Pro OpenGL ES for iOS

Mike Smithwick
To a couple of the greatest parents in the world, who always supported me, never flinching at my wacky requests such as sending me back to see an Apollo launch or buying a telescope.
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About the Author

Mike Smithwick’s slow descent into programming computers began when he first got a little 3-bit plastic DigiComp 1 computer in 1963 (http://en.wikipedia.org/wiki/Digi-Comp_I). Not too long before that, he got interested in planetariums. Eventually he graduated to programming NASA flight simulator graphics through the 1980s. But what he really wanted to do was become a syndicated cartoonist (really!). Failing to get any syndication deals, he wrote and sold the popular Distant Suns planetarium program for the Commodore Amiga, old-school Mac, and Microsoft Windows while selling himself as a contract programmer on the side, working for Apple, 3DO, Sense-8, and Epyx. Eventually he landed a “real” job at Live365, working on client software Windows and Windows Mobile 6, TiVo, Symbian (ahhh...Symbian...), and iPhone. After 13 short years he decided to go back to the dark side of contracting, writing, and working on Distant Suns for the iPhone after it became modest success in the App Store. Sometimes late at night, he thinks he can hear his Woz-autographed Apple II sobbing for attention from the garage. He may be contacted via www.distantsuns.com, lazyastronomer on AIM, and @distantsuns or @lazyastronomer on Twitter.
Leila Muhtasib has been passionate about programming since she wrote her first program on MS-DOS. Since then, she’s graduated with a Computer Science degree from the University of Maryland, College Park. Fascinated by mobile technology and its increasing ubiquity, she has been programming iPhone applications since the first SDK was released. She is now a Senior Software Engineer and Tech Lead of a mobile development team at Cisco Systems.
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And, of course, to Steve Jobs for never compromising and for producing insanely great tools that make work fun and make fun “funner.”
Introduction

In 1985 I brought home a new shiny Commodore Amiga 1000, about one week after they were released. Coming with a whopping 512K of memory, programmable colormaps, a Motorola 68K CPU, and a modern multitasking operating system, it had “awesome” writ all over it. Metaphorically speaking, of course. I thought it might make a good platform for an astronomy program, as I could now control the colors of those star-things instead of having to settle for a lame fixed color palette forced upon me from the likes of Hercules or the C64. So I coded up a 24-line basic routine to draw a random star field, turned out the lights, and thought, “Wow! I bet I could write a cool astronomy program for that thing!” Twenty-six years later I am still working on it (I’ll get it right one of these days). Back then my dream device was something I could slip into my pocket, pull out when needed, and aim it as the sky to tell me what stars or constellations I was looking at.

It’s called the iPhone.

I thought of it first.

As good as the iPhone is for playing music, making calls, or jumping Doodles, it really shines when you get to the 3D stuff. After all, 3D is all around us—unless you are a pirate and have taken to wearing an eye patch, in which case you’ll have very limited depth perception. Arrrggghhh.

Plus 3D apps are fun to show off to people. They’ll “get it.” In fact, they’ll get it much more than, say, that mulch buyer’s guide app all the kids are talking about. (Unless they show off their mulch in 3D, but that would be a waste of a perfectly good dimension.)

So, 3D apps are fun to see, fun to interact with, and fun to program. Which brings me to this book. I am by no means a guru in this field. The real gurus are the ones who can knock out a couple of NVIDIA drivers before breakfast, 4-dimensional hypercube simulators by lunch, and port Halo to a TokyoFlash watch before the evening’s Firefly marathon on SyFy. I can’t do that.

But I am a decent writer, have enough of a working knowledge of the subject to make me harmless, and know how to spell “3D.” So here we are.

First and foremost this book is for experienced iOS programmers who want to at least learn a little of the language of 3D. At least enough to where at the next game programmer’s cocktail party you too can laugh at the quaternion jokes with the best of them.
This book covers the basics in both theory of 3D and implementations using the industry standard OpenGL ES toolkit for small devices. While iOS supports both flavors—version 1.x for the easy way, and version 2.x for those who like to get where the nitty-is-gritty—I mainly cover the former, except in the final chapter which serves as an intro to the latter and the use of programmable shaders. And with the release of iOS 5, Apple has offered the 3D community a whole lotta lovin’ with some significant additions to the graphics libraries.

Chapter 1 serves as an intro to OpenGL ES alongside the long and tortuous path of the history of computer graphics. Chapter 2 is the math behind basic 3D rendering, whereas Chapters 3 through 8 lead you gently through the various issues all graphics programmers eventually come across, such as how to cast shadows, render multiple OpenGL screens, add lens flare, and so on. Eventually this works its way into a simple (S-I-M-P-L-E!) solar-system model consisting of the sun, earth, and some stars—a traditional 3D exercise. Chapter 9 looks at best practices and development tools, and Chapter 10 serves as a brief overview of OpenGL ES 2 and the use of shaders.

So, have fun, send me some M&Ms, and while you’re at it feel free to check out my own app in the Appstore: Distant Suns 3 for both the iPhone and the iPad. Yup, that’s the same application that started out on a Commodore Amiga 1000 in 1985 as a 24-line basic program that drew a couple hundred random stars on the screen.

It’s bigger now.