COSC363 - Assignment 1

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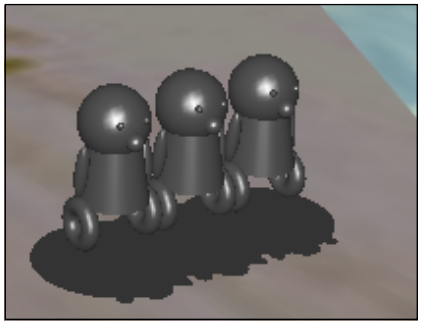
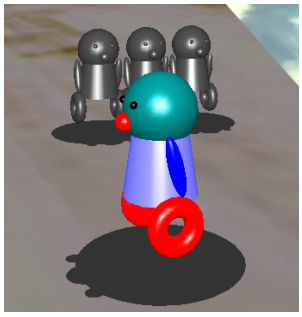
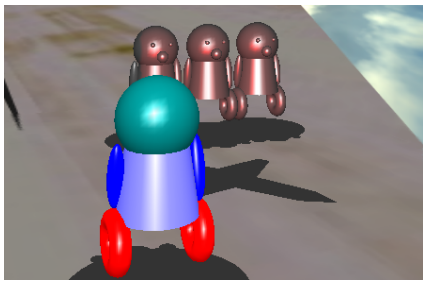
The scene basically displays a big spaceship, consisting of a circling airplane with a flag, a controllable moveable robot, and a motionless lighthouse. In addition, there are 2 backup airplanes on the right corner of the scene and 3 more stable grey robots whose arms can continued moving on the left corner. For the airplane and lighthouse, both of them can fire a bullet. The movement of the main colored robot is controlled by the user, moving inside around the scene. More over, its red nose gives out red sparkling red light. The light is seeable once it face to the 3 backup robots.



Extra Features



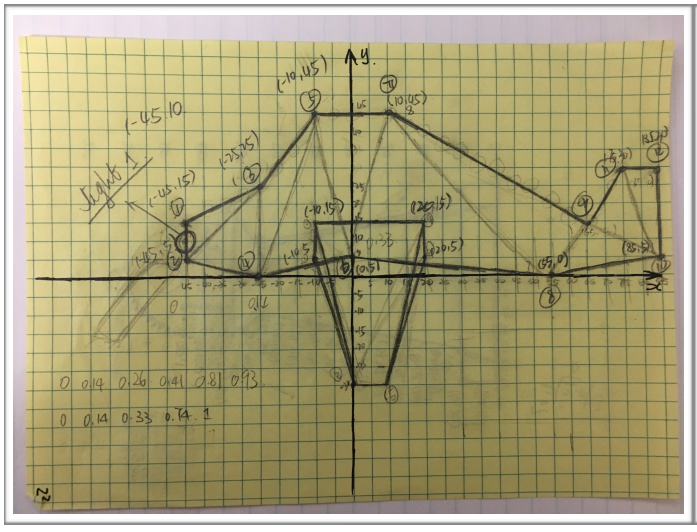


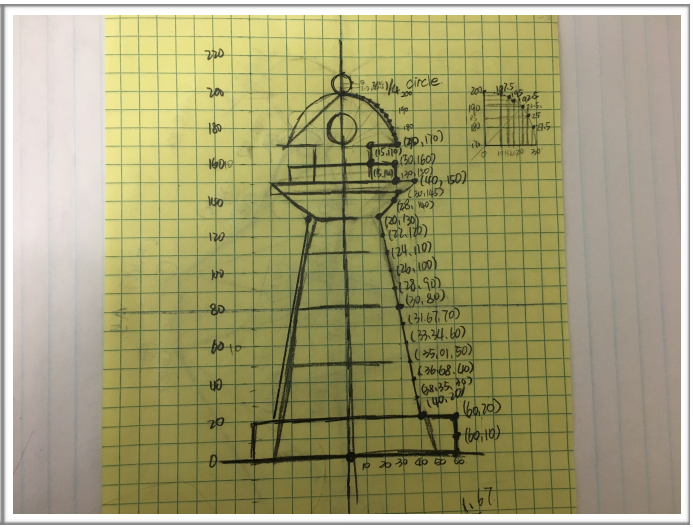
- *Planer shadow:*
  The circling airplane and robots do has shadow.
- *A spot light:*
  There is a red twinkling spot light allocates on the robot's nose.
- *Two camera modes:*
  There are two camera modes, one is general mode and the other one is first-person view, whose camera is place on the primary robot's head. The view can be modified by typing keys from keyboard.
- *Physics models:*
  There are two physics modes. One is the bullet fired by the airplane. And the other is the pathway of the bullet which is launched by the lighthouse.

```
// -------------------- Launch a bullet from lighthouse ---------------
void launch(int value)
{
    launch_x = 20 * timeline;
    launch_y -= 0.05 * timeline * timeline;
    timeline++;

    glutPostRedisplay();
    glutTimerFunc(50, launch, 0);
```

```
// -------------------- Launch a bullet by airplane --------------------
void fire(int value)
{
        bullet_y-= 2;
        bullet_x-=0.1;

    glutPostRedisplay();
    glutTimerFunc(50, fire, 0);
}
```

- *A custom-built model designed using vertex coordinates:*
  The airplane is made up by function *glBegin(GL_TRIANGLE_STRIP)* and *glBegin(GL_QUAD_STRIP).*
- *A custom-built sweep surface:*
  The lighthouse consists of 360 components and each component includes 35 vertex.





- *A surface shape generated using a mathematical formula:*
  Use sin() cos() to generate a waving flag.

```
glTexCoord2f((i+0)/20, (j+0)/50);
glVertex3f(sin(0.25*(i+0+shift))+cos(0.25*(j+0+shift)), 1.5*(i+0), 1.5*(j+0));
glTexCoord2f((i+1)/20, (j+0)/50);
glVertex3f(sin(0.25*(i+1+shift))+cos(0.25*(j+0+shift)), 1.5*(i+1), 1.5*(j+0));
glTexCoord2f((i+1)/20, (j+1)/50);
glVertex3f(sin(0.25*(i+1+shift))+cos(0.25*(j+1+shift)), 1.5*(i+1), 1.5*(j+1));
glTexCoord2f((i+0)/20, (j+1)/50);
glVertex3f(sin(0.25*(i+0+shift))+cos(0.25*(j+1+shift)), 1.5*(i+0), 1.5*(j+1));
```

- *Skybox:*
  The skybox source: http://www.custommapmakers.org/skyboxes.php.

Control Functions

- *Space Key:* Switch the camera modes.
- *Insert Key:* Let the lighthouse launch a white bullet.
- *'F' and 'f':* Let the airplane launch a yellow bullet.
- *'W' and 'w':* Move the robot forward along the x-axis in general view mode. Move the camera forward along the x-axis in the first-person view mode.
- *'S' and 's':* Move the robot backward along the x-axis in general view mode. Move the camera backward along the x-axis in the first-person view mode.
- *'A' and 'a':* Move the robot left along the z-axis in general mode. Move the camera left along the z-axis in the first-person view mode.
- *'D' and 'd':* Move the robot right along the z-axis in general mode. Move the camera right along the z-axis in the first-person view mode.
- *Arrow keys:* Only work in the general view mode. Change the position and the direction of the camera.

Souse and References

- Some codes, functions, and methods were obtained from LEARN, lecture notes, and lab files.
- The skybox textures was downloaded from: http://www.custommapmakers.org/skyboxes.php.
- Reused the 'Sun.tga' as 'Bullet.tga' from lab3 file.
- The textures for airplane, lighthouse, flag were download from: www.textures.com