3.5 Display Lists And Modeling

- Building hierarchical models involves incorporating relationships between various parts of a model

```c
#define EYE 1

GLfloat translatef(……);

glTranslatef(……);

#define FACE 2

glNewList(FACE);

/* Draw outline */
glTranslatef(…..)

/* code to draw eye */
glEndList();

```

3.6 Programing Event Driven Input

- Pointing Devices:

A mouse event occurs when one of the buttons of the mouse is pressed or released

```c
void myMouse(int button, int state, int x, int y)
{
    if (button == GLUT_LEFT_BUTTON && state == GLUT_DOWN)
        exit(0);
}
```

The callback from the main function would be:

```c
glutMouseFunc(myMouse);
```
Window Events

- Most windows system allows user to resize window.
- This is a window event and it poses several problems like
  - Do we redraw all the images
  - The aspect ratio
  - Do we change the size or attributes of the primitives to suit the new window

```c
void myReshape(GLsizei w, GLsizei h)
{
    /* first adjust clipping box */
    glMatrixMode(GL_PROJECTION);
    glLoadIdentity();
    gluOrtho2D(0.0,(GLdouble)w, 0.0, (GLdouble)h);
    glMatrixMode(GL_MODELVIEW);
    glLoadIdentity();

    /* adjust viewport */
    glViewport(0,0,w,h);
}
```

Keyboard Events

When a keyboard event occurs, the ASCII code for the key that generated the event and the mouse location are returned.

E.g.

```c
void myKey(unsigned char key, int x, int y)
{
    if (key=='q' || key=='Q')
        exit(0);
}
```

Callback : glutKeyboardFunc(myKey);

- GLUT provides the function `glutGetModifiers` function enables us to define functionalities for the meta keys
The Display and Idle callbacks
Interactive and animation programs might contain many calls for the reexecution of the display function.

- glutPostRedisplay() – Calling this function sets a flag inside GLUT’s main loop indicating that the display needs to be redrawn.
- At the end of each execution of the main loop, GLUT uses this flag to determine if the display function will be executed.
- The function ensures that the display will be drawn only once each time the program goes through the event loop.
- Idle Callback is invoked when there are no other events to be performed.
- Its typical use is to continuously generate graphical primitives when nothing else is happening.
- Idle callback : glutIdleFunc(function name)

Window Management
- GLUT supports creation of multiple windows
- Id = glutCreateWindow(“second window”);

- To set a particular window as the current window where the image has to be rendered glutSetWindow(id);