Assignment 2—Hello (3D) World

Due: Wednesday September 27 at 7am

1. Implement a planar pinhole camera class that stores the center of projection, the vector from the eye to the top left corner of the image, the pixel width vector, the pixel height vector, and the image resolution, and that has the following functionality:
   a. Constructor from resolution and horizontal field of view
   b. Left-right, up-down, and forward-backward translations
   c. Pan, tilt, roll rotations about center of projection
   d. Change of focal length
   e. Projection of 3-D point
   f. Interpolation between two given cameras
   g. Save / load from text file
2. Implement a triangle mesh class that stores shared vertices and triangle connectivity data and that has the following functionality:
   a. Load from bin file
   b. Computation of 3-D axis aligned bounding box (AABB)
   c. Translation of vertices
   d. Scaling of vertices
   e. Placing the centroid at given position and scaling to given AABB size
   f. Rendering in wireframe mode
   g. Rendering in filled mode with z-buffering and screen space interpolation of vertex colors
3. Demonstrate your code.
   a. Create a scene with at least 5 objects.
   b. Each object should rotate about an arbitrary axis.
   c. At least one object should be spinning, i.e. rotating about an axis passing through its centroid.
   d. Render a 10s 30Hz 720p video sequence illustrating your scene. For the first 5 seconds the camera should be fixed. For the next 5s the camera should move progressively from the initial view to a second view. The video file should be in a popular format. Use the video making software of your choice.
4. Turn in via blackboard one zip archive that contains
   a. Source code
   b. Executable
   c. Video file