Course Overview

This is course is tailor made for the wannabe 3D graphics enthusiast. The course covers the basics of 3D programming using OpenGL and provides a foundation of OpenGL concepts using which a programmer can begin exploring the capabilities of OpenGL and write 3D enabled applications. At the end of the course you would be able to create 3D scenes, orient objects in the scene, place lights in the scene, apply texture and use transparent objects in the scene. The course has a hands on approach to teaching OpenGL in that the participants will take part in designing and implementing a C++ library on top of OpenGL to help create simple 3D scenes.

Pre-Requisites

Sound knowledge of C and C++ and knowledge of Qt would be a plus. Basic knowledge of Trigonometry, Matrices and Algebra and other related math domains will be an advantage.

Target Audience

The course is targeted at developers who have entry level knowledge on 3D programming libraries. This course is a must for those interested in learning about OpenGL and get started with 3D Programming.

Course Outline

Introduction
Getting Started with OpenGL
- What is OpenGL
- Materials provided in the course
- Your First OpenGL Program
  - The QGLWidget Class
  - The initializeGL() method
  - The paintGL() method
  - The resizeGL() method
- OpenGL Command Syntax
  - Function Naming Convention
  - Constants, Datatypes & Macro naming conventions
- OpenGL as a State Machine
- Libraries related to OpenGL
- Animations in OpenGL

Drawing Objects
- Describing a Solid Object: Geometry & Topology
- OpenGL Primitives
  - Primitive Types
  - Polygon construction rules
- Solid Object Examples
  - Cube
  - Cone
  - Cylinder
- Drawing solid objects using GLUT Library

Coordinate Transformations
- Types of transformations
  - Translation
  - Scaling
  - Rotation
- Matrix Representation of Transformations
  - Vertex Matrix
  - Translation Matrix
  - Scaling Matrix
  - Rotation Matrix
- Composition of transformation matrices
- Understanding transformations in OpenGL
  - Eye Coordinates
  - Viewing Transformations
  - ..lodeling Transformations
    - The Model View duality
  - Projection Transformations
  - Viewport Transformations
- Specifying Transformations in OpenGL
- Atom Example

Camera Manipulation
- Viewing in 3D
  - Projection
  - Parallel Projection Math
  - Perspective Projection Math
- Model View Duality
  - Atom Example Improved
- Parallel and Perspective Projections.

Lights, Color, Materials, depth test
- Representation of a color in OpenGL
- Specifying Color in OpenGL
- Shading
- The Color Cube
- Colors in the Real World
- Light Concepts and Categories
  - Ambient Light
  - Diffuse Light
  - Specular Light
- Materials Concepts
- Surface Normals.
- OpenGL Lights and Materials
- Spot Lights
- Drawing Curved Surfaces
- The glColorMaterial() function

Texture Mapping
- Specifying the texture
- Indicate how the texture is to be applied to each pixel
- Enable texture mapping.
- Draw the scene, supplying both texture & geometric coordinates

XModel: Simple C++ wrapper for OpenGL

OpenGL Based Toolkits
- Open Inventor
- OpenSG
- VTK

Course Duration: Three Days: 10 am - 5.30 pm

Course Fee Rs. 12,000/-
(Plus Service Tax as applicable)