CSC 476 – Lab 2 – REVISION - April 30, 2007
A light map world

Please note that this lab should be completed **individually**! You may talk to one another about the lab, but you may not look at someone's working code!

Implement a simple box world with light maps that you can explore with your same camera controls from Lab 1. This lab must have two modes for shading: One which does not have any OpenGL lighting enabled and must use diffuse light maps and image textures to make the world look interesting and shaded and the other which uses the same image textures but does the shading using the traditional fixed function lighting. Please create your own diffuse light maps for the boxes (by setting up the camera appropriately to view a lighted version of a box side and then copy the diffuse light map out of the frame buffer – make sure that only diffuse lighting is enabled and that no texturing is included for the light map creation). Please strongly consider using a spot light for your lighting to make the lighting look interesting. Also consider turning on distance attenuation to create more realistic/interesting lighting. Your world must include:

- a texture mapped & light mapped ground plane,
- a sky box and
- at least 3 fairly large texture mapped & light mapped boxes in the scene
- the camera movement from Lab 1 in order to 'explore' the scene.

Use multi-texturing to combined interesting color/image texture information on the boxes and the diffuse light maps you create. Please use at least 3 different 'color' textures, which you vary either per side or per box to make the scene interesting. You have some creativity/freedom to decide on exactly how to set up your world. In general, your goal should be to create an aesthetically pleasing world. This means you should pay attention to your shading, lighting, texturing to make sure they look good when produced and rendered. In addition, you need to attend to general texturing, i.e. use mipmaps and use appropriate sized textures for your goal. Provide a mode (e.g. key board event) which can toggle between rendering with lighting on and lighting off (which uses light maps for the shading).
At this point, multi-texturing should be implemented using openGL extensions and not a shader.

Learning Objectives

- Learn to about **texture mapping and diffuse light maps**
- Learn about **multi-texturing**

• Grading and Due Date

You must **demo your program in lab on April 30th.**

• Programming Design and Implementation Requirements

1. You may download and use existing code for loading an image into openGL for use as a texture (see for example Lab 11 from CSC 471: http://www.csc.calpoly.edu/~zwood/teaching/csc471/material/tex_release.tar

2. You may download example textures, light maps, etc. from tutorial sites about multi-texturing, however, be very careful! Ultimately, your light maps much match one another and the scene, so to make them look right for the whole scene you will need to generate them on your own. I recommend practicing multi-texturing with existing tutorial example light maps.
3. When demoing your light map code OpenGL lighting should be off. When generating your light maps, diffuse lighting only should be enabled with no other texturing in place!
4. Create at least three different obstacles/boxes in your world. You may create more if you'd like. I encourage you to design an interesting scene.
    a. World obstacles should be rectangular objects (boxes) of some sort to ease in light map production and parameterization.
    b. Use multi-texturing techniques on these obstacles to make them more visually interesting. Specifically, combine a color/image with a light map.
5. You may use tutorials about multi-texturing but make sure you understand what you are doing so you can create <u>different</u> effects then those demonstrated in the tutorial.
6. Provide a mode (e.g. key board event) which can toggle between rendering with lighting on and lighting off (which uses light maps for the shading).