

Autodesk Maya Api White Paper

Near the end of the Terminal Classic Mayan period, a high priest commits a murder where a sacrifice is needed. The consequences of his deed will reach across worlds and ages. In our own time, Lydia Rosenstrom is a master translator working with an archaeological team in Yucatán and on a virtual reality simulation of the ancient site. She is drawn into a dangerous convergence of realities. This tightly-woven tale blends mysticism, technology, archaeology, authentic Mayan history, and Mayan prophecies for 2012 into an engrossing story about challenges, consciousness change, and transformation.

Practical Maya Programming with Python is a practical tutorial packed with plenty of examples and sample projects which guides you through building reusable, independent modules and handling unexpected errors. If you are a developer looking to build a powerful system using Python and Maya's capabilities, then this book is for you. Practical Maya Programming with Python is perfect for intermediate users with basic experience in Python and Maya who want to better their knowledge and skills.

In the early days of the Web a need was recognized for a language to display 3D objects through a browser. An HTML-like language, VRML, was proposed in 1994 and became the standard for describing interactive 3D objects and worlds on the Web. 3D Web courses were started, several best-selling books were published, and VRML continues to be used today. However VRML, because it was based on HTML, is a stodgy language that is not easy to incorporate with other applications and has been difficult to add features to. Meanwhile, applications for interactive 3D graphics have been exploding in areas such as medicine, science, industry, and entertainment. There is a strong need for a set of modern Web-based technologies, applied within a standard extensible framework, to enable a new generation of modeling & simulation applications to emerge, develop, and interoperate. X3D is the next generation open standard for 3D on the web. It is the result of several years of development by the Web 3D Consortium's X3D Task Group. Instead of a large monolithic specification (like VRML), which requires full adoption for compliance, X3D is a component-based architecture that can support applications ranging from a simple non-interactive animation to the latest streaming or rendering applications. X3D replaces VRML, but also provides compatibility with existing VRML content and browsers. Don Brutzman organized the first symposium on VRML and is playing a similar role with X3D; he is a founding member of the consortium. Len Daly is a professional member of the consortium and both Len and Don have been involved with the development of the standard from the start. The first book on the new way to present interactive 3D content over the Web, written by two of the designers of the standard Plentiful illustrations and screen shots in the full color text Companion website with extensive content, including the X3D specification, sample code and applications, content creation tools, and demos of compatible Web browsers

Get Started Quickly with DirectX 3D Programming: No 3D Experience Needed This step-by-step text demystifies modern graphics programming so you can quickly start writing professional code with DirectX and HLSL. Expert graphics instructor Paul Varcholik starts with the basics: a tour of the Direct3D graphics pipeline, a 3D math primer, and an introduction to the best tools and support

libraries. Next, you'll discover shader authoring with HLSL. You'll implement basic lighting models, including ambient lighting, diffuse lighting, and specular highlighting. You'll write shaders to support point lights, spotlights, environment mapping, fog, color blending, normal mapping, and more. Then you'll employ C++ and the Direct3D API to develop a robust, extensible rendering engine. You'll learn about virtual cameras, loading and rendering 3D models, mouse and keyboard input, and you'll create a flexible effect and material system to integrate your shaders. Finally, you'll extend your graphics knowledge with more advanced material, including post-processing techniques for color filtering, Gaussian blurring, bloom, and distortion mapping. You'll develop shaders for casting shadows, work with geometry and tessellation shaders, and implement a complete skeletal animation system for importing and rendering animated models. You don't need any experience with 3D graphics or the associated math:

Everything's taught hands-on, and all graphics-specific code is fully explained. Coverage includes

- The Direct3D API and graphics pipeline
- A 3D math primer: vectors, matrices, coordinate systems, transformations, and the DirectX Math library
- Free and low-cost tools for authoring, debugging, and profiling shaders
- Extensive treatment of HLSL shader authoring
- Development of a C++ rendering engine
- Cameras, 3D models, materials, and lighting
- Post-processing effects
- Device input, component-based architecture, and software services
- Shadow mapping, depth maps, and projective texture mapping
- Skeletal animation
- Geometry and tessellation shaders
- Survey of rendering optimization, global illumination, compute shaders, deferred shading, and data-driven engine architecture

Using a web API to provide services to application developers is one of the more satisfying endeavors that software engineers undertake. But building a popular API with a thriving developer ecosystem is also one of the most challenging. With this practical guide, developers, architects, and tech leads will learn how to navigate complex decisions for designing, scaling, marketing, and evolving interoperable APIs. Authors Brenda Jin, Saurabh Sahni, and Amir Shevat explain API design theory and provide hands-on exercises for building your web API and managing its operation in production. You'll also learn how to build and maintain a following of app developers. This book includes expert advice, worksheets, checklists, and case studies from companies including Slack, Stripe, Facebook, Microsoft, Cloudinary, Oracle, and GitHub. Get an overview of request-response and event-driven API design paradigms Learn best practices for designing an API that meets the needs of your users Use a template to create an API design process Scale your web API to support a growing number of API calls and use cases Regularly adapt the API to reflect changes to your product or business Provide developer resources that include API documentation, samples, and tools

Apresentando uma revisão concisa dos conceitos considerados essenciais e alguns tutoriais, este livro foi formulado para oferecer uma compreensão completa sobre como renderizar modelos em 3ds Max Design, de modo que esse conhecimento possa ser aplicado em qualquer projeto. A partir disso, os autores mostram como usar da melhor forma possível o software mental ray, trazendo lições sobre como calcular a renderização a partir de uma abordagem lógica, a otimizar o software para melhorar sua produtividade, a tornar a iluminação natural mais eficiente, apresenta seus novos materiais e shaders, como acrescentar efeitos especiais à cenas, entre outras informações. Nesta obra, o leitor poderá encontrar todas as dicas de produção e habilidades

necessárias para gerar renderizações como um profissional.

Create high-performance virtual reality applications with OpenSceneGraph, one of the best 3D graphics engines.

Fluid simulation is a computer graphic used to develop realistic animation of liquids in modern games. The Art of Fluid Animation describes visually rich techniques for creating fluid-like animations that do not require advanced physics or mathematical skills. It explains how to create fluid animations like water, smoke, fire, and explosions through computer code in a fun manner. The book presents concepts that drive fluid animation and gives a historical background of the computation of fluids. It covers many research areas that include stable fluid simulation, flows on surfaces, and control of flows. It also gives one-paragraph summaries of the material after each section for reinforcement. This book includes computer code that readers can download and run on several platforms so they can extend their work beyond what is described in the book. The material provided here is designed to serve as a starting point for aspiring programmers to begin creating their own programs using fluid animation.

Aesthetic 3D Lighting: History, Theory, and Application delves into the history, the theory, and the practical and aesthetic application of lighting in the fine arts and 3D animation. In this book, animation industry veteran and lighting expert Lee Lanier examines the importance of lighting and its ability to communicate information to the viewer. Lee examines the history of lighting as applied to the fine arts, film, photography, and 3D animation. He discusses the use of light color, light location and direction, and light shadow types to recreate specific locations and to generate moods. He includes guides for successful lighting in 3D animation. Software-agnostic examples lead you through useful 3D lighting set-ups. Chapter-long case studies step you through more complex 3D lighting projects in Autodesk Maya. An accompanying eResource (www.routledge.com/9781138737570) features 3D model files, scene files, and texture bitmaps, allowing you to practice the discussed techniques in Autodesk Maya and many other 3D programs. The lighting techniques covered in this book include: History of lighting as used in the fine arts The scientific mechanisms of light Light types and light application in 3D programs Light qualities including shadows variations Basic and advanced 3D lighting approaches 1-, 2-, 3-point, naturalistic, and stylistic lighting techniques Replication of real-world lighting scenarios and locations Overview of advanced 3D lighting and rendering systems

OpenGL, which has been bound in C, is a seasoned graphics library for scientists and engineers. As we know, Java is a rapidly growing language becoming the de facto standard of Computer Science learning and application development platform as many undergraduate computer science programs are adopting Java in place of C/C++. Released by Sun Microsystems in June 2003, the recent OpenGL binding with Java, JOGL, provides students, scientists, and engineers a new venue of graphics learning, research, and applications. Overview This book aims to be a shortcut to graphics theory and programming in JOGL. Specifically, it covers OpenGL programming in Java, using JOGL, along with concise

computer graphics theories. It covers all graphics basics and several advanced topics without including some implementation details that are not necessary in graphics applications. It also covers some basic concepts in Java programming for C/C++ programmers. It is designed as a textbook for students who know programming basics already. It is an excellent shortcut to learn 3D graphics for scientists and engineers who understand Java programming. It is also a good reference for C/C++ graphics vi Preface programmers to learn Java and JOGL. This book is a companion to Guide to Graphics Software Tools (Springer-Verlag, New York, ISBN 0-387-95049-4), which covers a smaller graphics area with similar examples in C but has a comprehensive list of graphics software tools. Organization and Features This book concisely introduces graphics theory and programming in Java with JOGL.

This updated bestseller provides an introduction to programming interactive computer graphics, with an emphasis on game development using DirectX 11. The book is divided into three main parts: basic mathematical tools, fundamental tasks in Direct3D, and techniques and special effects. It includes new Direct3D 11 features such as hardware tessellation, the compute shader, dynamic shader linkage and covers advanced rendering techniques such as screen-space ambient occlusion, level-of-detail handling, cascading shadow maps, volume rendering, and character animation. Includes a companion CD-ROM with code and figures. eBook Customers: Companion files are available for downloading with order number/proof of purchase by writing to the publisher at info@merclearning.com.

"The BIM Handbook is an extensively researched and meticulously written book, showing evidence of years of work rather than something that has been quickly put together in the course of a few months. It brings together most of the current information about BIM, its history, as well as its potential future in one convenient place, and can serve as a handy reference book on BIM for anyone who is involved in the design, construction, and operation of buildings and needs to know about the technologies that support it. The need for such a book is indisputable, and it is terrific that Chuck Eastman and his team were able to step up to the plate and make it happen. Thanks to their efforts, anyone in the AEC industry looking for a deeper understanding of BIM now knows exactly where to look for it." —AECbytes book review, August 28, 2008 (www.aecbytes.com/review/2008/BIMHandbook.html) **DISCOVER BIM: A BETTER WAY TO BUILD BETTER BUILDINGS** Building Information Modeling (BIM) offers a novel approach to design, construction, and facility management in which a digital representation of the building process is used to facilitate the exchange and interoperability of information in digital format. BIM is beginning to change the way buildings look, the way they function, and the ways in which they are designed and built. The BIM Handbook, Second Edition provides an in-depth understanding of BIM technologies, the business and organizational issues associated with its implementation, and the profound advantages that effective use of BIM can provide to all members of a project team. Updates to this edition

include: Completely updated material covering the current practice and technology in this fast-moving field Expanded coverage of lean construction and its use of BIM, with special focus on Integrated Project Delivery throughout the book New insight on the ways BIM facilitates sustainable building New information on interoperability schemas and collaboration tools Six new case studies Painting a colorful and thorough picture of the state of the art in building information modeling, the BIM Handbook, Second Edition guides readers to successful implementations, helping them to avoid needless frustration and costs and take full advantage of this paradigm-shifting approach to construct better buildings that consume fewer materials and require less time, labor, and capital resources.

Master complex workflows and conquer the world with Python and Maya About This Book Improve your modelling skills and reduce your scripting problems using Python in Maya Learn to communicate with web applications using Python for easier team development A quick and practical answer to every problem you can have whilst scripting in Maya with Python Who This Book Is For This book is for Python developers who have just started scripting with Maya. What You Will Learn Find out how to use Python scripting to automate tedious tasks Create functional user interfaces to make scripts easy to share with others Add new functionality to Maya via the power of scripting Import and export arbitrary data into and out of Maya Improve your workflow, and that of your team Create custom create custom controls to make rigs that are easy to work with Implement a system to render 3D assets for isometric games Use script jobs to trigger actions automatically in response to user interaction Open a command port to allow other applications to communicate with Maya In Detail Maya is a 3D graphics and animation software, used to develop interactive 3D applications and games with stupendous visual effects. The Maya Programming with Python Cookbook is all about creating fast, powerful automation systems with minimum coding using Maya Python. With the help of insightful and essential recipes, this book will help you improve your modelling skills. Expand your development options and overcome scripting problems encountered whilst developing code in Maya. Right from the beginning, get solutions to complex development concerns faced when implementing as parts of build. Style and approach This book is comprised of a set of practical recipes, grouped under specific topics, which can be referred to independently or in sequence. These recipes provide quick solutions to common problems, and cover most of the real-world scenarios that developers are likely to face when working with Maya. This is the 4th edition of Murach's classic Java book that's trained thousands of developers in the last 10 years. Now fully updated to take advantage of the NetBeans IDE, this book helps any programmer learn Java faster and better than ever before. It's the one Java book that presents object-oriented features like inheritance, interfaces, and polymorphism in a way that's both understandable and useful in the real world. It moves at the professional pace that's expected on the job. It is full of practical coding examples that enhance training and that work as time-saving models for new applications. And

it's all done in the distinctive Murach style that has been training professional programmers for more than 37 years. Learn 2D drawing and 3D modeling from scratch using AutoCAD 2021 and its more affordable LT version to become a CAD professional Key Features Explore the AutoCAD GUI, file format, and drawing tools to get started with CAD projects Learn to use drawing management tools for working efficiently on large projects Discover techniques for creating, modifying, and managing 3D models and converting 2D plans into 3D models Book Description AutoCAD and AutoCAD LT are one of the most versatile software applications for architectural and engineering designs and the most popular computer-aided design (CAD) platform for 2D drafting and 3D modeling. This hands-on guide will take you through everything you need to know to make the most out of this powerful tool, starting from a simple tour of the user interface through to using advanced tools. Starting with basic drawing shapes and functions, you'll get to grips with the fundamentals of CAD designs. You'll then learn about effective drawing management using layers, dynamic blocks, and groups and discover how to add annotations and plot like professionals. The book delves into 3D modeling and helps you convert your 2D drawings into 3D models and shapes. As you progress, you'll cover advanced tools and features such as isometric drawings, drawing utilities for managing and recovering complex files, quantity surveying, and multidisciplinary drawing files using xRefs, and you'll learn how to implement them with the help of practical exercises at the end of each chapter. Finally, you'll get to grips with rendering and visualizing your designs in AutoCAD. By the end of the book, you'll have developed a solid understanding of CAD principles and be able to work with AutoCAD software confidently to build impressive 2D and 3D drawings. What you will learn Understand CAD fundamentals using AutoCAD's basic functions, navigation, and components Create complex 3d solid objects starting from the primitive shapes using the solid editing tools Working with reusable objects like Blocks and collaborating using xRef Explore some advanced features like external references and dynamic block Get to grips with surface and mesh modeling tools such as Fillet, Trim, and Extend Use the paper space layout in AutoCAD for creating professional plots for 2D and 3D models Convert your 2D drawings into 3D models Who this book is for The book is for design engineers, mechanical engineers, architects, and anyone working in construction, manufacturing, or similar fields. Whether you're an absolute beginner, student, or professional looking to upgrade your engineering design skills, you'll find this AutoCAD book useful. No prior knowledge of CAD or AutoCAD is necessary.

"David Gould is an expert at using, programming, and teaching Maya, and it shows. People who need to program Maya will find this book essential. Even Maya users who don't intend to do extensive programming should read this book for a better understanding of what's going on under the hood. Compact yet thorough, it covers both MEL and the C++ API, and is written to be informative for both novice and expert programmers. Highly recommended!" -Larry Gritz, Exluna/NVIDIA,

co-author of *Advanced RenderMan: Creating CGI for Motion Pictures* "This book should be required reading for all Maya programmers, novice and expert alike. For the novice, it provides a thorough and wonderfully well thought-out hands-on tutorial and introduction to Maya. The book's greatest contribution, however, is that in it David shares his deep understanding of Maya's fundamental concepts and architecture, so that even the expert can learn to more effectively exploit Maya's rich and powerful programming interfaces." -Philip J. Schneider, Disney Feature Animation, co-author of *Geometric Tools for Computer Graphics* "Having provided a technical review of David Gould's *Complete Maya Programming*, I must say that this book is the definitive text for scripting and plug-in development for Maya. Never before has there been such a concise and clearly written guide to programming for Maya. Any user smart enough to pick up this book would be better off for it." -Chris Rock, a Technical Director at "a Large Animation Studio in Northern California" "If you ever wanted to open the Maya toolbox, this is your guide. With clear step-by-step instructions, you will soon be able to customize and improve the application, as well as create your own extensions, either through the MEL scripting language or the full C++ API." -Christophe Hery, Industrial Light & Magic Learning Maya, the world's leading 3D animation and effects package, is a challenge, especially for those who want to master Maya's versatile programming features in addition to its built-in tools. Finally, here is a practical, step-by-step guide that shows how to use Maya to its fullest potential, beginning with the basics. Readers of *Complete Maya Programming* will first gain a thorough understanding of Maya's inner workings, and then learn how to customize and extend Maya with scripts and plugins that take control and productivity to new levels. Users new to programming can apply Maya's easy scripting language MEL (Maya Embedded Language), while more advanced users can work with the C++ API (Application Programming Interface). Both a fundamental tutorial for Maya beginners and a solid reference for experienced developers, *Complete Maya Programming* is every user's guide to Maya mastery. FEATURES: *Demonstrates how to use MEL to control Maya, customize its interface, automate procedures, and more *Details how to use the C++ API to modify Maya functionality and develop tools and features to meet any need *Explains when to use MEL, when to use the C++ API, and how to use them together *Provides a multitude of real-world examples illustrating applications of Maya programming *Ideal for technical directors, developers, or anyone wishing to master Maya *Provides a storehouse of MEL scripts and C++ source code, glossary, and list of resources, available at www.davidgould.com

This textbook introduces the "Fundamentals of Multimedia", addressing real issues commonly faced in the workplace. The essential concepts are explained in a practical way to enable students to apply their existing skills to address problems in multimedia. Fully revised and updated, this new edition now includes coverage of such topics as 3D TV, social networks, high-efficiency video compression and conferencing, wireless and mobile networks, and their attendant technologies. Features: presents an overview of the key concepts in

multimedia, including color science; reviews lossless and lossy compression methods for image, video and audio data; examines the demands placed by multimedia communications on wired and wireless networks; discusses the impact of social media and cloud computing on information sharing and on multimedia content search and retrieval; includes study exercises at the end of each chapter; provides supplementary resources for both students and instructors at an associated website.

Maya Python for Games and Film is the first book to focus exclusively on how to implement Python with Maya. Written by trusted authorities in the field, this in-depth guide will help you master Maya Python, whether you're a seasoned technical artist looking to make the transition from MEL to Python or an aspiring artist not wanting to scramble for information.

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.

Takes programmers through the complete process of developing a professional quality game, covering a range of topics such as the key "gotcha" issues that could trip up even a veteran programmer, game interface design, game audio, and game engine technolog

An insightful presentation of the key concepts, paradigms, and applications of modeling and simulation Modeling and simulation has become an integral part of research and development across many fields of study, having evolved from a tool to a discipline in less than two decades. Modeling and Simulation Fundamentals offers a comprehensive and authoritative treatment of the topic and includes definitions, paradigms, and applications to equip readers with the skills needed to work successfully as developers and users of modeling and simulation. Featuring contributions written by leading experts in the field, the book's fluid presentation builds from topic to topic and provides the foundation and theoretical underpinnings of modeling and simulation. First, an introduction to the topic is presented, including related terminology, examples of model development, and various domains of modeling and simulation. Subsequent chapters develop the necessary mathematical background needed to understand modeling and simulation topics, model types, and the importance of visualization. In addition, Monte Carlo simulation, continuous simulation, and discrete event simulation are thoroughly discussed, all of which are significant to a complete understanding of modeling and simulation. The book also features chapters that outline sophisticated methodologies, verification and validation, and the importance of interoperability. A related FTP site features color representations of the book's numerous figures. Modeling and Simulation Fundamentals encompasses a comprehensive study of the discipline and is an excellent book for modeling and simulation courses at the upper-undergraduate and graduate levels. It is also a valuable reference for researchers and practitioners in the fields of computational statistics, engineering, and computer science who use statistical modeling techniques.

Presents an introduction to WebGL development and production concepts to create full 3D applications.

"Imagine, design, create offers a wide-ranging look at how the creative process and the tools of design are dramatically changing - and where design is headed in the coming years. Bringing together stories of good design happening around the world, the book shows how people are using fresh design approaches and new capabilities to solve problems, create opportunities, and improve the way we live and work"-- Book jacket.

Create high-quality photorealistic renders of architectural visualizations using 3ds Max and Vray with the project-based tutorials in this book. Learn how to combine lighting and rendering options to end-up with the most realistic final renders possible at a professional level. The tutorials in this book are filled with beautiful full-color images and they teach you how to light both interiors and exteriors and daytime and nighttime scenes. Learn how to save time without sacrificing the quality of your final renders with tips and tricks on rendering with Vray - the most accurate rendering application for 3ds Max. The companion CD includes all the project files that you need to recreate each of the projects presented within the book.

Produce mind-blowing visual effects with Autodesk Maya. Gain the practical skills and knowledge you need to recreate phenomena critical to visual effects work, including fire, water, smoke, explosions, and destruction, as well as their integration with real-world film and video. In *Creating Visual Effects in Maya*, Maya master Lee Lanier has combined the latest studio techniques with multi-chapter, hands-on projects and professionally-vetted workflows to bolster your CG toolkit. Engaging, full-color tutorials cover: Creating foliage, fire, and smoke with Paint Effects Growing Maya Fur and nHair on clothing, characters, and sets Replicating water, smoke, sparks, swarms, bubbles, and debris with nParticles and nCloth Controlling scenes and simulations with expressions and MEL, Python, and PyMEL scripting Adding dust, fog, smoke, rippling water, and fireballs with Fluid Effects containers Creating damage with Effects presets, deformers, and animated textures Matchmoving and motion tracking with Maya and MatchMover Creating complex destruction by combining rigid bodies, nParticles, nCloth, and Fluid Effects Setting up, rendering, and compositing mental ray render passes with Autodesk Composite, Adobe After Effects, and The Foundry Nuke The companion website (www.focalpress.com/cw/lanier) features a treasure trove of Maya, MatchMover, After Effects, and Nuke project files, image sequences, texture bitmaps, and MEL, Python, and PyMEL scripts, allowing you to immediately apply the techniques taught in the book.

If you are an engineer, a researcher, or a hobbyist, and you are interested in robotics and want to build your own robot, this book is for you. Readers are assumed to be new to robotics but should have experience with Python.

Thoroughly revised, this third edition focuses on modern techniques used to generate synthetic three-dimensional images in a fraction of a second. With the advent of programmable shaders, a wide variety of new algorithms have arisen and evolved over the past few years. This edition discusses current, practical rendering methods used in games and other applications. It also presents a solid theoretical framework and relevant mathematics for the field of interactive computer graphics, all in an approachable style. The authors have made the figures used in the book available for download for fair use.:Download Figures. Reviews Rendering has been a required reference for professional graphics practitioners for nearly a decade. This latest edition is as relevant as ever,

covering topics from essential mathematical foundations to advanced techniques used by today's cutting edge games. -- Gabe Newell, President, Valve, May 2008 Rendering ... has been completely revised and revamped for its updated third edition, which focuses on modern techniques used to generate three-dimensional images in a fraction of the time old processes took. From practical rendering for games to math and details for better interactive applications, it's not to be missed. -- The Bookwatch, November 2008 You'll get brilliantly lucid explanations of concepts like vertex morphing and variance shadow mapping—as well as a new respect for the incredible craftsmanship that goes into today's PC games. -- Logan Decker, PC Gamer Magazine , February 2009

API Design for C++ provides a comprehensive discussion of Application Programming Interface (API) development, from initial design through implementation, testing, documentation, release, versioning, maintenance, and deprecation. It is the only book that teaches the strategies of C++ API development, including interface design, versioning, scripting, and plug-in extensibility. Drawing from the author's experience on large scale, collaborative software projects, the text offers practical techniques of API design that produce robust code for the long term. It presents patterns and practices that provide real value to individual developers as well as organizations. API Design for C++ explores often overlooked issues, both technical and non-technical, contributing to successful design decisions that product high quality, robust, and long-lived APIs. It focuses on various API styles and patterns that will allow you to produce elegant and durable libraries. A discussion on testing strategies concentrates on automated API testing techniques rather than attempting to include end-user application testing techniques such as GUI testing, system testing, or manual testing. Each concept is illustrated with extensive C++ code examples, and fully functional examples and working source code for experimentation are available online. This book will be helpful to new programmers who understand the fundamentals of C++ and who want to advance their design skills, as well as to senior engineers and software architects seeking to gain new expertise to complement their existing talents. Three specific groups of readers are targeted: practicing software engineers and architects, technical managers, and students and educators. The only book that teaches the strategies of C++ API development, including design, versioning, documentation, testing, scripting, and extensibility. Extensive code examples illustrate each concept, with fully functional examples and working source code for experimentation available online. Covers various API styles and patterns with a focus on practical and efficient designs for large-scale long-term projects.

DVD-ROM includes over 9 hours of video lectures.

3D Animation for the Raw Beginner Using Autodesk Maya 2eCRC Press

Build your own low-level game engine in Metal! This book introduces you to graphics programming in Metal - Apple's framework for programming on the GPU. You'll build your own game engine in Metal where you can create 3D scenes and build your own 3D games. Who This Book Is For This book is for intermediate Swift developers interested in learning 3D graphics or gaining a deeper understanding of how game engines work. Topics Covered in Metal by Tutorials The Rendering Pipeline: Take a deep dive through the graphics pipeline. 3D Models: Import 3D models with Model I/O and discover what makes up a 3D model. Coordinate

Spaces: Learn the math behind 3D rendering. Lighting: Make your models look more realistic with simple lighting techniques. Textures & Materials: Design textures and surfaces for micro detail. Character Animation: Bring your 3D models to life with joints and animation. Tessellation: Discover how to use tessellation to add a greater level of detail using fewer resources. Environment: Add a sky to your scenes and use the sky image for lighting. Instancing & Procedural Generation: Save resources with instancing, and generate scenes algorithmically. Multipass & Deferred Rendering: Add shadows with advanced lighting effects. And more! After reading this book, you'll be prepared to take full advantage of graphics rendering with the Metal framework.

Hailed as a "must-have textbook" (CHOICE, January 2010), the first edition of Game Engine Architecture provided readers with a complete guide to the theory and practice of game engine software development. Updating the content to match today's landscape of game engine architecture, this second edition continues to thoroughly cover the major components that make up a typical commercial game engine. New to the Second Edition Information on new topics, including the latest variant of the C++ programming language, C++11, and the architecture of the eighth generation of gaming consoles, the Xbox One and PlayStation 4. New chapter on audio technology covering the fundamentals of the physics, mathematics, and technology that go into creating an AAA game audio engine Updated sections on multicore programming, pipelined CPU architecture and optimization, localization, pseudovectors and Grassman algebra, dual quaternions, SIMD vector math, memory alignment, and anti-aliasing Insight into the making of Naughty Dog's latest hit, The Last of Us The book presents the theory underlying various subsystems that comprise a commercial game engine as well as the data structures, algorithms, and software interfaces that are typically used to implement them. It primarily focuses on the engine itself, including a host of low-level foundation systems, the rendering engine, the collision system, the physics simulation, character animation, and audio. An in-depth discussion on the "gameplay foundation layer" delves into the game's object model, world editor, event system, and scripting system. The text also touches on some aspects of gameplay programming, including player mechanics, cameras, and AI. An awareness-building tool and a jumping-off point for further learning, Game Engine Architecture, Second Edition gives readers a solid understanding of both the theory and common practices employed within each of the engineering disciplines covered. The book will help readers on their journey through this fascinating and multifaceted field.

Foundation HTML5 Canvas: For Games and Entertainment teaches you how to make exciting interactive games and applications using HTML5 canvas. Canvas lets you produce graphics, animations, and applications using the HTML5 and JavaScript web standards. It allows you to draw directly within the browser without the need for third-party plugins like Adobe Flash, and so canvas works perfectly across desktop and mobile devices, like the iPhone and Android. Foundation HTML5 Canvas begins by introducing you to HTML5 and the cool new features that it opens up for you. You are then offered a quick guide to JavaScript programming to get you up to speed. Next up you'll receive a thorough introduction to the canvas element, which teaches you how to draw objects within the browser with great ease. Once the basics are covered you'll move on to the more advanced features of canvas, including image and video manipulation. You'll also learn how to create realistic animations with the help of some basic physics. Foundation HTML5 Canvas then teaches you how to create two thrilling space-based games using all the skills you've learned so far. You'll find plenty of code examples and illustrations designed to help you

understand even the most complex of topics. HTML5 is already here for you, and this book will provide you with all the information you need to enjoy the show. For more information, source code, and the latest blog posts from author Rob Hawkes, visit <http://rawkes.com/foundationcanvas>.

David Gould's acclaimed first book, *Complete Maya Programming: An Extensive Guide to MEL and the C++ API*, provides artists and programmers with a deep understanding of the way Maya works and how it can be enhanced and customized through programming. In his new book David offers a gentle, intuitive introduction to the core ideas of computer graphics. Each concept is explained progressively and is fully implemented in both MEL and C++ so that an artist or programmer can use the source code directly in their own programs. Geometry and modeling are covered in detail with progressively more complex examples demonstrating all of Maya's possible programming features. David Gould's first volume is widely regarded as the most authoritative reference on Maya programming. Volume II continues this tradition and provides an unmatched guide for the artist and programmer tackling complex tasks. Covers a spectrum of topics in computer graphics including points and vectors, rotations, transformations, curves and surfaces (polygonal, NURBS, subdivision), and modeling Offers insights to Maya's inner workings so that an artist or programmer can design and develop customized tools and solutions Discusses problem solving with MEL (Maya's scripting language) and the more powerful and versatile C++ API, with plenty of code examples for each

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), 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 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

The Living Architecture Systems Group is an interdisciplinary partnership of academics, artists, designers, and industry partners dedicated to researching and developing next-generation architectural environments. Projects produced by this group are now showing qualities that come strikingly close to life. These experimental works can move, respond, explore, learn, and adapt. Open boundaries and expanded dimensions run throughout the studies, exploring the scales of new adaptive and responsive architecture, from intimate personal spaces to regional infrastructures. Dimensions at the edges of human perception, subtle phenomena, immersive sonic environments, and precise

measurements using innovative software controls are included. Deep involvement in computation and material craft is offered, reflecting the unparalleled new abilities of designers to precisely addressing material performance. This White Papers 2019 volume offers readers a sense of the variety and depth of research that is being conducted by Living Architecture Systems Group.

Discover BIM: A better way to build better buildings Building Information Modeling (BIM) offers a novel approach to design, construction, and facility management in which a digital representation of the building product and process is used to facilitate the exchange and interoperability of information in digital format. BIM is beginning to change the way buildings look, the way they function, and the ways in which they are designed and built. The BIM Handbook, Third Edition provides an in-depth understanding of BIM technologies, the business and organizational issues associated with its implementation, and the profound advantages that effective use of BIM can provide to all members of a project team. Updates to this edition include: Information on the ways in which professionals should use BIM to gain maximum value New topics such as collaborative working, national and major construction clients, BIM standards and guides A discussion on how various professional roles have expanded through the widespread use and the new avenues of BIM practices and services A wealth of new case studies that clearly illustrate exactly how BIM is applied in a wide variety of conditions Painting a colorful and thorough picture of the state of the art in building information modeling, the BIM Handbook, Third Edition guides readers to successful implementations, helping them to avoid needless frustration and costs and take full advantage of this paradigm-shifting approach to construct better buildings that consume fewer materials and require less time, labor, and capital resources.

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.

Due to limited publicly available software and lack of documentation, those involved with production volume rendering often have to start from scratch creating the necessary elements to make their system work. Production Volume Rendering: Design and Implementation provides the first full account of volume rendering techniques used for feature animation and visual effects production. It covers the theoretical underpinnings as well as the implementation of a working renderer. The book offers two paths toward understanding production volume rendering. It describes: Modern production volume rendering techniques in a generic context, explaining how the techniques fit together and how the modules are used to achieve real-world goals Implementation of the techniques, showing how to translate abstract concepts into concrete, working code and how the ideas work together to create a complete system As an introduction to the field and an overview of current techniques and algorithms, this book is a valuable source of information for programmers, technical directors, artists, and anyone else interested in how production volume rendering works. Web Resource The scripts, data, and source code for the book's renderer are freely available at <https://github.com/pvrbook/pvr>. Readers can see how the code is implemented and acquire a practical understanding of how various design considerations impact scalability, extensibility, generality, and performance.

3D Animation for the Raw Beginner Using Autodesk Maya is a hands-on academic textbook as well as a do-it-yourself training manual for the individual animator. This second edition has been completely rewritten to take into account updates to Autodesk Maya, including Autodesk's renderer, Arnold. It contains entirely new examples and tutorial lessons. All 612 images are in full color. The book directs the reader to the parts of Maya that must be mastered in order to create complete 3D projects, and thus it simplifies the process of taking on Maya's vast and intricate interface, while giving the reader a firm foundation on which to build future knowledge of Maya. It also presents brief examples of

other popular 3D applications and rendering engines. This principles-based, yet pragmatic book: Introduces the basic steps of the 3D modeling, materials, animation, lighting, and rendering processes. Presents clear and concise tutorials that link key concepts to practical techniques. Includes access to a webpage for the book: <https://buzzking.com/AnimationTextbook/AnimationTextbook.html>. On this webpage are videos that cover many of the lessons in the book, as well as video tutorials that present bonus material not included in the book. Frees instructors from the painstaking task of developing step-by-step examples to present Maya's complex interface and basic capabilities. Boasts an easy-to-follow, tutorial-based learning style ideal for individual study by aspiring animators and do-it yourselfers. Roger "Buzz" King is a Professor Emeritus at the University of Colorado at Boulder, where he teaches 3D Animation for the Computer Science Department and the Alliance for Technology, Learning, and Society (ATLAS), an institute dedicated to the application of technology to the arts. Buzz is an independent 3D animator who serves on the board of directors of a 3D animation startup. Buzz has a B.A. in Mathematics from Occidental College, an M.S. and Ph.D. in Computer Science from the University of Southern California, and an M.Div. from the Iliff School of Theology.

Key Features Introduces critical aspects of the 3D animation process Presents clear and concise tutorials that link key concepts to practical techniques Includes access to a dedicated Web site, <http://3dbybuzz.com>, featuring useful videos, lessons, and updates Frees instructors from developing step-by-step examples to present Maya's complex interface and basic Boasts an easy-to-follow, hands-on learning style ideal for individual study by aspiring animators and do-ityourselfers

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