A Fire breathing Dragonfly

due Tuesday, March 21, at midnight

Time to create a dragonfly. All it needs is a simple body, it could be an elongated sphere, and a pair of wings. It needs something to distinguish the front from the back - a sphere head, a pointy tail, an eye... Extra, make it elaborate, two pairs of wings, antennae,... When prodded (d key) the dragonfly flaps her wings and starts flying. Her wings flap and she flies using one or more timer functions. She starts out on her lily pad on a big pond.

You also need three other objects in the pond. These could be simple 3D glut objects representing rocks, all different, or (extra) they could include a flower, a tree, an animal,... The three objects and the lily pad should make a proper quadrilateral - no 3 of them in a line.

You know her route, in straight segments, above all three objects and returns to the lily pad. (extra) You could make this route visible/invisible with a stippled curve, by pressing the r key. Each time she is prodded - pressing the d key - puts the dragonfly in flight, lifting into the air and flying over all three objects and landing safely on the landing pad, ready to fly again. As an extra, the dragonfly will not jump from point to point, but will fly smoothly, going through points in between, making the flight look smoother. Another nice extra, the dragonfly turns smoothly and always faces the direction she is moving. As she flies, for extra, you could show the dragonfly 's shadow. Other shadows? The flight uses a **timer** function. As an extra, you can make something happen, just stop midair or something dramatic if the dragonfly is stopped midflight. (s key)

If you click on the dragonfly with the left mouse key, she breathes fire. It can be just a triangle suddenly appears from her mouth, or the fire can emerge more slowly, or you can make the fire more interesting. Identifying a click on the dragonfly will be done using **color selection**. (She should also breathe fire if you press the f key.) If you click the dragonfly again, she stops breathing fire. If you left click one of the objects in the pond, (or use a, b, c keys) the object changes, perhaps getting bigger, changing shape or changing from wire mode to filled in. Maybe it all changes at once, or (extra) maybe we see it growing slowly. Clicking the object again changes it back. Clicking objects also uses color selection.

There is a cloud in the sky, maybe a sphere, maybe several overlapping spheres, or ...The cloud is traveling on a path in the sky, maybe on a line going back and forth, maybe traveling around the pond in a circle. The cloud moves with an idle function.

It would be nice to be able to view all of this from different sides. Pressing 1, 2, 3, or 4 lets us view the scene from the North, the East, the South and the West respectively. All these views are in perspective, using glFrustum or gluPerspective. In all these views we should be able to see the dragonfly, the three objects, and the lily pad.

Pressing the s key, for start, returns everything to the original setup- the dragonfly, the objects, the view. Since sometimes it is nice to view what is going on slowly, and sometimes we want to see it quicker, the right and left arrow keys should be able to speed up and slow down the action controlled by timers (the dragonfly, and objects.) The up and down arrow keys should speed up and slow down the cloud.

Explore the glut solids, the more different ones you use, the merrier (now where should I put that teapot?) Remember they can be stretched in various ways, so a flattened sphere can become a wing, a cube can become a slab of wood.

This is a 3D assignment. Make good use of the depth buffer.

**Interactions:**

Since we have to test lots of programs, please stick with the keyboard and mouse commands as specified. Feel free to add additional ones of your choice, in addition.

d - **d**ragonfly flies one time around

left mouse click on dragonfly, (also f) - breathes **f**ire, stops breathing fire.

left click on object (also a, b, and c, one for each object) - the object changes, or changes back.

1,2,3,4 - change view

r- toggle view of **r**oute

s- go to **s**tarting setup and view

right and left arrow - adjust speed of timer function-controlled action - dragonfly flying, ...

up and down arrow - adjust speed of cloud (idle function)

(I have used red for extra and blue for buttons/mouse. If you cannot see these colors, let me know and I will make a version using different fonts.)

Clicking on the dragonfly and objects in projective view will be done using **color selecting** which we will discuss in class. (It is not in the book.)

Viewing the same world from different points in space uses **gluLookAt**. This is in the book if you want a head start.

The shadows I refer to do not use lighting, but flattening an object and redrawing it in black at ground level. This is discussed in the book.