Homework 3: Meshes and Transformations

CS 440 Computer Graphics
Habib University

Fall 2023

Each problem below specifies the names of the files that you have to submit for it. Please make sure that your submitted files have the indicated names. Any files in your GitHub repository with these names at the time of the deadline will be considered your submission.

1. A repository of models

Obtain some models from the The Stanford 3D Scanning Repository to work with. You will need to run a local web server, as in the previous homework, to load the file into your program and perform the following operations.
Include interface elements to support the following GPU operations on the loaded model.

(a) On the CPU, read in the geometry and compute its bounding box. Send the bounding box information as a `uniform` to the vertex shader which then transforms the vertices to clip coordinates such that the aspect ratio of the model is preserved, the model is centered at the origin, and it is fully visible. Use indexed vertices to minimize the number of vertices that need to be passed to the GPU.

(b) Rotate the model slightly about each of the 3 axes in the clockwise or counterclockwise direction.

(c) Shift the model slightly in the positive or negative x, y, or z directions.

(d) Scale the model slightly along any of the x, y, or z directions.

(e) Reflect the model about any of the axes.

(f) Reset all transformations.

The model may appear flat. Try to use gl_FragDepth to create a perception of depth.

Files: `mesh.html, mesh.js`