




# OpenGL Programming II



Rick Skarbez, Instructor  
COMP 575  
September 13, 2007

The slide has a white background with the title 'OpenGL Programming II' in a large, black, serif font. Below the title is a small, grey, 3D-rendered classical building with a dome and columns. At the bottom, the instructor's name and course information are listed in a smaller, black, sans-serif font.

# Robot Ate My Homework

Mark Shirra  
Vancouver Film School, SIGGRAPH 2006



Available online:  
[http://www.vfs.com/showcase.php?id=7&category\\_id=10&project\\_id=858](http://www.vfs.com/showcase.php?id=7&category_id=10&project_id=858)

The slide has a white background with the title 'Robot Ate My Homework' in a large, black, sans-serif font. Below the title is the name 'Mark Shirra' and 'Vancouver Film School, SIGGRAPH 2006'. In the center is a small, 3D-rendered robot character with a round head and thin arms, standing in a room with posters on the wall. At the bottom, there is a line of text 'Available online:' followed by a URL.

# Announcements

- Reminder: Homework 1 is due today
  - Questions?
- Class next Tuesday (9/18) will be held in SN 014

The slide has a white background with the title 'Announcements' in a large, black, sans-serif font. Below the title is a bulleted list of announcements in a smaller, black, sans-serif font.

# Last Time

- Introduced the basics of OpenGL programming
  - OpenGL is a state machine
  - All objects are lists of vertices
  - 2 matrices in OpenGL
    - ModelView
    - Projection

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# Today

- Review a bit from last time
- Work through some demos
- Introduce/demo windowing toolkits
  - GLUT
  - FLTK

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## OpenGL in Java

- UPDATE: Apparently, the newest versions of Netbeans include JOGL bindings
- Check out <http://unc-cs575-lerch.blogspot.com>
- Many thanks to Tae

## Clearing the Screen

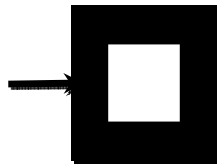
To Clear The On-Screen Image And The Z-Buffer

```
glClearColor(0.0, 0.0, 0.0, 0.0);
glClearDepth(1.0);
glClear(GL_COLOR_BUFFER_BIT | GL_DEPTH_BUFFER_BIT)
```



## Our First OpenGL Code

```
...
glClearColor(0.0, 0.0, 0.0, 0.0);
glClear(GL_COLOR_BUFFER_BIT);
glColor3f(1.0, 1.0, 1.0);
glOrtho(-1.0, 1.0, -1.0, 1.0, -1.0, 1.0);
glBegin(GL_POLYGON);
  glVertex2f(-0.5, -0.5);
  glVertex2f(-0.5, 0.5);
  glVertex2f(0.5, 0.5);
  glVertex2f(0.5, -0.5);
glEnd();
glFlush();
...
```



## Drawing into a Window

- You specify what you want drawn with OpenGL
  - But where are you drawing it?
    - Need to call the OS to get a window
- Two ways to do this:
  1. Make you learn the specifics of the operating / windowing system
  2. Use a toolkit that hides the OS interface

## UI Toolkits

- There are a lot of options to choose from:
  - GLUT
  - FLTK
  - QT
  - wxWindows
  - Cocoa
  - etc.
- I'm going to demonstrate GLUT today

## GLUT

- OpenGL Utility Toolkit
- Cross-Platform C++ Drawing/UI Toolkit
- Provides functions to make starting up and drawing fast and easy
- Supports only limited user interfaces

## Installing GLUT

- On Windows:
  - Download from Nate Robins' website:
    - <http://www.xmission.com/%7Enate/glut.html>
  - glut-3.7.6-bin has the dll/lib/header that are required
    - Copy glut.dll to {Windows DLL dir}\glut32.dll
    - Copy glut.lib to {VC++ lib path}\glut32.lib
    - Copy glut.h to {VC++ include path}\GL\glut.h

## Using GLUT

- Only need to include glut.h
  - #include <GL\glut.h>
    - Automatically includes gl.h and glu.h
- Lighthouse3D has a good GLUT tutorial
  - <http://www.lighthouse3d.com/opengl/glut/index.php?1>

## FLTK

- Fast Light Toolkit
- Cross-Platform C++ GUI Toolkit
- Provides more full-featured UI functionality than GLUT
  - Also supports GLUT code through emulation
- Download from <http://www.fltk.org>

## Next Time

- Review of Assignment 1
- Demo / discussion of Programming Assignment 1
- Geometry & Modeling
  
- Will end early (~4:25) for Randy Pausch lecture