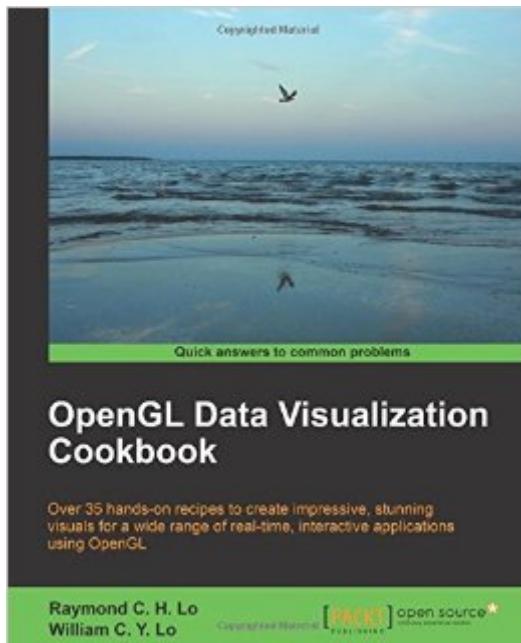


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# OpenGL Data Visualization Cookbook



## Synopsis

Over 35 hands-on recipes to create impressive, stunning visuals for a wide range of real-time, interactive applications using OpenGL. **About This Book** Get acquainted with a set of fundamental OpenGL primitives and concepts that enable users to create stunning visuals of arbitrarily complex 2D and 3D datasets for many common applications. **Explore** interactive, real-time visualization of large 2D and 3D datasets or models, including the use of more advanced techniques such as stereoscopic 3D rendering. **Create** stunning visuals on the latest platforms including mobile phones and state-of-the-art wearable computing devices. **Who This Book Is For** This book is aimed at anyone interested in creating impressive data visualization tools using modern graphics hardware. Whether you are a developer, engineer, or scientist, if you are interested in exploring the power of OpenGL for data visualization, this book is for you. While familiarity with C/C++ is recommended, no previous experience with OpenGL is assumed. **What You Will Learn** **Install**, compile, and integrate the OpenGL pipeline into your own project. **Create** interactive applications using GLFW to handle user inputs and the Android Sensor framework to detect gestures and motions on mobile devices. **Use** OpenGL primitives to plot 2-D datasets such as time series dynamically. **Render** complex 3D volumetric datasets with techniques such as data slicers and multiple viewpoint projection. **Render** images, videos, and point cloud data from 3D range-sensing cameras using the OpenGL Shading Language (GLSL). **Develop** video see-through augmented reality applications on mobile devices with OpenGL ES 3.0 and OpenCV. **Visualize** 3D models with meshes and surfaces using stereoscopic 3D technology. **In Detail** OpenGL is a great multi-platform, cross-language, and hardware-accelerated graphics interface for visualizing large 2D and 3D datasets. Data visualization has become increasingly challenging using conventional approaches as datasets become larger and larger, especially with the Big Data evolution. From a mobile device to a sophisticated high-performance computing cluster, OpenGL libraries provide developers with an easy-to-use interface to create stunning visuals in 3D in real time for a wide range of interactive applications. This book provides a series of easy-to-follow, hands-on tutorials to create appealing OpenGL-based visualization tools with minimal development time. We will first illustrate how to quickly set up the development environment in Windows, Mac OS X, and Linux. Next, we will demonstrate how to visualize data for a wide range of applications using OpenGL, starting from simple 2D datasets to increasingly complex 3D datasets with more advanced techniques. Each chapter addresses different visualization problems encountered in real life and introduces the relevant OpenGL features and libraries in a modular fashion. By the end of this book, you will be equipped with the essential skills to develop a wide range of impressive OpenGL-based applications for your unique data.

visualization needs, on platforms ranging from conventional computers to the latest mobile/wearable devices.

**Style and approach**

This is an easy-to-follow, comprehensive Cookbook showing readers how to create a variety of real-time, interactive data visualization tools. Each topic is explained in a step-by-step format. A range of hot topics is included, including stereoscopic 3D rendering and data visualization on mobile/wearable platforms.

## **Book Information**

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## **Customer Reviews**

This is an excellent book that gets you up and running quickly on OpenGL including the fixed function pipeline (version 2), shaders (version 3) and embedded systems/Android (ES). I appreciated the coverage on various platforms (Android, Linux, Mac, Windows) as I was able to use on Ubuntu 15.04, Windows 7/10, and Yosemite. The code depends on several open source libraries that jump start the projects to quickly see the reward for the effort. More importantly, the authors clearly explain why they are taking on the dependencies (GLEW for managing OpenGL extensions, GLFW for windowing, GLM for matrix math, SOIL for handling graphics formats, and OpenCV for imaging), I think most of these have fairly permissible licenses so you should be able to re-use without much concern (but I am an engineer and not a lawyer). The content is in tutorial format so it is a good first read for someone starting with OpenGL without having to search across multiple web sites. You will want to have a good reference with you to satisfy any curiosities about API calls. I was impressed with the examples that were more interesting than the standard tea pot and simple triangle renderings. Most of the content is generated programmatically through solution of math

problems. While the math can be fairly sophisticated, the problems were focused on medicine and I found them relatable despite the fact that medicine is not my principle area of study (but I have a heart beat and the authors take the time to provide background information on what a heart beat plot should look like that was quite interesting). Anyway, the recipes in the cookbook are related to computer imaging of data based on various mathematical models.

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