

Gpu Zen Advanced Rendering Techniques

ShaderX2Neural Approaches to Dynamics of Signal ExchangesVR Developer GemsKivy BlueprintsReal-Time RenderingGraphics ShadersHands-On C++ Game Animation ProgrammingRay Tracing GemsReal-Time Shader ProgrammingGPU Gems 3GPU Pro 7GPGPU Programming for Games and ScienceShaderX4GPU Pro 4Foundations of Game Engine Development, Volume 2Physically Based Shader Development for Unity 2017Effective Computation in PhysicsC Programming for ArduinoGPU Pro 360 Guide to RenderingAlternative Assets and CryptocurrenciesMastering PythonGame AI Pro 3GPU Pro 5Parsing TechniquesGPU Pro 2Template Matching Techniques in Computer VisionWPF Control Development UnleashedDeep Learning with PyTorchGPU Pro 6Game Engine Architecture, Third EditionGPU Zen 2Level of Detail for 3D GraphicsThe Ray Tracer ChallengeReal Time CamerasVulkan Programming GuideMetal Programming GuideReal-Time Rendering, Fourth EditionGame AI Pro 2Ray Tracing: A Tool for AllMultiplayer Game Programming

ShaderX2

Every other day we hear about new ways to put deep learning to good use: improved medical imaging, accurate credit card fraud detection, long range weather forecasting, and more. PyTorch puts these superpowers in your hands, providing a comfortable Python experience that gets you started quickly and then grows with you as you—and your deep learning skills—become more sophisticated. Deep Learning with PyTorch will make that journey engaging and fun. Summary Every other day we hear about new ways to put deep learning to good use: improved medical imaging, accurate credit card fraud detection, long range weather forecasting, and more. PyTorch puts these superpowers in your hands, providing a comfortable Python experience that gets you started quickly and then grows with you as you—and your deep learning skills—become more sophisticated. Deep Learning with PyTorch will make that journey engaging and fun. Foreword by Soumith Chintala, Cocreator of PyTorch. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the technology Although many deep learning tools use Python, the PyTorch library is truly Pythonic. Instantly familiar to anyone who knows PyData tools like NumPy and scikit-learn, PyTorch simplifies deep learning without sacrificing advanced features. It's excellent for building quick models, and it scales smoothly from laptop to enterprise. Because companies like Apple, Facebook, and JPMorgan Chase rely on PyTorch, it's a great skill to have as you expand your career options. It's easy to get started with PyTorch. It minimizes cognitive overhead without sacrificing the access to advanced features, meaning you can focus on what matters the most - building and training the latest and greatest deep learning models and contribute to making a dent in the world. PyTorch is also a snap to scale and extend, and it partners well with other Python tooling. PyTorch has been adopted by hundreds of deep learning practitioners and several first-class players like FAIR, OpenAI, FastAI and Purdue. About the book Deep Learning with PyTorch teaches you to create neural networks and deep learning systems with PyTorch. This practical book quickly gets you to work building a real-

world example from scratch: a tumor image classifier. Along the way, it covers best practices for the entire DL pipeline, including the PyTorch Tensor API, loading data in Python, monitoring training, and visualizing results. After covering the basics, the book will take you on a journey through larger projects. The centerpiece of the book is a neural network designed for cancer detection. You'll discover ways for training networks with limited inputs and start processing data to get some results. You'll sift through the unreliable initial results and focus on how to diagnose and fix the problems in your neural network. Finally, you'll look at ways to improve your results by training with augmented data, make improvements to the model architecture, and perform other fine tuning. What's inside Training deep neural networks Implementing modules and loss functions Utilizing pretrained models from PyTorch Hub Exploring code samples in Jupyter Notebooks About the reader For Python programmers with an interest in machine learning. About the author Eli Stevens had roles from software engineer to CTO, and is currently working on machine learning in the self-driving-car industry. Luca Antiga is cofounder of an AI engineering company and an AI tech startup, as well as a former PyTorch contributor. Thomas Viehmann is a PyTorch core developer and machine learning trainer and consultant. consultant based in Munich, Germany and a PyTorch core developer. Table of Contents PART 1 - CORE PYTORCH 1 Introducing deep learning and the PyTorch Library 2 Pretrained networks 3 It starts with a tensor 4 Real-world data representation using tensors 5 The mechanics of learning 6 Using a neural network to fit the data 7 Telling birds from airplanes: Learning from images 8 Using convolutions to generalize PART 2 - LEARNING FROM IMAGES IN THE REAL WORLD: EARLY DETECTION OF LUNG CANCER 9 Using PyTorch to fight cancer 10 Combining data sources into a unified dataset 11 Training a classification model to detect suspected tumors 12 Improving training with metrics and augmentation 13 Using segmentation to find suspected nodules 14 End-to-end nodule analysis, and where to go next PART 3 - DEPLOYMENT 15 Deploying to production

Neural Approaches to Dynamics of Signal Exchanges

VR Developer Gems

Wolfgang Engel's GPU Pro 360 Guide to Rendering gathers all the cutting-edge information from his previous seven GPU Pro volumes into a convenient single source anthology that covers real-time rendering. This volume is complete with 32 articles by leading programmers that focus on the ability of graphics processing units to process and generate rendering in exciting ways. GPU Pro 360 Guide to Rendering is comprised of ready-to-use ideas and efficient procedures that can help solve many rendering programming challenges that may arise. Key Features: Presents tips and tricks on real-time rendering of special effects and visualization data on common consumer software platforms such as PCs, video consoles, and mobile devices Covers specific challenges involved in creating games on various platforms Explores the latest developments in the rapidly evolving field of real-time rendering Takes a practical approach that helps graphics programmers solve their daily

challenges

Kivy Blueprints

Master the art of writing beautiful and powerful Python by using all of the features that Python 3.5 offers About This Book Become familiar with the most important and advanced parts of the Python code style Learn the trickier aspects of Python and put it in a structured context for deeper understanding of the language Offers an expert's-eye overview of how these advanced tasks fit together in Python as a whole along with practical examples Who This Book Is For Almost anyone can learn to write working script and create high quality code but they might lack a structured understanding of what it means to be 'Pythonic'. If you are a Python programmer who wants to code efficiently by getting the syntax and usage of a few intricate Python techniques exactly right, this book is for you. What You Will Learn Create a virtualenv and start a new project Understand how and when to use the functional programming paradigm Get familiar with the different ways the decorators can be written in Understand the power of generators and coroutines without digressing into lambda calculus Create metaclasses and how it makes working with Python far easier Generate HTML documentation out of documents and code using Sphinx Learn how to track and optimize application performance, both memory and cpu Use the multiprocessing library, not just locally but also across multiple machines Get a basic understanding of packaging and creating your own libraries/applications In Detail Python is a dynamic programming language. It is known for its high readability and hence it is often the first language learned by new programmers. Python being multi-paradigm, it can be used to achieve the same thing in different ways and it is compatible across different platforms. Even if you find writing Python code easy, writing code that is efficient, easy to maintain, and reuse is not so straightforward. This book is an authoritative guide that will help you learn new advanced methods in a clear and contextualised way. It starts off by creating a project-specific environment using venv, introducing you to different Pythonic syntax and common pitfalls before moving on to cover the functional features in Python. It covers how to create different decorators, generators, and metaclasses. It also introduces you to functools.wraps and coroutines and how they work. Later on you will learn to use asyncio module for asynchronous clients and servers. You will also get familiar with different testing systems such as py.test, doctest, and unittest, and debugging tools such as Python debugger and fault handler. You will learn to optimize application performance so that it works efficiently across multiple machines and Python versions. Finally, it will teach you how to access C functions with a simple Python call. By the end of the book, you will be able to write more advanced scripts and take on bigger challenges. Style and Approach This book is a comprehensive guide that covers advanced features of the Python language, and communicate them with an authoritative understanding of the underlying rationale for how, when, and why to use them.

Real-Time Rendering

Now that PC users have entered the realm of programmable hardware, graphics programmers can create 3D images and animations comparable to those produced by RenderMan's procedural programs—but in real time. Here is a book that will bring this cutting-edge technology to your computer. Beginning with the mathematical basics of vertex and pixel shaders, and building to detailed accounts of programmable shader operations, *Real-Time Shader Programming* provides the foundation and techniques necessary for replicating popular cinema-style 3D graphics as well as creating your own real-time procedural shaders. A compelling writing style, color illustrations throughout, and scores of online resources make *Real-Time Shader Programming* an indispensable tutorial/reference for the game developer, graphics programmer, game artist, or visualization programmer, to create countless real-time 3D effects. * Contains a complete reference of the low-level shader language for both DirectX 8 and DirectX 9 * Provides an interactive shader demonstration tool (RenderMonkey™) for testing and experimenting * Maintains an updated version of the detailed shader reference section at www.directx.com * Teaches the latest shader programming techniques for high-performance real-time 3D graphics

Graphics Shaders

The detection and recognition of objects in images is a key research topic in the computer vision community. Within this area, face recognition and interpretation has attracted increasing attention owing to the possibility of unveiling human perception mechanisms, and for the development of practical biometric systems. This book and the accompanying website, focus on template matching, a subset of object recognition techniques of wide applicability, which has proved to be particularly effective for face recognition applications. Using examples from face processing tasks throughout the book to illustrate more general object recognition approaches, Roberto Brunelli: examines the basics of digital image formation, highlighting points critical to the task of template matching; presents basic and advanced template matching techniques, targeting grey-level images, shapes and point sets; discusses recent pattern classification paradigms from a template matching perspective; illustrates the development of a real face recognition system; explores the use of advanced computer graphics techniques in the development of computer vision algorithms. *Template Matching Techniques in Computer Vision* is primarily aimed at practitioners working on the development of systems for effective object recognition such as biometrics, robot navigation, multimedia retrieval and landmark detection. It is also of interest to graduate students undertaking studies in these areas.

Hands-On C++ Game Animation Programming

Topics include advanced implementation of image space techniques and non-photorealistic rendering in Microsoft's DirectX 9.0

Ray Tracing Gems

The latest edition of this bestselling game development reference offers proven tips and techniques for the real-time rendering of special effects and visualization data that are useful for beginners and seasoned game and graphics programmers alike. Exploring recent developments in the rapidly evolving field of real-time rendering, GPU Pro 7: Advanc

Real-Time Shader Programming

Still more useful techniques, tips, and tricks for harnessing the power of the new generation of powerful GPUs.

GPU Gems 3

This book is a must-have for anyone serious about rendering in real time. With the announcement of new ray tracing APIs and hardware to support them, developers can easily create real-time applications with ray tracing as a core component. As ray tracing on the GPU becomes faster, it will play a more central role in real-time rendering. Ray Tracing Gems provides key building blocks for developers of games, architectural applications, visualizations, and more. Experts in rendering share their knowledge by explaining everything from nitty-gritty techniques that will improve any ray tracer to mastery of the new capabilities of current and future hardware. What you'll learn: The latest ray tracing techniques for developing real-time applications in multiple domains Guidance, advice, and best practices for rendering applications with Microsoft DirectX Raytracing (DXR) How to implement high-performance graphics for interactive visualizations, games, simulations, and more Who this book is for: Developers who are looking to leverage the latest APIs and GPU technology for real-time rendering and ray tracing Students looking to learn about best practices in these areas Enthusiasts who want to understand and experiment with their new GPUs

GPU Pro 7

Written as a practical Packt book brimming with engaging examples, C Programming for Arduino will help those new to the amazing open source electronic platform so that they can start developing some great projects from the very start. This book is great for people who want to learn how to design & build their own electronic devices. From interaction design art school students to the do-it-yourself hobbyist, or even simply people who want to learn electronics, this book will help by adding a new way to design autonomous but connected devices.

GPGPU Programming for Games and Science

Alternative assets such as fine art, wine, or diamonds have become popular investment vehicles in the aftermath of the global financial crisis. Correlation with classical financial markets is typically low, such that diversification benefits arise for portfolio allocation and risk management. Cryptocurrencies share many alternative asset features, but are hampered by high volatility, sluggish commercial acceptance, and regulatory uncertainties. This collection of papers addresses alternative assets and cryptocurrencies from economic, financial, statistical, and technical points of view. It gives an overview of their current state and explores their properties and prospects using innovative approaches and methodologies.

ShaderX4

In this new and improved third edition of the highly popular Game Engine Architecture, Jason Gregory draws on his nearly two decades of experience at Midway, Electronic Arts and Naughty Dog to present both the theory and practice of game engine software development. In this book, the broad range of technologies and techniques used by AAA game studios are each explained in detail, and their roles within a real industrial-strength game engine are illustrated. New to the Third Edition This third edition offers the same comprehensive coverage of game engine architecture provided by previous editions, along with updated coverage of: computer and CPU hardware and memory caches, compiler optimizations, C++ language standardization, the IEEE-754 floating-point representation, 2D user interfaces, plus an entirely new chapter on hardware parallelism and concurrent programming. This book is intended to serve as an introductory text, but it also offers the experienced game programmer a useful perspective on aspects of game development technology with which they may not have deep experience. As always, copious references and citations are provided in this edition, making it an excellent jumping off point for those who wish to dig deeper into any particular aspect of the game development process. Key Features Covers both the theory and practice of game engine software development Examples are grounded in specific technologies, but discussion extends beyond any particular engine or API. Includes all mathematical background needed. Comprehensive text for beginners and also has content for senior engineers.

GPU Pro 4

The latest edition of this bestselling game development reference offers proven tips and techniques for the real-time rendering of special effects and visualization data that are useful for beginners and seasoned game and graphics programmers alike. Exploring recent developments in the rapidly evolving field of real-time rendering, GPU Pro6: Advanced Rendering Techniques assembles a high-quality collection of cutting-edge techniques for advanced graphics processing unit (GPU) programming. It incorporates contributions from more than 45 experts who cover the latest developments in graphics programming for games and movies. The book covers advanced rendering techniques that run on the DirectX or OpenGL runtimes, as well as on any other runtime with any language available. It details the specific challenges involved in creating

games across the most common consumer software platforms such as PCs, video consoles, and mobile devices. The book includes coverage of geometry manipulation; rendering techniques, handheld devices programming, effects in image space, shadows, 3D engine design, graphics-related tools, and environmental effects. It also includes a dedicated section on general purpose GPU programming that covers CUDA, DirectCompute, and OpenCL examples. In color throughout, GPU Pro6 presents ready-to-use ideas and procedures that can help solve many of your daily graphics programming challenges. Example programs with downloadable source code are also provided on the book's CRC Press web page.

Foundations of Game Engine Development, Volume 2

Learn animation programming from first principles and implement modern animation techniques that can be integrated into any game development workflow

Key Features

- Build a functional and production-ready modern animation system with complete features using C++
- Learn basic, advanced, and skinned animation programming with this step-by-step guide
- Discover the math required to implement cutting edge animation techniques such as inverse kinematics and dual quaternions

Book Description

Animation is one of the most important parts of any game. Modern animation systems work directly with track-driven animation and provide support for advanced techniques such as inverse kinematics (IK), blend trees, and dual quaternion skinning. This book will walk you through everything you need to get an optimized, production-ready animation system up and running, and contains all the code required to build the animation system. You'll start by learning the basic principles, and then delve into the core topics of animation programming by building a curve-based skinned animation system. You'll implement different skinning techniques and explore advanced animation topics such as IK, animation blending, dual quaternion skinning, and crowd rendering. The animation system you will build following this book can be easily integrated into your next game development project. The book is intended to be read from start to finish, although each chapter is self-contained and can be read independently as well. By the end of this book, you'll have implemented a modern animation system and got to grips with optimization concepts and advanced animation techniques.

What you will learn

- Get the hang of 3D vectors, matrices, and transforms, and their use in game development
- Discover various techniques to smoothly blend animations
- Get to grips with GLTF file format and its design decisions and data structures
- Design an animation system by using animation tracks and implementing skinning
- Optimize various aspects of animation systems such as skinned meshes, clip sampling, and pose palettes
- Implement the IK technique for your game characters using CCD and FABRIK solvers
- Understand dual quaternion skinning and how to render large instanced crowds

Who this book is for

This book is for professional, independent, and hobbyist developers interested in building a robust animation system from the ground up. Some knowledge of the C++ programming language will be helpful.

Physically Based Shader Development for Unity 2017

Thoroughly updated, this fourth 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 o

Effective Computation in Physics

The Practical Guide to Building Reliable Networked Multiplayer Games Networked multiplayer games are a multibillion dollar business: some games now attract tens of millions of players. In this practical, code-rich guide, Joshua Glazer and Sanjay Madhav guide you through every aspect of engineering them. Drawing on their immense experience as both game developers and instructors, the authors lead you through building a robust multiplayer architecture, and creating every engine-level system. You'll learn through in-depth working code examples for two complete games: an action game and a real time strategy (RTS) game. First, Madhav and Glazer review the essentials of networking and network programming from the standpoint of game developers. Next, they walk through managing game data transmission, updating game objects across the network, and organizing the devices that join your game. You'll learn how to ensure reliable performance despite the Internet's inherent inconsistencies, and how to design game code for maximum security and scalability. The authors conclude by addressing two increasingly crucial issues: incorporating gamer services and hosting your games in the cloud. This guide's content has been extensively tested through the authors' multiplayer game programming courses at USC. It is equally valuable both to students and to working game programmers moving into networked games. Coverage includes How games have evolved to meet the challenges of networked environments Using Internet communication protocols and standards in game development Working with Berkeley Socket, the most widely used networking construct in multiplayer gaming Formatting game data for efficient Internet transmission Synchronizing states so all players share the same world Organizing networking topologies for large-scale games Overcoming latency and jitter problems that cause delays or lost data Scaling games without compromising performance Combating security vulnerabilities and software cheats Leveraging the networking functionality of the popular Unreal 4 and Unity game engines Integrating gamer services such as matchmaking, achievements, and leaderboards Running game servers in the cloud About the Website C++ source code for all examples is available at github.com/MultiplayerBook . Instructors will also find a full set of PowerPoint slides and a sample syllabus.

C Programming for Arduino

The book presents research that contributes to the development of intelligent dialog systems to simplify diverse aspects of everyday life, such as medical diagnosis and entertainment. Covering major thematic areas: machine learning and artificial neural networks; algorithms and models; and social and biometric data for applications in human-computer interfaces, it

discusses processing of audio-visual signals for the detection of user-perceived states, the latest scientific discoveries in processing verbal (lexicon, syntax, and pragmatics), auditory (voice, intonation, vocal expressions) and visual signals (gestures, body language, facial expressions), as well as algorithms for detecting communication disorders, remote health-status monitoring, sentiment and affect analysis, social behaviors and engagement. Further, it examines neural and machine learning algorithms for the implementation of advanced telecommunication systems, communication with people with special needs, emotion modulation by computer contents, advanced sensors for tracking changes in real-life and automatic systems, as well as the development of advanced human-computer interfaces. The book does not focus on solving a particular problem, but instead describes the results of research that has positive effects in different fields and applications.

GPU Pro 360 Guide to Rendering

In GPU Pro5: Advanced Rendering Techniques, section editors Wolfgang Engel, Christopher Oat, Carsten Dachsbacher, Michal Valient, Wessam Bahnassi, and Marius Bjorge have once again assembled a high-quality collection of cutting-edge techniques for advanced graphics processing unit (GPU) programming. Divided into six sections, the book covers rendering, lighting, effects in image space, mobile devices, 3D engine design, and compute. It explores rasterization of liquids, ray tracing of art assets that would otherwise be used in a rasterized engine, physically based area lights, volumetric light effects, screen-space grass, the usage of quaternions, and a quadtree implementation on the GPU. It also addresses the latest developments in deferred lighting on mobile devices, OpenCL optimizations for mobile devices, morph targets, and tiled deferred blending methods. In color throughout, GPU Pro5 is the only book that incorporates contributions from more than 50 experts who cover the latest developments in graphics programming for games and movies. It presents ready-to-use ideas and procedures that can help solve many of your daily graphics programming challenges. Example programs with source code are provided on the book's CRC Press web page.

Alternative Assets and Cryptocurrencies

This is the first book to offer a comprehensive overview for anyone wanting to understand the benefits and opportunities of ray tracing, as well as some of the challenges, without having to learn how to program or be an optics scientist. It demystifies ray tracing and brings forward the need and benefit of using ray tracing throughout the development of a film, product, or building — from pitch to prototype to marketing. Ray Tracing and Rendering clarifies the difference between conventional faked rendering and physically correct, photo-realistic ray traced rendering, and explains how programmer's time, and backend compositing time are saved while producing more accurate representations with 3D models that move. Often considered an esoteric subject the author takes ray tracing out of the confines of the programmer's lair and shows

how all levels of users from concept to construction and sales can benefit without being forced to be a practitioner. It treats both theoretical and practical aspects of the subject as well as giving insights into all the major ray tracing programs and how many of them came about. It will enrich the readers' understanding of what a difference an accurate high-fidelity image can make to the viewer — our eyes are incredibly sensitive to flaws and distortions and we quickly disregard things that look phony or unreal. Such dismissal by a potential user or customer can spell disaster for a supplier, producer, or developer. If it looks real it will sell, even if it is a fantasy animation. Ray tracing is now within reach of every producer and marketer, and at prices one can afford, and with production times that meet the demands of today's fast world.

Mastering Python

Exploring recent developments in the rapidly evolving field of game real-time rendering, GPU Zen assembles a high-quality collection of cutting-edge contributions for programming the GPU. Rendering (Patrick Cozzi)1. Adaptive GPU Tessellation with Compute Shaders by Jad Houry, Jonathan Dupuy, and Christophe Riccio2. Applying Vectorized Visibility on All frequency Direct Illumination by Ho Chun Leung, Tze Yui Ho, Zhenni Wang, Chi Sing Leung, Eric Wing Ming Wong3. Non-periodic Tiling of Noise-based Procedural Textures by Aleksandr Kirillov4. Rendering Surgery Simulation with Vulkan by Nicholas Milef, Di Qi, and Suvranu De5. Skinned Decals by Hawar DoghramachiEnvironmental Effects (Wolfgang Engel)1. Real-Time Fluid Simulation in Shadow of the Tomb Raider by Peter Sikachev, Martin Palko and Alexandre Chekroun2. Real-time Snow Deformation in Horizon Zero Dawn: The Frozen Wilds by Kevin ÖrtegrenShadows (Maurizio Vives)1. Soft Shadow Approximation for Dappled Light Sources by Mariano Merchante2. Parallax-Corrected Cached Shadow Maps by Pavlo Turchyn3D Engine Design (Wessam Bahnassi)1. Real-Time Layered Materials Compositing Using Spatial Clustering Encoding by Sergey Makeev2. Procedural Stochastic Textures by Tiling and Blending by Thomas Deliot and Eric Heitz3. A Ray Casting Technique for Baked Texture Generation by Alain Galvan and Jeff Russell4. Writing an efficient Vulkan renderer by Arseny Kapoulkine5. gITF - Runtime 3D Asset Delivery by Marco HutterRay Tracing (Anton Kaplanyan)1. Real-Time Ray-Traced One-Bounce Caustics by Holger Gruen2. Adaptive Anti-Aliasing using Conservative Rasterization and GPU Ray Tracing by Rahul Sathe, Holger Gruen, Adam Marrs, Josef Spjut, Morgan McGuire, Yury Uralsky

Game AI Pro 3

Benefit from the latest rendering tech developments, currently covered only in papers and talks from Siggraph, in a way any developer or technical artist using Unity can take advantage of. This book starts by introducing how shader programming works in general, the common principles of different platforms (OpenGL, Vulkan, and DirectX), and the shading languages Unity uses: Cg, GLSL, and ShaderLab. Physically Based Shader Development for Unity 2017 discusses artistic choices, presenting various techniques (such as translucency and subsurface scattering) and BRDFs (Oren-Nayar,

Cook-Torrance, and Ashikhmin-Shirley), and what they can be used for. Finally you'll cover the importance of optimizing your code by developing approximations, which achieve similar end results, but are computationally cheaper. By the end of your journey you'll be able to develop the look of your game or Unity-rendered animated short so that it looks both unique and impressively realistic, thanks to your own custom lighting system. What You Will Learn Master shader programming Gain all you need to know about physically based shading Take almost full control of the shader subsystem Discover what you can achieve with that control Implement a custom physically based lighting system and examine the logic behind every choice Who This Book Is For Most game developers (both indie and AA) that use Unity and technical artists who are responsible for the final look of a game.

GPU Pro 5

An In-Depth, Practical Guide to GPGPU Programming Using Direct3D 11 GPGPU Programming for Games and Science demonstrates how to achieve the following requirements to tackle practical problems in computer science and software engineering: Robustness Accuracy Speed Quality source code that is easily maintained, reusable, and readable The book primarily addresses programming on a graphics processing unit (GPU) while covering some material also relevant to programming on a central processing unit (CPU). It discusses many concepts of general purpose GPU (GPGPU) programming and presents practical examples in game programming and scientific programming. The author first describes numerical issues that arise when computing with floating-point arithmetic, including making trade-offs among robustness, accuracy, and speed. He then shows how single instruction multiple data (SIMD) extensions work on CPUs since GPUs also use SIMD. The core of the book focuses on the GPU from the perspective of Direct3D 11 (D3D11) and the High Level Shading Language (HLSL). This chapter covers drawing 3D objects; vertex, geometry, pixel, and compute shaders; input and output resources for shaders; copying data between CPU and GPU; configuring two or more GPUs to act as one; and IEEE floating-point support on a GPU. The book goes on to explore practical matters of programming a GPU, including code sharing among applications and performing basic tasks on the GPU. Focusing on mathematics, it next discusses vector and matrix algebra, rotations and quaternions, and coordinate systems. The final chapter gives several sample GPGPU applications on relatively advanced topics. Web Resource Available on a supporting website, the author's fully featured Geometric Tools Engine for computing and graphics saves you from having to write a large amount of infrastructure code necessary for even the simplest of applications involving shader programming. The engine provides robust and accurate source code with SIMD when appropriate and GPU versions of algorithms when possible.

Parsing Techniques

This book is intended for programmers who are comfortable with the Python language and who want to build desktop and

mobile applications with rich GUI in Python with minimal hassle. Knowledge of Kivy is not strictly required—every aspect of the framework is described when it's first used.

GPU Pro 2

Graphics Shaders: Theory and Practice is intended for a second course in computer graphics at the undergraduate or graduate level, introducing shader programming in general, but focusing on the GLSL shading language. While teaching how to write programmable shaders, the authors also teach and reinforce the fundamentals of computer graphics. The second edition has been updated to incorporate changes in the OpenGL API (OpenGL 4.x and GLSL 4.x0) and also has a chapter on the new tessellation shaders, including many practical examples. The book starts with a quick review of the graphics pipeline, emphasizing features that are rarely taught in introductory courses, but are immediately exposed in shader work. It then covers shader-specific theory for vertex, tessellation, geometry, and fragment shaders using the GLSL 4.x0 shading language. The text also introduces the freely available glman tool that enables you to develop, test, and tune shaders separately from the applications that will use them. The authors explore how shaders can be used to support a wide variety of applications and present examples of shaders in 3D geometry, scientific visualization, geometry morphing, algorithmic art, and more. Features of the Second Edition: Written using the most recent specification releases (OpenGL 4.x and GLSL 4.x0) including code examples brought up-to-date with the current standard of the GLSL language. More examples and more exercises A chapter on tessellation shaders An expanded Serious Fun chapter with examples that illustrate using shaders to produce fun effects A discussion of how to handle the major changes occurring in the OpenGL standard, and some C++ classes to help you manage that transition The authors thoroughly explain the concepts, use sample code to describe details of the concepts, and then challenge you to extend the examples. They provide sample source code for many of the book's examples at www.cgeducation.org

Template Matching Techniques in Computer Vision

This book focuses on advanced rendering techniques that run on the DirectX and/or OpenGL run-time with any shader language available. It includes articles on the latest and greatest techniques in real-time rendering, including MLLA, adaptive volumetric shadow maps, light propagation volumes, wrinkle animations, and much more. The book emphasizes techniques for handheld programming to reflect the increased importance of graphics on mobile devices. It covers geometry manipulation, effects in image space, shadows, 3D engine design, GPGPU, and graphics-related tools. Source code and other materials are available for download on the book's CRC Press web page.

WPF Control Development Unleashed

The control of cameras is as important in games as it is in cinema. How the camera tracks and moves determines our point of view and influences our attitude towards the content. A poorly designed camera system in a game can disrupt a user's experience, while a well-designed one can make a good game into a great one. The challenge in games is that th

Deep Learning with PyTorch

Master Metal: The Next-Generation Graphics and GPU Programming Platform for Apple Developers Metal enables Apple developers to maximize performance in demanding tasks like 3D graphics, games, scientific programming, visualization, and GPU-accelerated machine learning. Metal® Programming Guide is the authoritative, practical guide to Metal for all iOS programmers who are interested in graphics programming but don't know where to start. Pioneering Apple developer Janie Clayton covers everything from basic draw calls to advanced parallel computing, combining easy-to-understand conceptual explanations with well-tested Swift 4/Xcode 9 sample code (available for download at GitHub). Clayton introduces the essential Metal, graphics, and math concepts every graphics programmer needs to know. She also discusses key graphics-specific libraries, concepts, and Metal Classes, presenting techniques and examples you'll find valuable for both graphics and data processing. Clayton also provides coverage of the Metal Compute Pipeline, demonstrating practical GPU programming applications ranging from image processing to neural networking. Quickly get a basic Metal project running Work with Metal resources and memory management Learn how shaders are compiled and accessed by the CPU Program both 2D and 3D graphics with Metal Import 3D models and assets from Blender, Maya, and other programs Apply imported textures to model objects Use multipass rendering to efficiently implement computationally expensive techniques Leverage tessellation to reduce mesh detail Use the GPU for a wide spectrum of general-purpose computing applications Get started with the Metal Performance Shaders Framework

GPU Pro 6

GPU Pro4: Advanced Rendering Techniques presents ready-to-use ideas and procedures that can help solve many of your day-to-day graphics programming challenges. Focusing on interactive media and games, the book covers up-to-date methods for producing real-time graphics. Section editors Wolfgang Engel, Christopher Oat, Carsten Dachsbacher, Michal Valient, Wessam Bahnassi, and Sebastien St-Laurent have once again assembled a high-quality collection of cutting-edge techniques for advanced graphics processing unit (GPU) programming. Divided into six sections, the book begins with discussions on the ability of GPUs to process and generate geometry in exciting ways. It next introduces new shading and global illumination techniques for the latest real-time rendering engines and explains how image space algorithms are becoming a key way to achieve a more realistic and higher quality final image. Moving on to the difficult task of rendering shadows, the book describes the state of the art in real-time shadow maps. It then covers game engine design, including

quality, optimization, and high-level architecture. The final section explores approaches that go beyond the normal pixel and triangle scope of GPUs as well as techniques that take advantage of the parallelism of modern graphic processors in a variety of applications. Useful to beginners and seasoned game and graphics programmers alike, this color book offers practical tips and techniques for creating real-time graphics. Example programs and source code are available for download on the book's CRC Press web page. The directory structure of the online material closely follows the book structure by using the chapter numbers as the name of the subdirectory.

Game Engine Architecture, Third Edition

This second edition of Grune and Jacobs' brilliant work presents new developments and discoveries that have been made in the field. Parsing, also referred to as syntax analysis, has been and continues to be an essential part of computer science and linguistics. Parsing techniques have grown considerably in importance, both in computer science, ie. advanced compilers often use general CF parsers, and computational linguistics where such parsers are the only option. They are used in a variety of software products including Web browsers, interpreters in computer devices, and data compression programs; and they are used extensively in linguistics.

GPU Zen 2

This book takes the practicality of other "Gems" series such as "Graphics Gems" and "Game Programming Gems" and provide a quick reference for novice and expert programmers alike to swiftly track down a solution to a task needed for their VR project. Reading the book from cover to cover is not the expected use case, but being familiar with the territory from the Introduction and then jumping to the needed explanations is how the book will mostly be used. Each chapter (other than Introduction) will contain between 5 to 10 "tips", each of which is a self-contained explanation with implementation detail generally demonstrated as pseudo code, or in cases where it makes sense, actual code. Key Features Sections written by veteran virtual reality researchers and developers Usable code snippets that readers can put to immediate use in their own projects. Tips of value both to readers entering the field as well as those looking for solutions that expand their repertoire.

Level of Detail for 3D Graphics

2006 FrontLine Award Winner. The ShaderX series provides a complete toolbox of cutting-edge advanced graphics hardware and software techniques for all levels of graphics programmers, from novices to graphics gurus. With the increasing pixel shader power of current graphics cards, techniques that were once done on the CPU or simply avoided due

to their expense are now possible, and this latest volume of the ShaderX series is filled with articles that provide methods for performing these techniques. The collection covers state-of-the-art, shader rendering techniques that will bring your graphics to a new level of realism. Throughout the book you'll find a plethora of all new, ready-to-use solutions and tools for the many graphics programming challenges you face everyday. These solutions will save valuable programming time, helping to make you more efficient and productive. Throughout the collection you'll find: How to simulate cloth on the GPU; How to use ambient occlusion efficiently in a game environment; Several global illumination approaches suitable for current hardware platforms; How to do real-time caustics on the GPU; Several ways for how to make your shadow penumbra software for shadow volumes and shadow maps; Tips for using the D3DXEffects framework efficiently and how to integrate post processing; Real-time damage system that uses a damage map to store damage data; Snow rendering; Procedural generation of textures; Tricks, tips, and techniques for super shader, a light map precomputation tool that stores radiosity light maps, and a system for debugging and optimizing applications, and much more. This is an indispensable series that should be on every graphics programmer's bookshelf!

The Ray Tracer Challenge

WPF Control Development Unleashed Building Advanced User Experiences In this book, two leading Windows Presentation Foundation experts give developers everything they need to build next-generation WPF applications—software that is more robust, usable, and compelling. Drawing on their close ties with Microsoft's WPF development team, Pavan Podila and Kevin Hoffman give you a clear, robust, and practical understanding of WPF, its underpinnings, its overall architecture, and its design philosophy. Podila and Hoffman introduce never-before-published WPF design patterns and support them with robust, real-world code examples—all presented in full color, just as they appear in Visual Studio. The authors begin by explaining how to “think in WPF,” and then introduce powerful new techniques for everything from handling 3D layouts to creating game-like physics effects. Along the way, they offer in-depth coverage of data binding, building interactivity, and control development: three of WPF's most challenging concepts. You'll learn how to choose the right WPF features for every programming challenge, and use those features far more creatively and effectively. If you want to build truly outstanding WPF applications, this is the book that will get you there. Master the patterns and techniques you need to build state-of-the-art WPF applications Write more powerful and effective applications that reflect a deep understanding of WPF's design philosophy Learn how WPF has evolved, and take full advantage of its growing sophistication Make the most of advanced declarative programming techniques Leverage IScrollInfo, virtualization, control theming, and other complex features Build more powerful interactivity into your WPF applications Create more visual software with 3D elements, custom animations, and shader effects Optimize WPF application performance in real-world environments Master design patterns for organizing your controls more effectively Category: .NET Programming / WPF Covers: Windows Presentation Foundation User Level: Intermediate—Advanced

Real Time Cameras

Brace yourself for a fun challenge: build a photorealistic 3D renderer from scratch! In just a couple of weeks, build a ray tracer that renders beautiful scenes with shadows, reflections, refraction effects, and subjects composed of various graphics primitives: spheres, cubes, cylinders, triangles, and more. With each chapter, implement another piece of the puzzle and move the renderer forward. Use whichever language and environment you prefer, and do it entirely test-first, so you know it's correct.

Vulkan Programming Guide

Game AI Pro3: Collected Wisdom of Game AI Professionals presents state-of-the-art tips, tricks, and techniques drawn from developers of shipped commercial games as well as some of the best-known academics in the field. This book acts as a toolbox of proven techniques coupled with the newest advances in game AI. These techniques can be applied to almost any game and include topics such as behavior trees, utility theory, path planning, character behavior, and tactical reasoning. KEY FEATURES Contains 42 chapters from 50 of the game industry's top developers and researchers. Provides real-life case studies of game AI in published commercial games. Covers a wide range of AI in games, with topics applicable to almost any game. Includes downloadable demos and/or source code, available at <http://www.gameai.pro> SECTION EDITORS Neil Kirby General Wisdom Alex Champandard Architecture Nathan Sturtevant Movement and Pathfinding Damian Isla Character Behavior Kevin Dill Tactics and Strategy; Odds and Ends

Metal Programming Guide

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

Real-Time Rendering, Fourth Edition

Written by recognized LOD leaders, this is a coherent, state-of-the-art account of cutting-edge LOD research and development. This complete resource enables programmers to incorporate LOD technology into their own systems.

Game AI Pro 2

More physicists today are taking on the role of software developer as part of their research, but software development isn't always easy or obvious, even for physicists. This practical book teaches essential software development skills to help you automate and accomplish nearly any aspect of research in a physics-based field. Written by two PhDs in nuclear engineering, this book includes practical examples drawn from a working knowledge of physics concepts. You'll learn how to use the Python programming language to perform everything from collecting and analyzing data to building software and publishing your results. In four parts, this book includes: Getting Started: Jump into Python, the command line, data containers, functions, flow control and logic, and classes and objects Getting It Done: Learn about regular expressions, analysis and visualization, NumPy, storing data in files and HDF5, important data structures in physics, computing in parallel, and deploying software Getting It Right: Build pipelines and software, learn to use local and remote version control, and debug and test your code Getting It Out There: Document your code, process and publish your findings, and collaborate efficiently; dive into software licenses, ownership, and copyright procedures

Ray Tracing: A Tool for All

The Definitive Vulkan™ Developer's Guide and Reference: Master the Next-Generation Specification for Cross-Platform Graphics The next generation of the OpenGL specification, Vulkan, has been redesigned from the ground up, giving applications direct control over GPU acceleration for unprecedented performance and predictability. Vulkan™ Programming Guide is the essential, authoritative reference to this new standard for experienced graphics programmers in all Vulkan environments. Vulkan API lead Graham Sellers (with contributions from language lead John Kessenich) presents example-rich introductions to the portable Vulkan API and the new SPIR-V shading language. The author introduces Vulkan, its goals, and the key concepts framing its API, and presents a complex rendering system that demonstrates both Vulkan's uniqueness and its exceptional power. You'll find authoritative coverage of topics ranging from drawing to memory, and threading to compute shaders. The author especially shows how to handle tasks such as synchronization, scheduling, and

memory management that are now the developer's responsibility. Vulkan™ Programming Guide introduces powerful 3D development techniques for fields ranging from video games to medical imaging, and state-of-the-art approaches to solving challenging scientific compute problems. Whether you're upgrading from OpenGL or moving to open-standard graphics APIs for the first time, this guide will help you get the results and performance you're looking for. Coverage includes Extensively tested code examples to demonstrate Vulkan's capabilities and show how it differs from OpenGL Expert guidance on getting started and working with Vulkan's new memory system Thorough discussion of queues, commands, moving data, and presentation Full explanations of the SPIR-V binary shading language and compute/graphics pipelines Detailed discussions of drawing commands, geometry and fragment processing, synchronization primitives, and reading Vulkan data into applications A complete case study application: deferred rendering using complex multi-pass architecture and multiple processing queues Appendixes presenting Vulkan functions and SPIR-V opcodes, as well as a complete Vulkan glossary Example code can be found here: Example code can be found here: <https://github.com/vulkanprogrammingguide/examples>

Multiplayer Game Programming

Game AI Pro2: Collected Wisdom of Game AI Professionals presents cutting-edge tips, tricks, and techniques for artificial intelligence (AI) in games, drawn from developers of shipped commercial games as well as some of the best-known academics in the field. It contains knowledge, advice, hard-earned wisdom, and insights gathered from across the community of developers and researchers who have devoted themselves to game AI. In this book, 47 expert developers and researchers have come together to bring you their newest advances in game AI, along with twists on proven techniques that have shipped in some of the most successful commercial games of the last few years. The book provides a toolbox of proven techniques that can be applied to many common and not-so-common situations. It is written to be accessible to a broad range of readers. Beginners will find good general coverage of game AI techniques and a number of comprehensive overviews, while intermediate to expert professional game developers will find focused, deeply technical chapters on specific topics of interest to them. Covers a wide range of AI in games, with topics applicable to almost any game Touches on most, if not all, of the topics necessary to get started in game AI Provides real-life case studies of game AI in published commercial games Gives in-depth, technical solutions from some of the industry's best-known games Includes downloadable demos and/or source code, available at <http://www.gameapro.com>

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