GRAPHICS PROGRAMMING

The Sierpinski Gasket :

It is an object that can be defined recursively & randomly

Basic Algorithm :

Start with 3 non-collinear points in space. Let the plane be z=0.

1. Pick an initial point (x,y,z) at random inside the triangle.
2. Select 1 of the 3 vertices in random.
3. Find the location halfway between the initial point & the randomly selected vertex.
4. Display the new point.
5. Replace the point (x,y,z) with the new point
6. Return to step 2.

Assumption : we view the 2-D space or surface as a subset of the 3-D space.

A point can be represented as p=(x,y,z). In the plane z=0, p = (x,y,0).

Vertex function genral form – glVertex*() - * is of the form ntv

n – dimensions (2,3,4)

t – data type (i,f,d)

v – if present, represents a pointer to an array.

Programing 2-D applications :

Definition of basic OpenGL types :

- E.g. – glVertex2i(Glint xi, Glint yi)

  or

```
#define GLfloat float.
GLfloat vertex[3]
glVertex3fv(vertex)
```

E.g. prog :

```
glBegin(GL_LINES);
        glVertex3f(x1,y1,z1);
        glVertex3f(x2,y2,z2);
glEnd();
```

The sierpinski gasket display() function :

```
void display()
{
    GLfloat vertices[3][3] = {{0.0,0.0,0.0},{25.0,50.0,0.0},{50.0,0.0,0.0}};
    /* an arbitrary triangle in the plane z=0 */
    GLfloat p[3] = {7.5,5.0,0.0}; /* initial point inside the triangle */
    int j,k;
    int rand();

    glBegin(GL_POINTS);
    for (k=0;k<5000;k++){
        j=rand()%3;
        p[0] = (p[0] + vertices[j][0])/2; /* compute new location */
        p[1] = (p[1] + vertices[j][1])/2;
        /* display new point */
        glVertex3fv(p);
    }


        glEnd();
        glFlush();
    }
```

Coordinate Systems :

- One of the major advances in the graphics systems allows the users to work on any coordinate systems that they desire.
- The user's coordinate system is known as the "world coordinate system"
- The actual coordinate system on the output device is known as the screen coordinates.
- The graphics system is responsible to map the user's coordinate to the screen coordinate.

Source : http://elearningatria.files.wordpress.com/2013/10/cse-vi-computer-graphics-and-visualization-10cs65-notes.pdf