Assignment 4 (Complete)

CMSC 427, Fall 2003
Due: 11:00am Tuesday, November 25, 2003

This part of the assignment involves illumination and shading. The assignment web-page is at www.cs.umd.edu/class/fall2003/cmsc427/assg4/.

Note: The motions (camera movements, player movements) and energy bar for this assignment should be implemented as in Assignment 3.

(a) Change the primitives for the players from `glutWireCube` and `glutWireSphere` to `glutSolidCube` and `glutSolidSphere`. Set up the lighting and material parameters as follows:

- Set up a single white *(RGB = 1, 1, 1)* directional light source (at infinity) along the direction *(1, 1, 1)*. The light should have diffuse and specular components and the shininess coefficient of the specular light should be *60*. Initialize a global ambient light *(GL_ LIGHT_MODEL_AMBIENT)* with a color of *(0.8, 0.8, 0.8)*.
- Set up the material colors for the red and blue players as red and blue diffuse colors. Set up their specular colors to be *(0.6, 0.6, 0.6)* with a shininess coefficient of *60*.

(7)

(b) Draw the cubes representing the player limbs and torso with six rectangles each (instead of `glutSolidCube`). Calculate the normal vector at each vertex by averaging the normal vectors of the adjacent cube faces. Now shade them in OpenGL using smooth Gouraud shading. The cubes will now have less faceted appearance. **(5)**

(c) We have provided three texture files – `ground.bmp`, `bricks.bmp`, and `sky.bmp`. Texture map these to the floor, the walls, and the roof polygons of the Assignment 3 room as follows:

- Texture map `ground.bmp` to the floor of the room. Assign the texture coordinates such that the image is repeated *100* times along the length and along the width of the floor polygon.
- Texture map `bricks.bmp` to the four walls of the room. Assign the texture coordinates such that the image is repeated *20* times along the length and along the height of each wall polygon.
- Texture map `sky.bmp` to the entire ceiling of the room. Assign the texture coordinates such that the image is *not* repeated.

(5)

(d) Draw the shadows of the two players on the $y = 1$ plane. Note that this places the shadow slightly above the ground plane $(y = 0)$ so that the shadow does not get occluded by the ground. Assume the light source is along the direction *(1, 1, 1)* as in part (a) above. **(8)**