OpenGL – Beginners Guide

From Basics to Intermediate

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Agenda

- Introduction
  - 3D Graphics overview
  - What is OpenGL and how does it work ?
  - OpenGL Primitives
  - API Specifics
  - Concept of OpenGL Extensions
- Getting Started
  - Source code distribution
  - A small talk on CMake
  - GLUT/FreeGLUT – what and how

- Drawing Shapes
  - OpenGL State Machine
  - Drawing Points, Lines and Triangles
  - Drawing simple 3D Shapes
  - Drawing complex 3D Shapes
  - Loading 3D Models

- Color, Material, Light and Normal
  - Color function basics
  - Concept of material
  - RGBA, Transparency → Alpha Blending
  - Light → Ambient, Diffuse, Specular
  - Surface Normals, Vertex Normals
- Texture mapping
  - Bitmap images
  - Texture mapping, with texture coordinates
  - Mipmaps
  - Texture Environment
  - Texture Objects / Multiple textures

- Transformations Matrices et al.
  - Model View Matrices.
  - Projection Matrices - Perspective and Orthographic
  - Viewport Transformations
  - Transformation Pipeline
  - Basic Transformations → Translation, scaling, rotation

- Optimization Techniques
  - Using Arrays and Indices
  - Revisit OpenGL Extensions
  - Using Vertex Buffer Objects (VBO)

- Advanced OpenGL – GLSL/Shaders
  - The Programmable Pipeline and Shaders
  - OpenGL Shading Language (GLSL)
  - Vertex Shaders
  - Fragmet Shaders
  - Geometry Shaders
  - Realistic Visual Effects with example