate a teapot using slerp-ing and quaternions.**

**Due date:** Friday, May 26, 9:00pm.

**Hand in:** (a) Upload source code to a dropbox folder. AND (b) An individual grading session with your professor or TA.

### **ZIP file with source code:**

[http://www.math.ucsd.edu/~sbuss/CourseWeb/Math155B\\_2017Spring/Project4/Project4\\_Math155B\\_Spring2017.zip](http://www.math.ucsd.edu/~sbuss/CourseWeb/Math155B_2017Spring/Project4/Project4_Math155B_Spring2017.zip)

**Overview:** For this assignment, you will duplicate the functionality of the Teapot155BDemo program. This is included with the .zip file for this assignment. There are three components for this:

1. Track the left mouse button status and the mouse position to let the mouse drag the orientation of a teapot.
2. Draw the current rotation vector.
3. When the “a” (animate) command is given, interpolate the teapot between its current position and its rest position.

For full credit, please use quaternions. It is possible to do the assignment with only rotation matrices, but there may be a point deduction for this.

### **Steps to follow:**

1. Understand the code in **TeapotBase.cpp** (included in the .zip file).
2. As currently written, the TeapotBase.cpp code tracks the mouse position, and prints to the console window the updated mouse position, and the amount of movement of the mouse as a fraction of the size of the screen. This movement will drive the rotation of the teapot.
3. Note that when the left mouse button is pressed, the teapot follows the mouse movement until the left mouse is un-pressed.
4. The change in mouse position, is used to generate a rotation around an axis lying in the  $xy$  plane. This is used to generate a quaternion. The current quaternion can be updated using quaternion multiplication.
5. To display the teapot, use the current quaternion to generate a rotation, and use this to rotate the teapot.
6. Use the rotation to draw the visible rotation vector.
7. The final part of the program to write is the animation. When ‘a’ is pressed, the program goes into animation-mode, and draws the rotating teapot until it reaches the original orientation.

**Hand in procedure: One-one grading PLUS submit a PDF file PLUS save good quality .bmp files of your scene rendered with only basic raytracing and with distributed raytracing..**

(1) As usual, create a directory called **Project4** in the **Documents** folder your networked file system on the PC computers. (not the desktop). Place there your source files and your Visual C++ solution and

project files. Your program should compile and run in your work directory with the version of Visual C++ installed on the computer lab computers. If you use another version of C++ at home for development, it is your responsibility to convert your project files to work on the computer lab computers.

(2) Place your sources into a zip file, and upload them to the dropbox folder. Further instructions will be given via piazza.

**Grading:** Grading is an individual session with Srivastava or Professor Buss, and on evaluation of your PDF submission. Please do not modify your files after the due date.