

A6—Hardware Rendering

Due: Thursday November 29th, at 11:59pm

1. Enhance your interactive graphics application with fixed pipeline hardware rendering support. Provide the following features:
 - a. Shared vertex triangle mesh rendering
 - b. Filled mode and wireframe mode
 - c. Vertex color interpolation
 - d. Texture mapping
2. **Option 1.** Enhance your interactive graphics application with shader support. Write GPU shaders for rendering reflections of nearby objects by approximating the nearby objects with billboards; a billboard approximating an object is a rectangle texture mapped with an image of the object, with a transparent background.
 - a. **Extra credit 2%. Distant geometry and distant reflected geometry should be rendered by cube mapping.**
3. **Option 2.** Write GPU shaders to render soft shadows for a scene with three boxes moving on a ground plane and a moving rectangular light source.
 - a. The boxes do not intersect
 - b. The shadows of at least two boxes should intersect
 - c. The boxes should not only cast but also receive shadows
 - d. Soft shadows should be computed by estimating visibility to 16x16 light samples
 - e. **Extra credit 2%. Carve the box surfaces with the help of two “stencil” textures**
 - i. One texture is to be used for the top face of the boxes
 - ii. The other texture is to be used for the side faces of the boxes
 - iii. The texture should have white and black pixels; white means “hole”, that is “absence of material”; black means “solid”, that is “presence of material”
 - iv. The top texture should be continuous with the lateral textures
 - v. Update your shaders to carve the boxes using the two textures; shadow computation should account for the modified geometry.
4. **Option 3.** Choose a project for A6. Send a proposal by 11/18.
5. Make a 60s video to illustrate your work, including any extra credit feature you have completed.
6. Turn in via blackboard one zip archive that contains
 - a. Source code
 - b. Executable
 - c. Video file