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# Computer Graphics Through OpenGL: From Theory To Experiments, Second Edition



## Synopsis

From geometric primitives to animation to 3D modeling to lighting, shading, and texturing, *Computer Graphics Through OpenGL®: From Theory to Experiments, Second Edition* presents a comprehensive introduction to computer graphics that uses an active learning style to teach key concepts. Equally emphasizing theory and practice, the book provides an understanding not only of the principles of 3D computer graphics, but also the use of the OpenGL® Application Programming Interface (API) to code 3D scenes and animation, including games and movies. The undergraduate core of the book is a one-semester sequence taking the student from zero knowledge of computer graphics to a mastery of the fundamental concepts with the ability to code applications using fourth-generation OpenGL. The remaining chapters explore more advanced topics, including the structure of curves and surfaces and the application of projective spaces and transformations. New to the Second Edition 30 more programs, 50 more experiments, and 50 more exercises. Two new chapters on OpenGL 4.3 shaders and the programmable pipeline. Coverage of: Vertex buffer and array objects Occlusion culling and queries and conditional rendering Texture matrices Multitexturing and texture combining Multisampling Point sprites Image and pixel manipulation Pixel buffer objects Shadow mapping. Web Resource: The book's website at [www.sumantaguha.com](http://www.sumantaguha.com) provides program source code that runs on various platforms. It includes a guide to installing OpenGL and executing the programs, special software to help run the experiments, and figures from the book. The site also contains an instructor's manual with solutions to 100 problems (for qualifying instructors only).

## Book Information

File Size: 215201 KB

Print Length: 951 pages

Publisher: A K Peters/CRC Press; 2 edition (August 6, 2014)

Publication Date: August 6, 2014

Sold by: Digital Services LLC

Language: English

ASIN: B00L2EBLKG

Text-to-Speech: Not enabled

X-Ray: Not Enabled

Word Wise: Not Enabled

Lending: Not Enabled

Enhanced Typesetting: Not Enabled

Best Sellers Rank: #481,815 Paid in Kindle Store (See Top 100 Paid in Kindle Store) #25

inÂ Books > Computers & Technology > Programming > Graphics & Multimedia > OpenGL #265

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## Customer Reviews

I have reviewed this book in exchange for a free book. I am already familiar with this subject. I have spent a lot of time with this book. There is Lots of Math! Trigonometry, polynomials, calculus (differential, integral), matrices, linear algebra summation.... The Appendix has a math self-test with 30 problems & their solutions. The index has errors. The author has updated the index. Link: <http://sumantaguha.com/files/materials/subjectAndProgramIndex.pdf> Cons: 1. difficult time a. reading sections in various parts: Some are: calculus, radiosity, splines, sphere mapping At times, I needed to do further research. Throughout the book, the author mentions sections that can be skipped. He also has a Suggested Course Outlines section - see Preface pg xxvii b. understanding how the code works in some of the programs 2. no compute shaders, particles 3. Unfortunately, the solutions to the exercises are only available to a course instructor. They should be also available for self-study because the book clearly says it can be used for self-study. Pros: 1. suitable for beginners & advanced 2. Compared to Frank Luna's "Introduction to 3D Game Programming with DirectX 11" book which I'm more than 1/2 way through, Sumanta's book scores in: 1. the amount of interaction & that the interaction starts early on 2. no windows programming - uses free GLut 3. no shader programming till towards the end 4. programs for linux & mac also 5. can email the author 3. Excellent Interaction: a. about 250 programs in the source! WOW! All of them work.

I received this book as a review copy from CRC. I'm a graphics programmer and occasional writer. CRC sent me a review copy, upon my request. This review is reprinted from my blog; it naturally does not include the links I had in the original post. I'm a tough critic. I'm also an unpaid one: I spent a few hours with this book, but certainly did not read it cover to cover (though I hope to find the time to do so with this one for topics I know nothing about). So, beyond a general skim, I decided to choose a few graphics-related operations in advance and see how well this book covered them. The topics: \* Antialiasing, since it's important to modern applications \* Phong shading vs. lighting, since they're different \* Clip coordinates, which is what vertex shaders produce This book is, unfortunately, currently broken, because of a faulty index. The index page

numbers are off by quite a bit. For example, Sutherland-Hodgeman (which should be spelled Hodgman - Angel & Shreiner's Interactive Computer Graphics, a book I generally like, also makes that goof; no biggie) in the index is listed as page 589, but actually appears on page 556 - a 33 page error. This problem appears to be a scale problem. Entries early in the book are correct, e.g. clipping is listed as page 33 and indeed appears there. Selection is listed on page 184 and appears on page 174, a 10 page error. Near the end, homogeneous coordinates are listed as 879 but are actually 826. By curve fitting using Excel, the equation is: actual page number =  $0.9412 \times \text{index page number} + 1.4594$ . Let's get past the index and mention it no more. A workaround is to use Google Books to search for the correct page number instead.

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