

# OpenGL Data Visualization Cookbook

Over 35 hands-on recipes to create impressive, stunning  
visuals for a wide range of real-time, interactive  
applications using OpenGL

**Raymond C. H. Lo**

**William C. Y. Lo**

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# OpenGL Data Visualization Cookbook

**M Mosston**



## **OpenGL Data Visualization Cookbook:**

**OpenGL Data Visualization Cookbook** Raymond Lo, William Lo, 2015-08-30 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 2D 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

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MacLane, 2017-06-04 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. [Python Data Visualization Cookbook](#) Igor Milovanovic, Dimitry Foures, Giuseppe Vettigli, 2015-11-30 Over 70 recipes to get you started with popular Python libraries based on the principal concepts of data visualization. About This Book Learn how to set up an optimal Python environment for data visualization. Understand how to import, clean and organize your data. Determine different approaches to data visualization and how to choose the most appropriate for your needs. Who This Book Is For If you already know about Python programming and want to understand data formats, data visualization and how to use Python to visualize data, then this book is for you. What You Will Learn Introduce yourself to the essential tooling to set up your working environment. Explore your data using the capabilities of standard Python Data Library and Panda Library. Draw your first chart and customize it. Use the most popular data visualization Python libraries. Make 3D visualizations mainly using mplot3d. Create charts with images and maps. Understand the most appropriate charts to describe your data. Know the matplotlib hidden gems. Use plot.ly to share your visualization online. In Detail Python Data Visualization Cookbook will progress the reader from the point of installing and setting up a Python environment for data manipulation and visualization all the way to 3D animations using Python libraries. Readers will benefit from over 60 precise and reproducible recipes that will guide the reader towards a better understanding of data concepts and the building blocks for subsequent and sometimes more advanced concepts. Python Data Visualization Cookbook starts by showing how to set up matplotlib and the related libraries that are required for most parts of the book before moving on to discuss some of the lesser used diagrams and charts such as Gantt Charts or Sankey diagrams. Initially it uses simple plots and charts to more advanced ones to make it easy to understand for readers. As the readers will go through the book they will get to know about the 3D diagrams and animations. Maps are irreplaceable for displaying geo spatial data so this book will also show how to build them. In the last chapter it includes explanation on how to

incorporate matplotlib into different environments such as a writing system LaTeX or how to create Gantt charts using Python Style and approach A step by step recipe based approach to data visualization The topics are explained sequentially as cookbook recipes consisting of a code snippet and the resulting visualization

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OpenGL - Build high performance graphics Muhammad Mobeen Movania, David Wolff, Raymond C. H. Lo, William C. Y. Lo, 2017-05-29 Gain proficiency with OpenGL and build compelling graphics for your games and applications About This Book Get to grips with a wide range of techniques for implementing shadows using shadow maps shadow volumes and more Explore interactive real time visualizations 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 The course is appropriate for anyone who wants to develop the skills and techniques essential for working with OpenGL to develop compelling 2D and 3D graphics What You Will Learn Off screen rendering and environment mapping techniques to render mirrors Shadow mapping techniques including variance shadow mapping Implement a particle system using shaders Utilize noise in shaders Make use of compute shaders for physics animation and general computing 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 In Detail OpenGL is a fully functional cross platform API widely adopted across the industry for 2D and 3D graphics development It is mainly used for game development and applications but is equally popular in a vast variety of additional sectors This practical course will help you gain proficiency with OpenGL and build compelling graphics for your games and applications OpenGL Development Cookbook This is your go to guide to learn graphical programming techniques and implement 3D animations with OpenGL This straight talking Cookbook is perfect for intermediate C programmers who want to exploit the full potential of OpenGL Full of practical techniques for implementing amazing computer graphics and visualizations using OpenGL OpenGL 4 0 Shading Language Cookbook Second Edition With Version 4 the language has been further refined to provide programmers with greater power and flexibility with new stages such as tessellation and compute OpenGL Shading Language 4 Cookbook is a practical guide that takes you from the fundamentals of programming with modern GLSL and OpenGL through to advanced techniques

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**OpenGL 4 Shading Language Cookbook** David Wolff,2018      **3D Graphics Rendering Cookbook** Sergey Kosarevsky,Viktor Latypov,2021-08-25 Build a 3D rendering engine from scratch while solving problems in a step by step way with the help of useful recipes Key Features Learn to integrate modern rendering techniques into a single performant 3D rendering engine Leverage Vulkan to render 3D content use AZDO in OpenGL applications and understand modern real time rendering methods Implement a physically based rendering pipeline from scratch in Vulkan and OpenGL Book Description OpenGL is a popular cross language cross platform application programming interface API used for rendering 2D and 3D graphics while Vulkan is a low overhead cross platform 3D graphics API that targets high performance applications 3D Graphics Rendering Cookbook helps you learn about modern graphics rendering algorithms and techniques using C programming along with OpenGL and Vulkan APIs The book begins by setting up a development environment and takes you



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