The G3D Engine

as a Platform for Research and Education

OpenGL is a hardware graphics abstraction layer. To write platform-independent graphics applications, you need more support. That’s why G3D extends OpenGL with 3D model file formats, utility classes like Vector3 and TextInput, automatic memory and resource management, and other features summarized on the right.

Game companies develop on engines that provide these facilities—G3D is an engine for both industry and academia, packaged as free 200,000-line Open Source C++ library that supports Windows, Linux, OS X, and all graphics cards.

Open, Layered Architecture

G3D abstracts low-level hardware details yet exposes underlying hardware and OS services on request. This provides and easy-to-use, platform independent API while maintaining access to the latest features and highest possible performance. G3D is well-suited to hardware rendering and GPGPU applications where an externally-imposed scene graph can limit innovation. It fills a niche between OpenGL, which is too low-level and cumbersome, and scene graph packages like Alice, Open Scene Graph, Ogre, and Delphi that are too high-level for many of our users.

Feature Highlights

Our mandate is to provide “the features common to every 3D application.”

Fast Rendering State change minimization, vertex buffers, render-to-texture, GPU profiling hooks, MMX and SIMD

Algorithms Compute tangent space, mesh welding, SVD, KD-trees, collisions, tessellations, silhouettes

Network TCP/UDP, serializers, compression, discovery

Portability Vendor-specific optimizations, emulation, and workarounds for OS, CPU, and GPU: Write once, compile and run anywhere!

Compatibility Bindings for SDLMixer and Mod (audio), ODE (physics), wxWidgets, Qt, and GLUT (GUI)

Documentation 500 page manual with tutorials, FAQs, and forums

Formats 3DS, IFS, PLV2, MD2, ESP, JPG, PNG, PPM, GIF, BMP, TGA, AVI, ICO, X

Shaders Cg, ASM, and GLSL with extensions for fixed function

Academic Adoption

We’re aware of over thirty publications, commercial games, and SIGGRAPH demos that use the library. It has been downloaded 60,000 times in three years and is one of the most active Open Source projects (99.97th percentile on SourceForge).

Brown University uses G3D as a common code base across four courses, so that students don’t train on new support code each semester. This also enables them to tackle more challenging projects and to transition into research. In the first year that course CS224 used G3D, six student projects were accepted as SIGGRAPH posters and two were awarded first place in the SIGGRAPH Student Research Competition graduate and undergraduate divisions.

Other schools at which students and faculty are using G3D include:

University of North Carolina Georgia State University
Harvard Extension School University of Kent
University of Ulm Guang Dong University of China
Rensselaer Polytechnic Institute


Kevin Egan
Rhythm & Hues

Daniel J. Hilferty
U.S. Air Force

Daniel F. Keefe
Brown University

Morgan McGuire*
Brown University

Casey O’Donnell
Rensselaer Polytechnic Institute

Peter G. Sibley
Brown University

Corey Taylor
Electronic Arts

Tom Wardill
University of Hull

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