

### OpenGL Documentation

Do you love video games? Ever wondered if you could create one of your own, with all the bells and whistles? It's not as complicated as you'd think, and you don't need to be a math whiz or a programming genius to do it. In fact, everything you need to create your first game, "Invasion of the Slugwroths," is included in this book and CD-ROM. Author David Conger starts at square one, introducing the tools of the trade and all the basic concepts for getting started programming with C++, the language that powers most current commercial games. Plus, he's put a wealth of top-notch (and free) tools on the CD-ROM, including the Dev-C++ compiler, linker, and debugger--and his own LlamaWorks2D game engine. Step-by-step instructions and ample illustrations take you through game program structure, integrating sound and music into games, floating-point math, C++ arrays, and much more. Using the sample programs and the source code to run them, you can follow along as you learn. Bio: David Conger has been programming professionally for over 23 years. Along with countless custom business applications, he has written several PC and online games. Conger also worked on graphics firmware for military aircraft, and taught computer science at the university level for four years. Conger has written numerous books on C, C++, and other computer-related topics. He lives in western Washington State and has also published a collection of Indian folk tales.

Pro Android 2 shows how to build real-world and fun mobile applications using Google's latest Android software development kit. This new edition is updated for Android 2, covering everything from the fundamentals of building applications for embedded devices to advanced concepts such as custom 3D components, OpenGL, and touchscreens including gestures. While other Android development guides simply discuss topics, Pro Android 2 offers the combination of expert insight and real sample applications that work. Discover the design and architecture of the Android SDK through practical examples, and how to build mobile applications using the Android SDK. Explore and use the Android APIs, including those for media and Wi-Fi. Learn about Android 2's integrated local and web search, handwriting gesture UI, Google Translate, and text-to-speech features. Pro Android 2 dives deep, providing you with all the knowledge and techniques you need to build mobile applications ranging from games to Google apps, including add-ons to Google Docs. You'll be able to extend and run the new Google Chrome APIs on the G1, the G2, and other next-generation Google phones and Android-enabled devices.

To create successful games for the iPhone family of mobile devices, developers need to know how touch-input, real-time graphics, and sound come together in the iOS environment. iOS Game Development: Developing Games for iPad, iPhone, and iPod Touch takes you from the basics of app coding to releasing and marketing your game on the App

Store. The book offers a wealth of previously unpublished information about the iOS platform. The text focuses on the concrete requirements of game developers, presenting in-depth details on each step in the mobile game development process. It explains the use of OpenGL ES for 2D/3D graphics and OpenAL for sound, both of which are recommended for game performance on the iOS platform. It also covers new APIs such as the GLKit, GameKit, and Box2D Physics Engine. To better understand the explanations, the author encourages you to access more than 30 iOS example apps from his website. Each app represents a small piece of the complex field of game development in a straightforward manner. The apps can be run on any device in the iPhone family and have been extensively tested with various iOS versions. Suitable for both newcomers and more advanced developers, this color book helps you get started with iOS game development. By following the book's clear descriptions and example programs, you will understand how to implement the fundamentals in smaller game projects and be able to create your first game for the App Store.

OpenGL® ES™ is the industry's leading software interface and graphics library for rendering sophisticated 3D graphics on handheld and embedded devices. The newest version, OpenGL ES 3.0, makes it possible to create stunning visuals for new games and apps, without compromising device performance or battery life. In the OpenGL® ES™ 3.0 Programming Guide, Second Edition, the authors cover the entire API and Shading Language. They carefully introduce OpenGL ES 3.0 features such as shadow mapping, instancing, multiple render targets, uniform buffer objects, texture compression, program binaries, and transform feedback. Through detailed, downloadable C-based code examples, you'll learn how to set up and program every aspect of the graphics pipeline. Step by step, you'll move from introductory techniques all the way to advanced per-pixel lighting and particle systems. Throughout, you'll find cutting-edge tips for optimizing performance, maximizing efficiency with both the API and hardware, and fully leveraging OpenGL ES 3.0 in a wide spectrum of applications. All code has been built and tested on iOS 7, Android 4.3, Windows (OpenGL ES 3.0 Emulation), and Ubuntu Linux, and the authors demonstrate how to build OpenGL ES code for each platform. Coverage includes EGL API: communicating with the native windowing system, choosing configurations, and creating rendering contexts and surfaces Shaders: creating and attaching shader objects; compiling shaders; checking for compile errors; creating, linking, and querying program objects; and using source shaders and program binaries OpenGL ES Shading Language: variables, types, constructors, structures, arrays, attributes, uniform blocks, I/O variables, precision qualifiers, and invariance Geometry, vertices, and primitives: inputting geometry into the pipeline, and assembling it into primitives 2D/3D, Cubemap, Array texturing: creation, loading, and rendering; texture wrap modes, filtering, and formats; compressed textures, sampler objects, immutable textures, pixel unpack buffer objects, and mipmapping Fragment shaders: multitexturing, fog, alpha test, and user clip planes Fragment operations: scissor, stencil, and depth tests;

multisampling, blending, and dithering Framebuffer objects: rendering to offscreen surfaces for advanced effects  
Advanced rendering: per-pixel lighting, environment mapping, particle systems, image post-processing, procedural textures, shadow mapping, terrain, and projective texturing Sync objects and fences: synchronizing within host application and GPU execution This edition of the book includes a color insert of the OpenGL ES 3.0 API and OpenGL ES Shading Language 3.0 Reference Cards created by Khronos. The reference cards contain a complete list of all of the functions in OpenGL ES 3.0 along with all of the types, operators, qualifiers, built-ins, and functions in the OpenGL ES Shading Language.

Covering all the essentials of modern Android development, an updated, real-world guide to creating robust, commercial-grade Android apps offers expert insights for the entire app development lifecycle, from concept to market.

This book provides readers with an introductory resource for learning how to create compelling games using the open source Python programming language and Pygame games development library. Authored by industry veteran and Python expert Will McGugan, readers are treated to a comprehensive, practical introduction to games development using these popular technologies. They can also capitalize upon numerous tips and tricks the author has accumulated over his career creating games for some of the world's largest gaming developers.

Digital Visual Fortran is the latest version of a major programming language tool used by scientists and engineers. Written by key technical writers from the Digital Visual Fortran product team, Digital Visual Fortran Programmer's Guide presents in printed form the critical portions of the official programmer's guide, previously only available online. The result is the authoritative book on Digital Visual Fortran's features and how to use them to create effective applications. Digital Visual Fortran is the language of choice for computation-intensive scientific and engineering applications, financial applications, and other programs. Digital recently acquired Fortran technology and rights from Microsoft that allows them to use the Microsoft Developer Studio Integrated Development Environment, which is featured in Microsoft's Visual C++ and Visual Basic. The result is that Digital Visual Fortran is much easier to use and looks and works much like Microsoft's industry-leading programming products for other market segments. The official programmer's guide to Digital Visual Fortran for Version 6.0A Authors are experts from the Digital Visual Fortran product group New Digital Fortran version include Microsoft interface and object technologies

This new edition provides step-by-step instruction on modern 3D graphics shader programming in OpenGL with Java, along with its theoretical foundations. It is appropriate both for computer science graphics courses, and for professionals interested in mastering 3D graphics skills. It has been designed in a 4-color, "teach-yourself" format with numerous examples that the reader can run just as presented. Every shader stage is explored, from the basics of modeling,

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textures, lighting, shadows, etc., through advanced techniques such as tessellation, normal mapping, noise maps, as well as new chapters on simulating water, stereoscopy, and ray tracing. FEATURES Covers modern OpenGL 4.0+ shader programming in Java, with instructions for both PC/Windows and Macintosh Illustrates every technique with running code examples. Everything needed to install the libraries, and complete source code for each example Includes step-by-step instruction for using each GLSL programmable pipeline stage (vertex, tessellation, geometry, and fragment) Explores practical examples for modeling, lighting and shadows (including soft shadows), terrain, water, and 3D materials such as wood and marble Adds new chapters on simulating water, stereoscopy, and ray tracing with compute shaders Explains how to optimize code with tools such as Nvidia's Nsight debugger Includes companion files with code, object models, figures, and more

OpenGL opens the door to the world of high-quality, high-performance 3D computer graphics. The preferred application programming interface for developing 3D applications, OpenGL is widely used in video game development, visualization and simulation, CAD, virtual reality, modeling, and computer-generated animation. OpenGL® Distilled provides the fundamental information you need to start programming 3D graphics, from setting up an OpenGL development environment to creating realistic textures and shadows. Written in an engaging, easy-to-follow style, this book makes it easy to find the information you're looking for. You'll quickly learn the essential and most-often-used features of OpenGL 2.0, along with the best coding practices and troubleshooting tips. Topics include Drawing and rendering geometric data such as points, lines, and polygons Controlling color and lighting to create elegant graphics Creating and orienting views Increasing image realism with texture mapping and shadows Improving rendering performance Preserving graphics integrity across platforms A companion Web site includes complete source code examples, color versions of special effects described in the book, and additional resources.

"This book--a renamed new edition of Android Wireless Application Development, Volume II--is the definitive guide to advanced commercial-grade Android development, updated for the latest Android SDK. The book serves as a reference for the Android API."--

The new edition of an introduction to computer programming within the context of the visual arts, using the open-source programming language Processing; thoroughly updated throughout. The visual arts are rapidly changing as media moves into the web, mobile devices, and architecture. When designers and artists learn the basics of writing software, they develop a new form of literacy that enables them to create new media for the present, and to imagine future media that are beyond the capacities of current software tools. This book introduces this new literacy by teaching computer programming within the context of the visual arts. It offers a comprehensive reference and text for Processing ([www.processing.org](http://www.processing.org)), an open-source programming language that can be used by students, artists, designers, architects, researchers, and anyone who wants to program images, animation, and interactivity. Written by Processing's cofounders, the book offers a definitive reference for students and professionals. Tutorial chapters make up the bulk of the book; advanced professional projects from such domains as animation, performance, and installation are discussed in interviews with their creators. This second edition has been thoroughly updated. It is the first book to offer in-depth coverage of Processing 2.0 and 3.0, and all examples have been updated for the new syntax. Every chapter has been revised, and new chapters introduce new ways to work with data and geometry. New "synthesis" chapters offer

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discussion and worked examples of such topics as sketching with code, modularity, and algorithms. New interviews have been added that cover a wider range of projects. "Extension" chapters are now offered online so they can be updated to keep pace with technological developments in such fields as computer vision and electronics. Interviews SUE.C, Larry Cuba, Mark Hansen, Lynn Hershman Leeson, Jürg Lehni, LettError, Golan Levin and Zachary Lieberman, Benjamin Maus, Manfred Mohr, Ash Nehru, Josh On, Bob Sabiston, Jennifer Steinkamp, Jared Tarbell, Steph Thirion, Robert Winter

Table of contents

The Official Reference Document to OpenGL, Version 1.4 OpenGL is a powerful software interface used to produce high-quality computer-generated images and interactive graphics applications by rendering 2D and 3D geometric objects, bitmaps, and color images. Officially sanctioned by the OpenGL Architecture Review Board (ARB), The OpenGL Reference Manual, Fourth Edition, is the comprehensive and definitive documentation of all core OpenGL functions. This fourth edition has been completely revised and updated for OpenGL Versions 1.3 and 1.4. It features coverage of cube-mapped textures, multisampling, depth textures and shadowing, multitexturing, and register combiners. In addition, this book documents all OpenGL Utility Library functions (GLU 1.3) and the OpenGL extension to the X Window System (GLX 1.3). A comprehensive reference section documents each set of related OpenGL commands. Each reference page contains: A description of the command's parameters The command's effect on rendering and how OpenGL's state is modified Examples References to related functions Errors generated by each function This book also includes a conceptual overview of OpenGL, a summary of commands and routines, a chapter on defined constants and associated commands, and descriptions of the multitexturing and imaging subset ARB extensions. The OpenGL Technical Library provides tutorial and reference books for OpenGL. The Library enables programmers to gain a practical understanding of OpenGL and shows them how to unlock its full potential. Originally developed by SGI, the Library continues to evolve under the auspices of the Architecture Review Board (ARB), an industry consortium responsible for guiding the evolution of OpenGL and related technologies. The OpenGL ARB is composed of leaders in the computer graphics industry: 3DLabs, Apple, ATI, Dell, Evans & Sutherland, Hewlett-Packard, IBM, Intel, Matrox, NVIDIA, SGI, and Sun Microsystems.

The Android Developer's Collection includes two highly successful Android application development eBooks: The Android Developer's Cookbook: Building Applications with the Android SDK Android Wireless Application Development, Second Edition This collection is an indispensable resource for every member of the Android development team: software developers with all levels of mobile experience, team leaders and project managers, testers and QA specialists, software architects, and even marketers. Completely up-to-date to reflect the newest and most widely used Android SDKs, The Android Developer's Cookbook is the essential resource for developers building apps for any Android device, from phones to tablets. Proven, modular recipes take you from the absolute basics to advanced location-based services, security techniques, and performance optimization. You'll learn how to write apps from scratch, ensure interoperability, choose the best solutions for common problems, and avoid development pitfalls. Android Wireless Application Development, Second Edition, delivers all the up-to-date information, tested code, and best practices you need to create and market successful mobile apps with the latest versions of Android. Drawing on their extensive experience with mobile and wireless development, Lauren Darcey and Shane Conder cover every step: concept, design, coding, testing, packaging, and delivery. Every chapter of this edition has been updated for the newest Android SDKs, tools, utilities, and hardware. All sample code has been overhauled and tested on leading devices from multiple companies, including HTC, Motorola, and ARCHOS. Many new examples have been added, including complete new applications. In this collection, coverage includes

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Implementing threads, services, receivers, and other background tasks Providing user alerts Organizing user interface layouts and views Managing user-initiated events such as touches and gestures Recording and playing audio and video Using hardware APIs available on Android devices Interacting with other devices via SMS, Web browsing, and social networking Storing data efficiently with SQLite and its alternatives Accessing location data via GPS Using location-related services such as the Google Maps API Building faster applications with native code Providing backup and restore with the Android Backup Manager Testing and debugging apps throughout the development cycle Using Web APIs, using the Android NDK, extending application reach, managing users, synchronizing data, managing backups, and handling advanced user input Editing Android manifest files, registering content providers, and designing and testing apps Working with Bluetooth, voice recognition, App Widgets, live folders, live wallpapers, and global search Programming 3D graphics with OpenGL ES 2.0 Ensuring cross-device compatibility, from designing for the smallest phones to the big tablets Designing, developing, and testing applications for different devices

Get Real-World Insight from Experienced Professionals in the OpenGL Community With OpenGL, OpenGL ES, and WebGL, real-time rendering is becoming available everywhere, from AAA games to mobile phones to web pages. Assembling contributions from experienced developers, vendors, researchers, and educators, OpenGL Insights presents real-world techniques for intermediate and advanced OpenGL, OpenGL ES, and WebGL developers. Go Beyond the Basics The book thoroughly covers a range of topics, including OpenGL 4.2 and recent extensions. It explains how to optimize for mobile devices, explores the design of WebGL libraries, and discusses OpenGL in the classroom. The contributors also examine asynchronous buffer and texture transfers, performance state tracking, and programmable vertex pulling. Sharpen Your Skills Focusing on current and emerging techniques for the OpenGL family of APIs, this book demonstrates the breadth and depth of OpenGL. Readers will gain practical skills to solve problems related to performance, rendering, profiling, framework design, and more.

An ideal text for students that ties together classical and modern topics of advanced vibration analysis in an interesting and lucid manner. It provides students with a background in elementary vibrations with the tools necessary for understanding and analyzing more complex dynamical phenomena that can be encountered in engineering and scientific practice. It progresses steadily from linear vibration theory over various levels of nonlinearity to bifurcation analysis, global dynamics and chaotic vibrations. It trains the student to analyze simple models, recognize nonlinear phenomena and work with advanced tools such as perturbation analysis and bifurcation analysis. Explaining theory in terms of relevant examples from real systems, this book is user-friendly and meets the increasing interest in non-linear dynamics in mechanical/structural engineering and applied mathematics and physics. This edition includes a new chapter on the useful effects of fast vibrations and many new exercise problems.

Android Wireless Application Development has earned a reputation as the most useful real-world guide to building robust, commercial-grade Android apps. Now, authors Lauren Darcey and Shane Conder have systematically revised and updated this guide for the latest Android SDK and tools updates. To accommodate their extensive new coverage, they've split the book into two leaner, cleaner volumes. This Volume II focuses on advanced techniques for the entire app development cycle, including design, coding, testing, debugging, and distribution. Darcey and Conder cover hot topics ranging from tablet development to protecting against piracy and demonstrate advanced techniques for everything from data integration and UI development to in-app

billing. Every chapter has been thoroughly updated to reflect the latest SDKs, tools, and devices. The sample code has been completely overhauled and is available for download on a companion website. Drawing on decades of in-the-trenches experience as professional mobile developers, the authors also provide even more tips and best practices for highly efficient development. This new edition covers Advanced app design with async processing, services, SQLite databases, content providers, intents, and notifications Sophisticated UI development, including input gathering via gestures and voice recognition Developing accessible and internationalized mobile apps Maximizing integrated search, cloud-based services, and other exclusive Android features Leveraging Android 4.0 APIs for networking, web, location services, the camera, telephony, and hardware sensors Building richer apps with 2D/3D graphics (OpenGL ES and RenderScript), animation, and the Android NDK Tracking app usage patterns with Google Analytics Streamlining testing with the Android Debug Bridge This book is an indispensable resource for every intermediate- to advanced-level Java developer now participating in Android development and for every seasoned mobile developer who wants to take full advantage of the newest Android platform and hardware. Also look for: Android Wireless Application Development, Volume I: Android Essentials (ISBN: 9780321813831)

OpenGL® Shading Language, Third Edition, extensively updated for OpenGL 3.1, is the experienced application programmer's guide to writing shaders. Part reference, part tutorial, this book thoroughly explains the shift from fixed-functionality graphics hardware to the new era of programmable graphics hardware and the additions to the OpenGL API that support this programmability. With OpenGL and shaders written in the OpenGL Shading Language, applications can perform better, achieving stunning graphics effects by using the capabilities of both the visual processing unit and the central processing unit. In this book, you will find a detailed introduction to the OpenGL Shading Language (GLSL) and the new OpenGL function calls that support it. The text begins by describing the syntax and semantics of this high-level programming language. Once this foundation has been established, the book explores the creation and manipulation of shaders using new OpenGL function calls. OpenGL® Shading Language, Third Edition, includes updated descriptions for the language and all the GLSL entry points added though OpenGL 3.1, as well as updated chapters that discuss transformations, lighting, shadows, and surface characteristics. The third edition also features shaders that have been updated to OpenGL Shading Language Version 1.40 and their underlying algorithms, including Traditional OpenGL fixed functionality Stored textures and procedural textures Image-based lighting Lighting with spherical harmonics Ambient occlusion and shadow mapping Volume shadows using deferred lighting Ward's BRDF model The color plate section illustrates the power and sophistication of the OpenGL Shading Language. The API Function Reference at the end of the book is an excellent guide to the API entry points that support the OpenGL Shading Language.

Developing Graphics Frameworks with Python and OpenGL shows you how to create software for rendering complete three-dimensional scenes. The authors explain the foundational theoretical concepts as well as the practical programming techniques that will enable you to create your own animated and interactive computer-generated worlds. You will learn how to combine the power of OpenGL, the most widely adopted cross-platform API for GPU programming, with the accessibility and versatility of the

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Python programming language. Topics you will explore include generating geometric shapes, transforming objects with matrices, applying image-based textures to surfaces, and lighting your scene. Advanced sections explain how to implement procedurally generated textures, postprocessing effects, and shadow mapping. In addition to the sophisticated graphics framework you will develop throughout this book, with the foundational knowledge you will gain, you will be able to adapt and extend the framework to achieve even more spectacular graphical results.

Android Wireless Application Development has earned a reputation as the most useful real-world guide to building robust, commercial-grade Android apps. To accommodate their extensive new coverage, the authors have split the book into two leaner, cleaner volumes. This Volume II focuses on advanced techniques for the entire app development cycle, covers hot topics ranging from tablet development to protecting against piracy, and demonstrates advanced techniques for everything from data integration and UI development to in-app billing. Every chapter has been thoroughly updated to reflect the latest SDKs, tools, and devices. The sample code has been completely overhauled and is available on the CD. Drawing on decades of in-the-trenches experience as professional mobile developers, the authors also provide even more tips and best practices for highly efficient development. This new edition covers Advanced app design with async processing, services, SQLite databases, content providers, intents, and notifications Sophisticated UI development, including input gathering via gestures and voice recognition Developing accessible and internationalized mobile apps Maximizing integrated search, cloud-based services, and other exclusive Android features Leveraging Android 4.0 APIs for networking, web, location services, the camera, telephony, and hardware sensors Building richer apps with 2D/3D graphics (OpenGL ES and RenderScript), animation, and the Android NDK Tracking app usage patterns with Google Analytics Streamlining testing with the Android Debug Bridge This book is an indispensable resource for every intermediate- to advanced-level Java developer now participating in Android development and for every seasoned mobile developer who wants to take full advantage of the newest Android platform and hardware. This book includes a fully functional application and two exclusive appendices: a rundown of the Java syntax commonly used in Android and a walkthrough of the application. About the CD-ROM: The accompanying CD-ROM contains all the sample code that is presented in the book, organized by chapter.

Beginning Python Games Development, Second Edition teaches you how to create compelling games using Python and the PyGame games development library. It will teach you how to create visuals, do event handling, create 3D games, add media elements, and integrate OpenGL into your Python game. In this update to the first ever book to cover the popular open source PyGame games development library, you'll stand to gain valuable technical insights and follow along with the creation of a real-world, freely downloadable video game. Written by industry veterans and Python experts Will McGugan and Harrison Kinsley, this is a comprehensive, practical introduction to games development in Python. You can also capitalize upon numerous tips and tricks the authors have accumulated over their careers creating games for some of the world's largest game developers.

Over 70 recipes that cover advanced techniques for 3D programming such as lighting, shading, textures, particle systems, and

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image processing with OpenGL 4.6 Key Features Explore techniques for implementing shadows using shadow maps and shadow volumes Learn to use GLSL features such as compute, geometry, and tessellation shaders Use GLSL to create a wide variety of modern, realistic visual effects Book Description OpenGL 4 Shading Language Cookbook, Third Edition provides easy-to-follow recipes that first walk you through the theory and background behind each technique, and then proceed to showcase and explain the GLSL and OpenGL code needed to implement them. The book begins by familiarizing you with beginner-level topics such as compiling and linking shader programs, saving and loading shader binaries (including SPIR-V), and using an OpenGL function loader library. We then proceed to cover basic lighting and shading effects. After that, you'll learn to use textures, produce shadows, and use geometry and tessellation shaders. Topics such as particle systems, screen-space ambient occlusion, deferred rendering, depth-based tessellation, and physically based rendering will help you tackle advanced topics. OpenGL 4 Shading Language Cookbook, Third Edition also covers advanced topics such as shadow techniques (including the two of the most common techniques: shadow maps and shadow volumes). You will learn how to use noise in shaders and how to use compute shaders. The book provides examples of modern shading techniques that can be used as a starting point for programmers to expand upon to produce modern, interactive, 3D computer-graphics applications. What you will learn Compile, debug, and communicate with shader programs Use compute shaders for physics, animation, and general computing Learn about features such as shader storage buffer objects and image load/store Utilize noise in shaders and learn how to use shaders in animations Use textures for various effects including cube maps for reflection or refraction Understand physically based reflection models and the SPIR-V Shader binary Learn how to create shadows using shadow maps or shadow volumes Create particle systems that simulate smoke, fire, and other effects Who this book is for If you are a graphics programmer looking to learn the GLSL shading language, this book is for you. A basic understanding of 3D graphics and programming experience with C++ are required. Learn OpenGL will teach you the basics, the intermediate, and tons of advanced knowledge, using modern (core-profile) OpenGL. The aim of this book is to show you all there is to modern OpenGL in an easy-to-understand fashion, with clear examples and step-by-step instructions, while also providing a useful reference for later studies.

Learn OpenGL Learn Modern OpenGL Graphics Programming in a Step-by-step Fashion.

Pro Android 3 starts with the basics, giving you a firm foundation in Android development. It then builds on this foundation to teach you how to build real-world and fun mobile applications using the new Android 3.0 SDK. This book covers advanced concepts in detail including maps, geocoding, services, live folders, drag and drop, touchscreens, and the new Android 3.0 features: fragments and ActionBar. Pro Android 3 is uniquely comprehensive: it covers sensors, text to speech, OpenGL, live widgets, search, and the audio and video APIs. Using the code-heavy tutorials and expert advice, you'll quickly be able to build cool mobile apps and run them on dozens of Android-based smartphones. You'll explore and use the Android APIs, including those for media, sensors, and long-running services. And you'll check out what's

new with Android 3.0, including the improved UI across all Android platforms, drag and drop, fragment dialogs, and more, giving you the knowledge to create stunning, cutting-edge apps, while keeping you agile enough to respond to changes in the future.

This new edition provides step-by-step instruction on modern 3D graphics shader programming in OpenGL with C++, along with its theoretical foundations. It is appropriate both for computer science graphics courses and for professionals interested in mastering 3D graphics skills. It has been designed in a 4-color, “teach-yourself” format with numerous examples that the reader can run just as presented. Every shader stage is explored, from the basics of modeling, textures, lighting, shadows, etc., through advanced techniques such as tessellation, normal mapping, noise maps, as well as new chapters on simulating water, stereoscopy, and ray tracing. FEATURES: Covers modern OpenGL 4.0+ shader programming in C++, with instructions for both PC/Windows and Macintosh Adds new chapters on simulating water, stereoscopy, and ray tracing Includes companion files with code, object models, figures, and more (also available for downloading by writing to the publisher) Illustrates every technique with running code examples. Everything needed to install the libraries, and complete source code for each example Includes step-by-step instruction for using each GLSL programmable pipeline stage (vertex, tessellation, geometry, and fragment) Explores practical examples for modeling, lighting, and shadows (including soft shadows), terrain, water, and 3D materials such as wood and marble Explains how to optimize code for tools such as Nvidia’s Nsight debugger.

This book will provide you with a comprehensive guide to developing games for both the Windows Mobile platform and the Windows Phone using the industry standard programming languages C# and VB .NET. You will be walked through every aspect of developing for the Windows Mobile platform—from setting up your development environment for the first time to creating advanced 3D graphics. Finally, you’ll learn how you can make your applications available to others, whether distributing for free or selling online. Using extensive code samples throughout, you’ll gather all the information needed to create your own games and distribute them successfully for others to enjoy. Aimed primarily at C# developers, almost everything in the book can be used in VB .NET too. For those areas where this is not the case, workarounds are suggested so that VB .NET developers are still able to use the techniques described.

OpenGL® SuperBible, Seventh Edition, is the definitive programmer’s guide, tutorial, and reference for OpenGL 4.5, the world’s leading 3D API for real-time computer graphics. The best introduction for any developer, it clearly explains OpenGL’s newest APIs; key extensions; shaders; and essential, related concepts. You’ll find up-to-date, hands-on guidance for all facets of modern OpenGL development—both desktop and mobile. The authors explain what OpenGL does, how it connects to the graphics pipeline, and how it manages huge datasets to deliver compelling experiences.

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Step by step, they present increasingly sophisticated techniques, illuminating key concepts with worked examples. They introduce OpenGL on several popular platforms, and offer up-to-date best practices and performance advice. This revised and updated edition introduces many new OpenGL 4.5 features, including important ARB and KHR extensions that are now part of the standard. It thoroughly covers the latest Approaching Zero Driver Overhead (AZDO) performance features, and demonstrates key enhancements with new example applications. Coverage includes A practical introduction to real-time 3D graphics, including foundational math Core techniques for rendering, transformations, and texturing Shaders and the OpenGL Shading Language (GLSL) in depth Vertex processing, drawing commands, primitives, fragments, and framebuffers Compute shaders: harnessing graphics cards for more than graphics Pipeline monitoring and control Managing, loading, and arbitrating access to data Building larger applications and deploying them across platforms Advanced rendering: light simulation, artistic and non-photorealistic effects, and more Reducing CPU overhead and analyzing GPU behavior Supercharging performance with persistent maps, bindless textures, and fine-grained synchronization Preventing and debugging errors New applications: texture compression, text drawing, font rendering with distance fields, high-quality texture filtering, and OpenMP Bonus material and sample code are available at [openglsuperbible.com](http://openglsuperbible.com).

An introduction to the basic concepts of 3D computer graphics that offers a careful mathematical exposition within a modern computer graphics application programming interface. Computer graphics technology is an amazing success story. Today, all of our PCs are capable of producing high-quality computer-generated images, mostly in the form of video games and virtual-life environments; every summer blockbuster movie includes jaw-dropping computer generated special effects. This book explains the fundamental concepts of 3D computer graphics. It introduces the basic algorithmic technology needed to produce 3D computer graphics, and covers such topics as understanding and manipulating 3D geometric transformations, camera transformations, the image-rendering process, and materials and texture mapping. It also touches on advanced topics including color representations, light simulation, dealing with geometric representations, and producing animated computer graphics. The book takes special care to develop an original exposition that is accessible and concise but also offers a clear explanation of the more difficult and subtle mathematical issues. The topics are organized around a modern shader-based version of OpenGL, a widely used computer graphics application programming interface that provides a real-time “rasterization-based” rendering environment. Each chapter concludes with exercises. The book is suitable for a rigorous one-semester introductory course in computer graphics for upper-level undergraduates or as a professional reference. Readers should be moderately competent programmers and have had some experience with linear algebra. After mastering the material presented, they will be on the path to expertise in an

exciting and challenging field.

OpenGL Shading Language 4 Cookbook is a hands-on guide that gets straight to the point – actually creating graphics, instead of just theoretical learning. Each recipe is specifically tailored to satisfy your appetite for producing real-time 3-D graphics using the latest GLSL specification. This book is for OpenGL programmers looking to use the modern features of GLSL 4 to create real-time, three-dimensional graphics. Familiarity with OpenGL programming, along with the typical 3D coordinate systems, projections, and transformations is assumed. It can also be useful for experienced GLSL programmers who are looking to implement the techniques that are presented here.

Helps readers to develop their own professional quality computer graphics. Hands-on examples developed in OpenGL illustrate key concepts.

Please note that this title's color insert (referred to as "Plates" within the text) is not available for this digital product.

OpenGL is a powerful software interface used to produce high-quality, computer-generated images and interactive applications using 2D and 3D objects, bitmaps, and color images. The OpenGL® Programming Guide, Seventh Edition , provides definitive and comprehensive information on OpenGL and the OpenGL Utility Library. The previous edition covered OpenGL through Version 2.1. This seventh edition of the best-selling “red book” describes the latest features of OpenGL Versions 3.0 and 3.1. You will find clear explanations of OpenGL functionality and many basic computer graphics techniques, such as building and rendering 3D models; interactively viewing objects from different perspective points; and using shading, lighting, and texturing effects for greater realism. In addition, this book provides in-depth coverage of advanced techniques, including texture mapping, antialiasing, fog and atmospheric effects, NURBS, image processing, and more. The text also explores other key topics such as enhancing performance, OpenGL extensions, and cross-platform techniques. This seventh edition has been updated to include the newest features of OpenGL Versions 3.0 and 3.1, including Using framebuffer objects for off-screen rendering and texture updates Examples of the various new buffer object types, including uniform-buffer objects, transform feedback buffers, and vertex array objects Using texture arrays to increase performance when using numerous textures Efficient rendering using primitive restart and conditional rendering Discussion of OpenGL’s deprecation mechanism and how to verify your programs for future versions of OpenGL This edition continues the discussion of the OpenGL Shading Language (GLSL) and explains the mechanics of using this language to create complex graphics effects and boost the computational power of OpenGL. The OpenGL Technical Library provides tutorial and reference books for OpenGL. The Library enables programmers to gain a practical understanding of OpenGL and shows them how to unlock its full potential. Originally developed by SGI, the Library continues to evolve under the auspices of the Khronos OpenGL ARB Working Group, an industry consortium

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responsible for guiding the evolution of OpenGL and related technologies.

This book looks at the two most popular ways of using Java SE 6 to write 3D games on PCs: Java 3D (a high-level scene graph API) and JOGL (a Java layer over OpenGL). Written by Java gaming expert, Andrew Davison, this book uses the new Java (SE) 6 platform and its features including splash screens, scripting, and the desktop tray interface. This book is also unique in that it covers Java game development using the Java 3D API and Java for OpenGL--both critical components and libraries for Java-based 3D game application development

A comprehensive set of straight-forward, easy-to-follow tutorials in OpenGL and Bullet Physics that will teach you how modern game physics and 3D graphics work. If you're a beginner or intermediate programmer with a basic understanding of 3D mathematics, and you want a stronger foundation in 3D graphics and physics, then this book is perfect for you!

You'll even learn some of the fundamental concepts in 3D mathematics and software design that lies beneath them both, discovering some techniques and tricks in graphics and physics that you can use in any game development project.

Includes Complete Coverage of the OpenGL® Shading Language! Today's OpenGL software interface enables programmers to produce extraordinarily high-quality computer-generated images and interactive applications using 2D and 3D objects, color images, and programmable shaders. OpenGL® Programming Guide: The Official Guide to Learning OpenGL®, Version 4.3, Eighth Edition, has been almost completely rewritten and provides definitive, comprehensive information on OpenGL and the OpenGL Shading Language. This edition of the best-selling "Red Book" describes the features through OpenGL version 4.3. It also includes updated information and techniques formerly covered in OpenGL® Shading Language (the "Orange Book"). For the first time, this guide completely integrates shader techniques, alongside classic, functioncentric techniques. Extensive new text and code are presented, demonstrating the latest in OpenGL programming techniques. OpenGL® Programming Guide, Eighth Edition, provides clear explanations of OpenGL functionality and techniques, including processing geometric objects with vertex, tessellation, and geometry shaders using geometric transformations and viewing matrices; working with pixels and texture maps through fragment shaders; and advanced data techniques using framebuffer objects and compute shaders. New OpenGL features covered in this edition include Best practices and sample code for taking full advantage of shaders and the entire shading pipeline (including geometry and tessellation shaders) Integration of general computation into the rendering pipeline via compute shaders Techniques for binding multiple shader programs at once during application execution Latest GLSL features for doing advanced shading techniques Additional new techniques for optimizing graphics program performance Gain proficiency with OpenGL and build compelling graphics for your games and applications About This Book Get to grips with a wide range of techniques for implementing shadows using shadow maps, shadow volumes, and more

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Explore interactive, real-time visualizations of large 2D and 3D datasets or models, including the use of more advanced techniques such as stereoscopic 3D rendering Create stunning visuals on the latest platforms including mobile phones and state-of-the-art wearable computing devices Who This Book Is For The course is appropriate for anyone who wants to develop the skills and techniques essential for working with OpenGL to develop compelling 2D and 3D graphics. What You Will Learn Off-screen rendering and environment mapping techniques to render mirrors Shadow mapping techniques, including variance shadow mapping Implement a particle system using shaders Utilize noise in shaders Make use of compute shaders for physics, animation, and general computing Create interactive applications using GLFW to handle user inputs and the Android Sensor framework to detect gestures and motions on mobile devices Use OpenGL primitives to plot 2-D datasets (such as time series) dynamically Render complex 3D volumetric datasets with techniques such as data slicers and multiple viewpoint projection In Detail OpenGL is a fully functional, cross-platform API widely adopted across the industry for 2D and 3D graphics development. It is mainly used for game development and applications, but is equally popular in a vast variety of additional sectors. This practical course will help you gain proficiency with OpenGL and build compelling graphics for your games and applications. OpenGL Development Cookbook – This is your go-to guide to learn graphical programming techniques and implement 3D animations with OpenGL. This straight-talking Cookbook is perfect for intermediate C++ programmers who want to exploit the full potential of OpenGL. Full of practical techniques for implementing amazing computer graphics and visualizations using OpenGL. OpenGL 4.0 Shading Language Cookbook, Second Edition – With Version 4, the language has been further refined to provide programmers with greater power and flexibility, with new stages such as tessellation and compute. OpenGL Shading Language 4 Cookbook is a practical guide that takes you from the fundamentals of programming with modern GLSL and OpenGL, through to advanced techniques. OpenGL Data Visualization Cookbook - This easy-to-follow, comprehensive Cookbook shows readers how to create a variety of real-time, interactive data visualization tools. Each topic is explained in a step-by-step format. A range of hot topics is included, including stereoscopic 3D rendering and data visualization on mobile/wearable platforms. By the end of this guide, you will be equipped with the essential skills to develop a wide range of impressive OpenGL-based applications for your unique data visualization needs. This Learning Path combines some of the best that Packt has to offer in one complete, curated package. It includes content from the following Packt products, OpenGL Development Cookbook by Muhammad Mobeen Movania, OpenGL 4.0 Shading Language Cookbook, Second Edition by David Wolff, OpenGL Data Visualization Cookbook by Raymond C. H. Lo, William C. Y. Lo Style and approach Full of easy-to-follow hands-on tutorials, this course teaches you to develop a wide range of impressive OpenGL-based applications in a step-by-step format.

iPhone OS Development: Your visual blueprint for developing apps for Apple's mobile devices provides essential tips, tricks, and techniques for developing for the iPad, iPhone, or iPod touch. This book covers everything from the key features of the Objective-C language, to hands-on tips for getting the most from the Apple SDK, to inside information about programming the touch screen, accelerometer, GPS, graphics, sound, and connectivity. It includes all of the information a new developer needs to create her first application, and references facts for more experienced developers who need distilled information about the most important iPad, iPhone, and iPod touch technologies. Also included is a step by step guide to uploading products to the App Store, and designing projects that maximize buyer interest and sales potential. Note: CD-ROM/DVD and other supplementary materials are not included as part of eBook file.

OpenGL® SuperBible, Fifth Edition is the definitive programmer's guide, tutorial, and reference for the world's leading 3D API for real-time computer graphics, OpenGL 3.3. The best all-around introduction to OpenGL for developers at all levels of experience, it clearly explains both the API and essential associated programming concepts. Readers will find up-to-date, hands-on guidance on all facets of modern OpenGL development, including transformations, texture mapping, shaders, advanced buffers, geometry management, and much more. Fully revised to reflect ARB's latest official specification (3.3), this edition also contains a new start-to-finish tutorial on OpenGL for the iPhone, iPod touch, and iPad. Coverage includes A practical introduction to the essentials of real-time 3D graphics Core OpenGL 3.3 techniques for rendering, transformations, and texturing Writing your own shaders, with examples to get you started Cross-platform OpenGL: Windows (including Windows 7), Mac OS X, GNU/Linux, UNIX, and embedded systems OpenGL programming for iPhone, iPod touch, and iPad: step-by-step guidance and complete example programs Advanced buffer techniques, including full-definition rendering with floating point buffers and textures Fragment operations: controlling the end of the graphics pipeline Advanced shader usage and geometry management A fully updated API reference, now based on the official ARB (Core) OpenGL 3.3 manual pages New bonus materials and sample code on a companion Web site, [www.starstonesoftware.com/OpenGL](http://www.starstonesoftware.com/OpenGL) Part of the OpenGL Technical Library—The official knowledge resource for OpenGL developers The OpenGL Technical Library provides tutorial and reference books for OpenGL. The Library enables programmers to gain a practical understanding of OpenGL and shows them how to unlock its full potential. Originally developed by SGI, the Library continues to evolve under the auspices of the OpenGL Architecture Review Board (ARB) Steering Group (now part of the Khronos Group), an industry consortium responsible for guiding the evolution of OpenGL and related technologies.

The MATLAB® programming environment is often perceived as a platform suitable for prototyping and modeling but not for "serious" applications. One of the main complaints is that MATLAB is just too slow. Accelerating MATLAB

Performance aims to correct this perception by describing multiple ways to greatly improve MATLAB program speed. Packed with thousands of helpful tips, it leaves no stone unturned, discussing every aspect of MATLAB. Ideal for novices and professionals alike, the book describes MATLAB performance in a scale and depth never before published. It takes a comprehensive approach to MATLAB performance, illustrating numerous ways to attain the desired speedup. The book covers MATLAB, CPU, and memory profiling and discusses various tradeoffs in performance tuning. It describes both the application of standard industry techniques in MATLAB, as well as methods that are specific to MATLAB such as using different data types or built-in functions. The book covers MATLAB vectorization, parallelization (implicit and explicit), optimization, memory management, chunking, and caching. It explains MATLAB's memory model and details how it can be leveraged. It describes the use of GPU, MEX, FPGA, and other forms of compiled code, as well as techniques for speeding up deployed applications. It details specific tips for MATLAB GUI, graphics, and I/O. It also reviews a wide variety of utilities, libraries, and toolboxes that can help to improve performance. Sufficient information is provided to allow readers to immediately apply the suggestions to their own MATLAB programs. Extensive references are also included to allow those who wish to expand the treatment of a particular topic to do so easily. Supported by an active website, and numerous code examples, the book will help readers rapidly attain significant reductions in development costs and program run times.

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