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Introduction to GLUI

Related material in Hill and Kelley: Ch. 3.2, 5

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Preview

- Some hints for first assignment
- GLUI: another solution to “listening” problem

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Hint 1: Wireframe

- `glPolygonMode` function

```
- glPolygonMode(GL_FRONT_AND_BACK, GL_FILL);  
- glPolygonMode(GL_FRONT_AND_BACK, GL_LINE);  
- glPolygonMode(GL_FRONT_AND_BACK, GL_POINT);
```



- OO-tip: Have a method in base class that handles color, wireframe—call in children

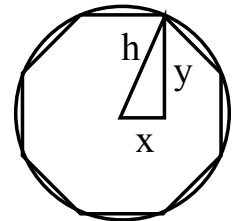
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Hint 2: Curves

- OpenGL doesn't have primitive curves
- Instead: approximate using lines
- Preview of parametric curves:
 - $\sin \Theta = x/h$
 - $\cos \Theta = y/h$
 - Can calculate x and y in terms of where on circle Θ is
 - What is h with respect to the circle...?



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Hint 3: Menu Callbacks

- `glutMenuStatusFunc()` function
- Register callback with three arguments:
 - `myMenuCallback(int status, int x, int y)...`
- Can treat a `status` of `GLUT_MENU_IN_USE` as a mouse-pressed event, if careful
- *Current* menu `glutGetMenu()` is menu ID
- OO-tip: `MouseEvent`'s shouldn't know about menus, but a `MenuSource` could be a source of mouse events...

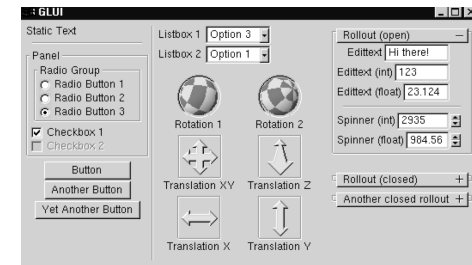
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GLUI Library

- Problem: want to “listen” to user, but don't want to create everything from scratch
- GLUI is a simple solution



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Why GLUI?

- Built completely atop GLUT
 - Portable (cross-platform)
 - Works seamlessly with GLUT
- Has everything needed for a simple app
 - Scrollbars (undocumented, but there in 2.3.5!)
 - Check-boxes
 - Text entry
 - Much more...
 - Still no pull-down menus

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Main Steps in Using GLUI

- GLUI Initialization
- Setup GLUI window
- Create GLUI callback functions
- Attach GLUI window to GLUT window
- Link in glui library
- Windows: fix `glui.h`, use `<GL/...>` includes



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GLUI Initialization

```
#include <GL/glui.h>
...
//hold onto ID for the GLUT window
int mainWindowID;
mainWindowID = glutCreateWindow("Demo");
...
//other GLUT setup code...
...
//Create the GLUI window
GLUI *glui = GLUI_Master.create_glui(
    "Control Panel" );
```

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GLUI Window Setup

- Add controls to your GLUI gui
- Examples



- Checkbox, using a “live” variable `lighting`
`int lighting;`
`glui->add_checkbox("Lighting", &lighting);`
- Button, using our existing popup menu callback
`glui->add_button("Quit", MY_EXIT_CMD,`
`processRightButtonMenu);`
- Button, using some new callback `flipCallback`
`glui->add_button("Flip Left", -1, flipCallback);`

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Create GLUI Callback Functions

- Return `void`, takes `int` that you specify when you registered the callback

– We just did this:

```
glui->add_button( "Flip Left", -1, flipCallback);
```

– So somewhere we need to define the callback

```
void flipCallback( int command )
{
    if (command == -1) //implement flip-left
    ...
}
```

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Create GLUI Callback Functions

- Also need to specify the “Idle” function
`GLUI_Master.set_glutIdleFunc(myIdleFunc);`
- Callback `myIdleFunc` called whenever GLUT is *idle*: not doing anything else
- Must use `set_glutIdleFunc` even if not using callback

```
GLUI_Master.set_glutIdleFunc( NULL );
```

– Lets GLUI set up its own idle-time business

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Attach GLUT-Win to GLUT-Win

- Remember when we did this?

```
mainWindowID = glutCreateWindow("Demo");
```

- Now we can do this:

```
glui->set_main_gfx_window( mainWindowID );
```

- Lets GLUT know which window to redisplay whenever
 - User modifies control attached to a live variable
 - So change to live variable can be drawn in OpenGL window (object sizes, colors, etc.)

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Embedding GLUT in GLUT-Win

- Also possible to set up GLUT windows inside part of an existing GLUT window

- Use different creation code:

```
GLUI *glui_subwin =  
    GLUI_Master.create_glui_subwindow(  
        mainWindowID,  
        GLUI_SUBWINDOW_RIGHT );
```

- Compensate in OpenGL code for used space:

- Use own glViewport call with own values, or
- `GLUI_Master.auto_set_viewport();` for default

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Link to Proper GLUT Library

- All prior steps happen before call to `glutMainLoop();`
- Then you can update build: link `libglui.a` or `glui32.lib`, depending on your OS
- Installed on agate, but on own machine, you may have to build from source:

http://sourceforge.net/project/showfiles.php?group_id=92496&package_id=97869

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Windows Fixes

- Using `<GL/...>` for includes in your source files
 - `#include <GL/glut.h>`
 - `#include <GL/glui.h>`
- `glui.h` must be fixed so it doesn't re-define `exit()`—one way is to move the include for `vector` above all other includes:

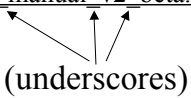
```
...  
#ifndef GLUI_GLUI_H  
#define GLUI_GLUI_H  
#include <vector>  
...  
←
```

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GLUI Resources

- GLUI manual
http://internap.dl.sourceforge.net/sourceforge/glui/glui_manual_v2_beta.pdf

(underscores)
- Main site:
<http://glui.sourceforge.net/>

More GLUI Features

- Things you may want to explore
 - Control layout: panels, rollouts, columns
 - Changing values from code, reflecting in gui
 - `sync_live_all()` a good call to look up
 - `set*_val()` methods (where * is int, float, or text)
 - Enabling/disabling controls

Review

- `glPolygonMode()` function for wireframe
- Parametric drawing for circular curves
- `glutMenuStatusFunc()` function to register callback to detect when menu is posted
- Using GLUI to create simple GUI's

Next

- More transformations