Introduction

Computer Graphics
Fall Semester 2025

S. Felix

University of Applied Sciences and Arts Northwestern Switzerland
School of Computer Science

https://www.youtube.com/watch?v=cmhtRHw_Bv0

https://www.youtube.com/watch?v=tjYVcOJONdI

About Me

Simon

Senior Research Fellow

Institute for Data Science (I4DS)

Ateleris GmbH

Computer Graphics is all about

using Computers to **produce and manipulate Images and Videos**

Linear Algebra
3D
Rendering
Colors
Optics
Mixed Reality

Geometry
2D
Animation
Image Processing
Topology
Physics Simulations

Computer Vision
Drawing
Modelling
Design
Aesthetics & Art
Visualization

Get Help

Microsoft Teams “**E-omputer Graphics HS2025_M365**”

Ground Rules

- Attendance not compulsory, but recommended
- Feel free to do other things in class
- Reading materials not required

- Questions are encouraged
- Note-taking is encouraged
- Creativity is encouraged

It’s my job to meet the schedule.
It’s your job to slow me down.

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Graphics Programming weekly - Issue 304 - September 10th, 2023

Sun, Sep 10, 2023 weekly, graphics

Subscribe to graphics programming weekly: email, twitter or RSS
Database of all articles

[pdf] Authoring Materials That Matters - Substrate in Unreal Engine 5

- The presentation covers the development of a new material model based on Slaps, Operators, and Trees
- explains what these three concepts represent and the issues they aim to resolve
- shows the implementation details, data storage, and integration into the rendering pipeline
- additionally presents how to integrate visualization for tool purposes

wayback-archive

What we talk about when we talk about Ray Tracing?

- The article provides an overview of ray

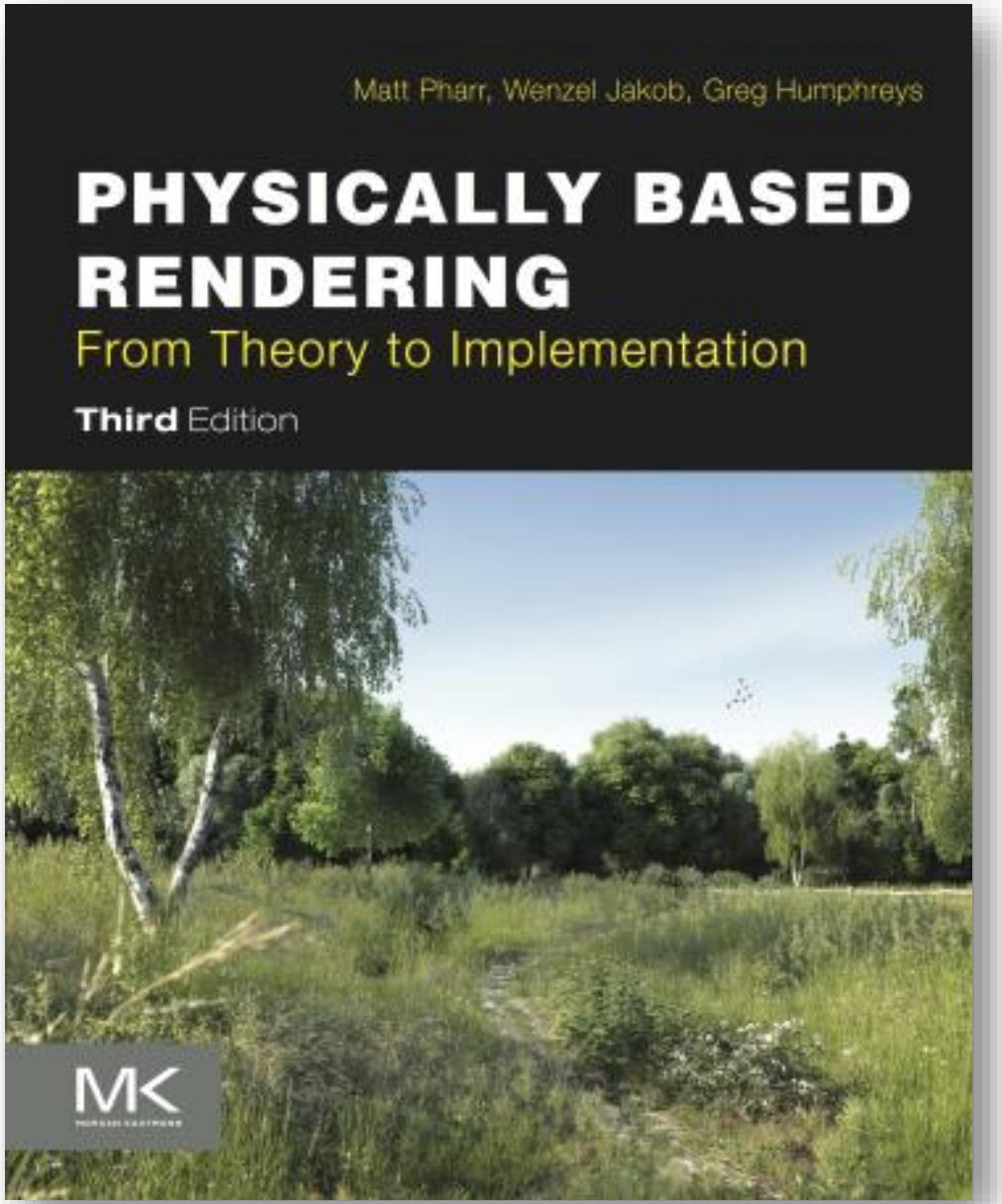
Reading Materials

Physically Based Rendering

Third Edition, 2016

Matt Pharr, Wenzel Jakob,
Greg Humphreys

ISBN 978-0128006450



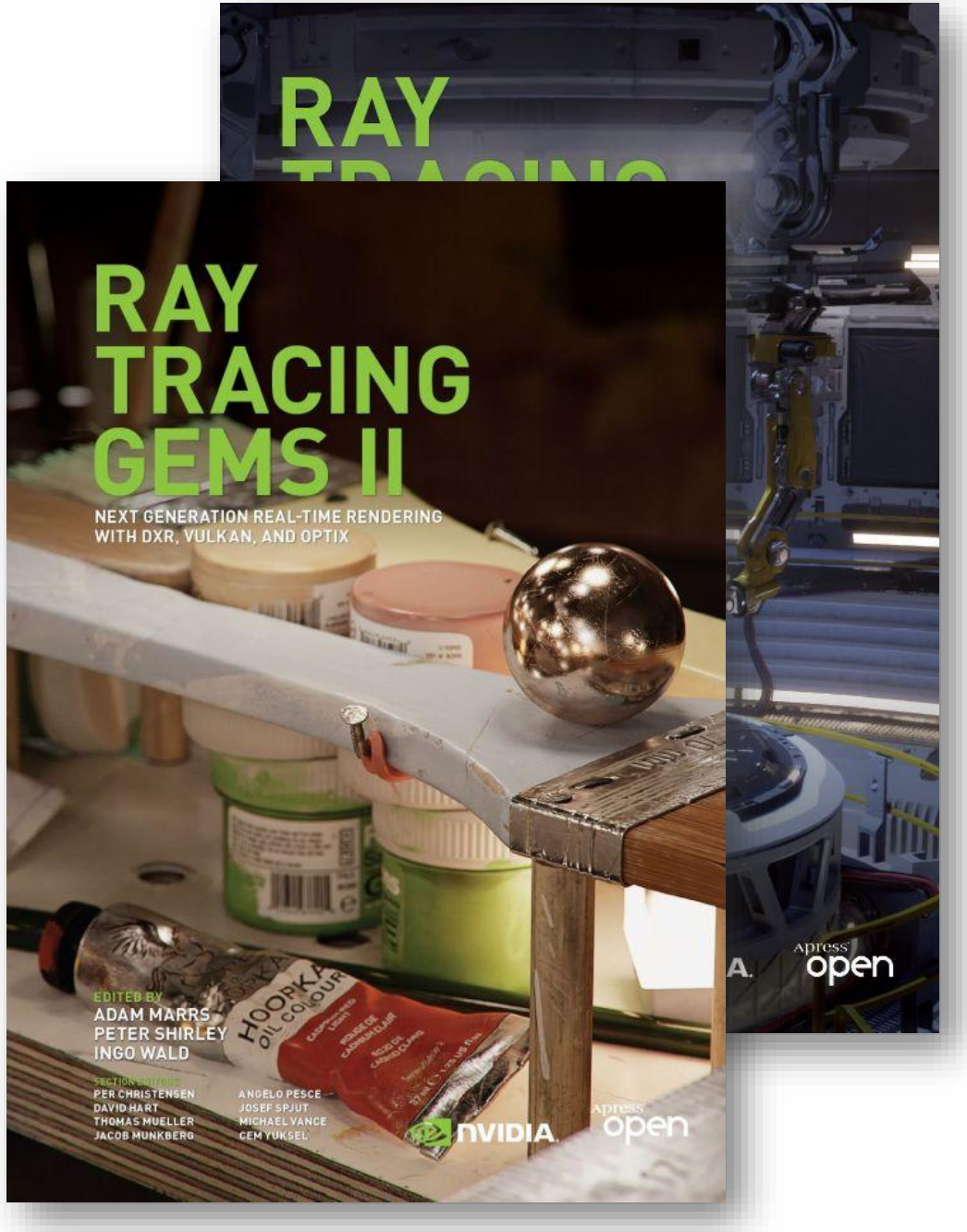
Freely available from
http://www.pbr-book.org/

Reading Materials

Ray Tracing Gems I & II

Eric Haines,
Thomas Akenine-Möller

Adam Marrs, Peter Shirley,
Ingo Wald



Freely available from
http://www.realtimerendering.com/raytracinggems/

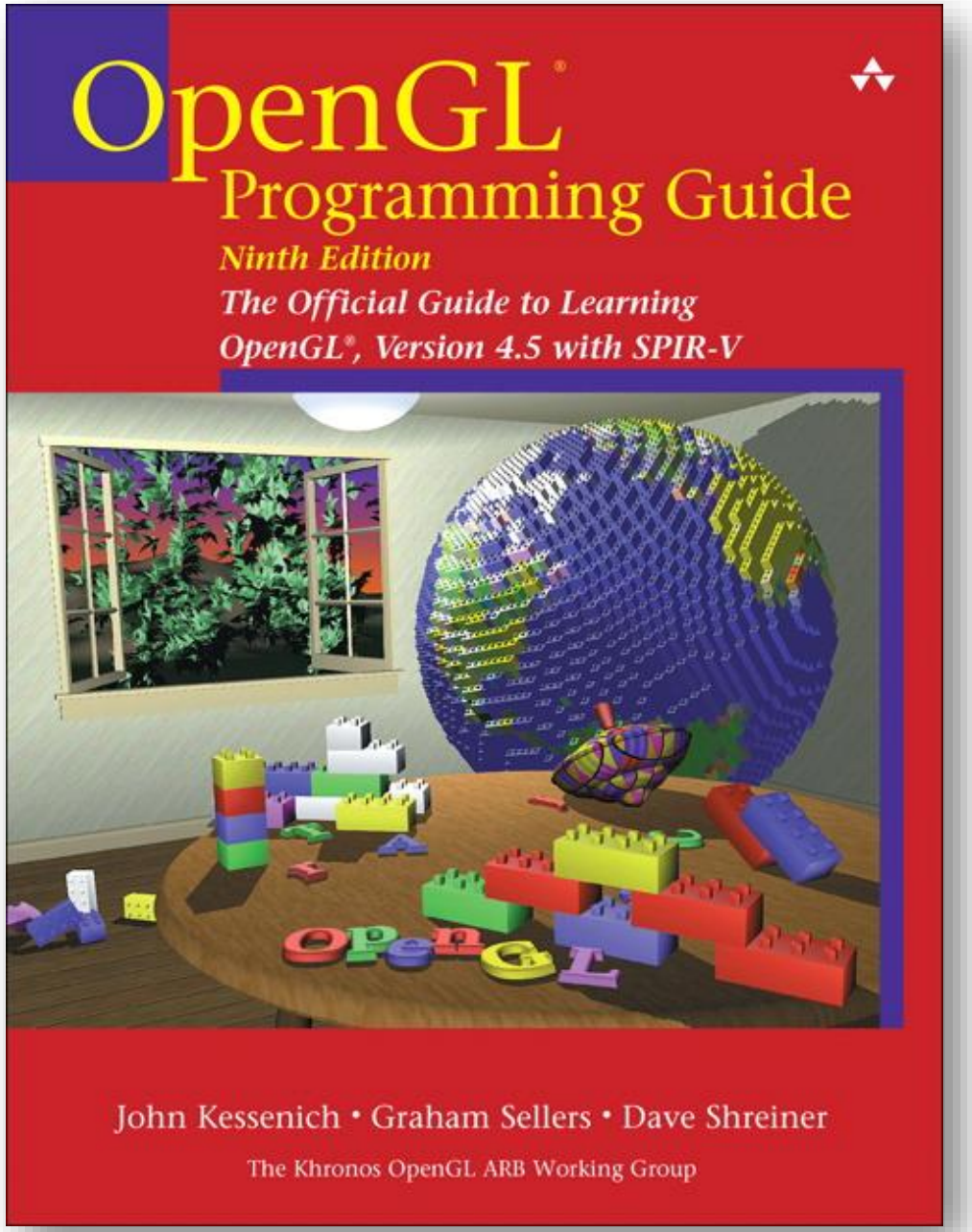
Reading Materials

OpenGL Programming Guide

Ninth Edition, 2016

John Kessenich, Graham Sellers, Dave Shreiner

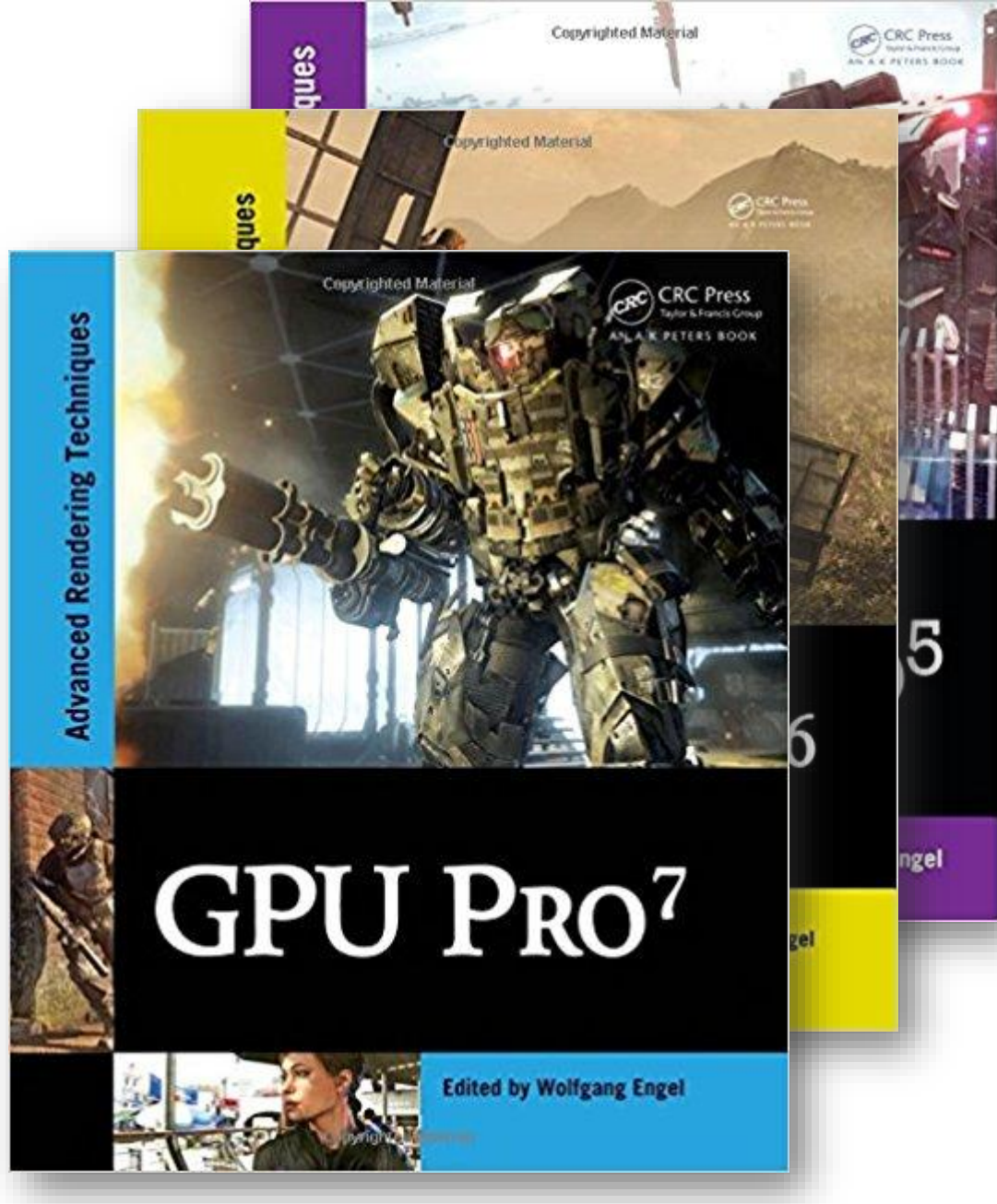
ISBN 978-0134495491



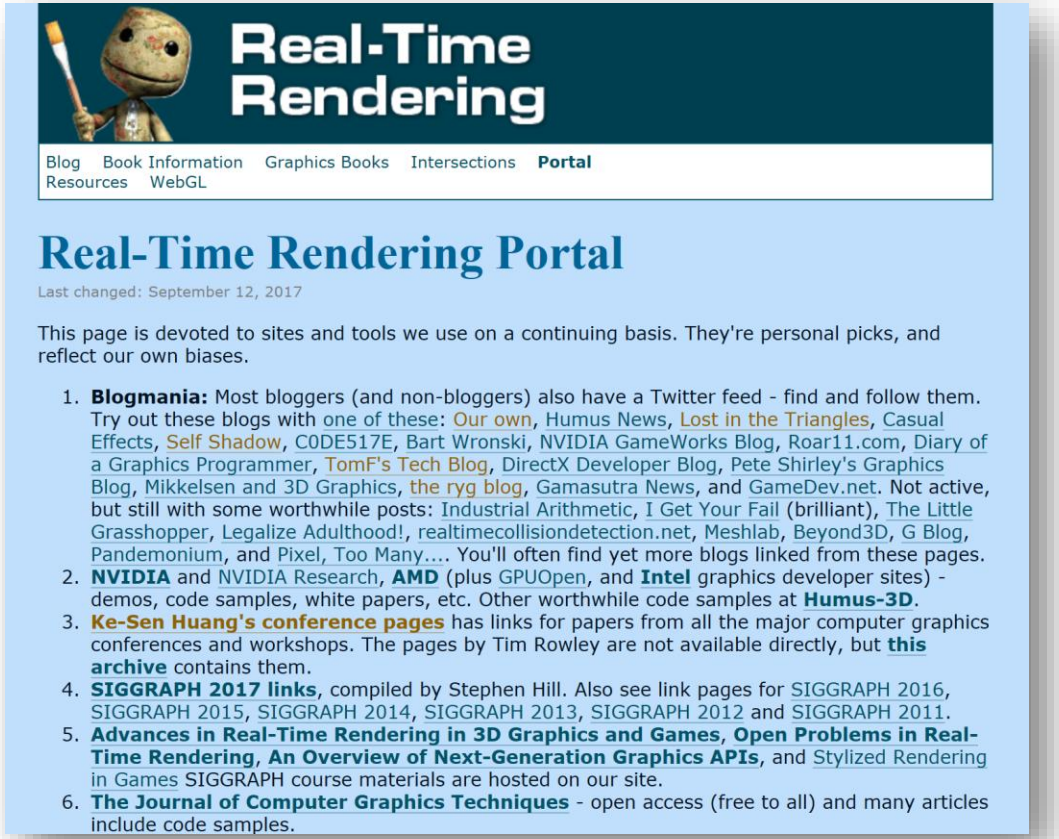
Reading Materials

GPU Pro 1-7: Advanced Rendering Techniques

Wolfgang Engel



Reading Materials



Real-Time Rendering

Blog Book Information Graphics Books Intersections **Portal**
Resources WebGL

Real-Time Rendering Portal

Last changed: September 12, 2017

This page is devoted to sites and tools we use on a continuing basis. They're personal picks, and reflect our own biases.

1. **Blogmania:** Most bloggers (and non-bloggers) also have a Twitter feed - find and follow them. Try out these blogs with one of these: Our own, Humus News, Lost in the Triangles, Casual Effects, Self Shadow, C0DE517E, Bart Wronski, NVIDIA GameWorks Blog, Roar11.com, Diary of a Graphics Programmer, TomF's Tech Blog, DirectX Developer Blog, Pete Shirley's Graphics Blog, Mikkelsen and 3D Graphics, the ryg blog, Gamasutra News, and GameDev.net. Not active, but still with some worthwhile posts: Industrial Arithmetic, I Get Your Fail (brilliant), The Little Grasshopper, Legalize Adulthood!, realtimecollisiondetection.net, Meshlab, Beyond3D, G Blog, Pandemonium, and Pixel, Too Many.... You'll often find yet more blogs linked from these pages.
2. **NVIDIA** and NVIDIA Research, **AMD** (plus GPUOpen, and **Intel** graphics developer sites) - demos, code samples, white papers, etc. Other worthwhile code samples at **Humus-3D**.
3. **Ke-Sen Huang's conference pages** has links for papers from all the major computer graphics conferences and workshops. The pages by Tim Rowley are not available directly, but **this archive** contains them.
4. **SIGGRAPH 2017 links**, compiled by Stephen Hill. Also see link pages for SIGGRAPH 2016, SIGGRAPH 2015, SIGGRAPH 2014, SIGGRAPH 2013, SIGGRAPH 2012 and SIGGRAPH 2011.
5. **Advances in Real-Time Rendering in 3D Graphics and Games**, **Open Problems in Real-Time Rendering**, **An Overview of Next-Generation Graphics APIs**, and Stylized Rendering in Games SIGGRAPH course materials are hosted on our site.
6. **The Journal of Computer Graphics Techniques** - open access (free to all) and many articles include code samples.

- Real-Time Rendering Portal http://www.realtimerendering.com/portal.html
- SIGGRAPH https://www.siggraph.org/
- Blogs
  - https://interplayoflight.wordpress.com/
  - https://aras-p.info/blog/
  - http://iquilezles.org/
  - http://fgiesen.wordpress.com/
  - …

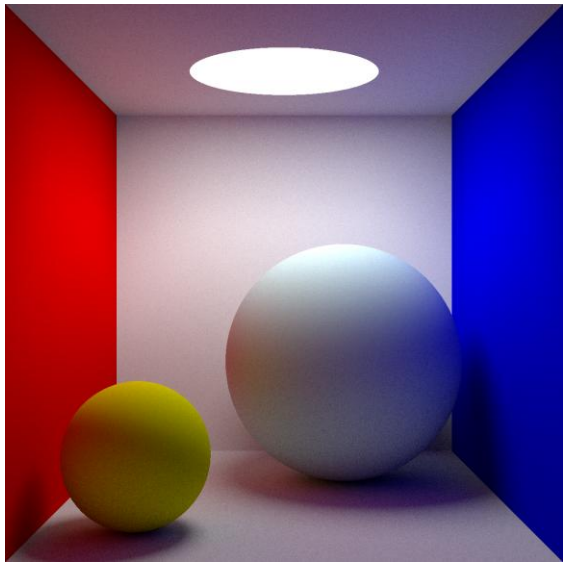
Part A

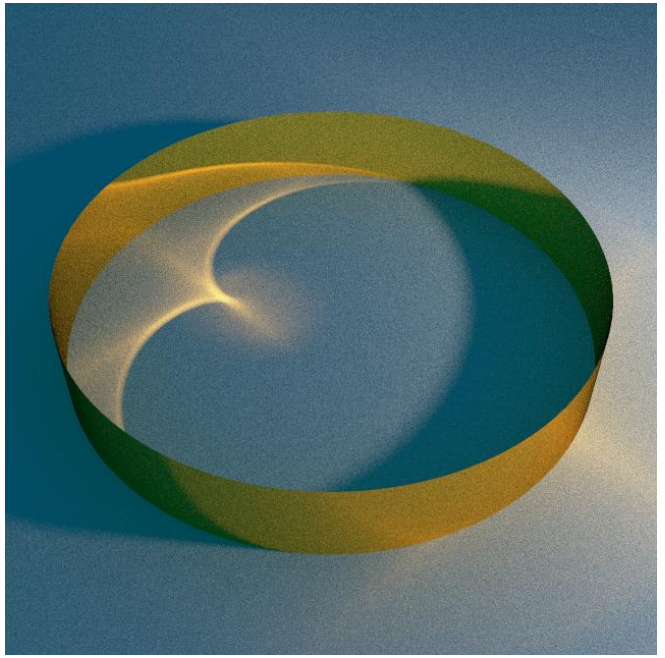
Path Tracing

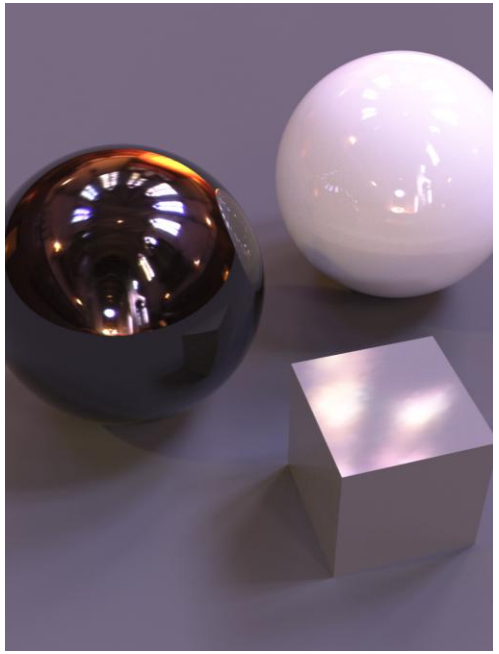
Focus on photorealism.

Topics include

- Light
- Color
- Linear Algebra
- Acceleration Structures
- Post Processing
- Monte Carlo Integration







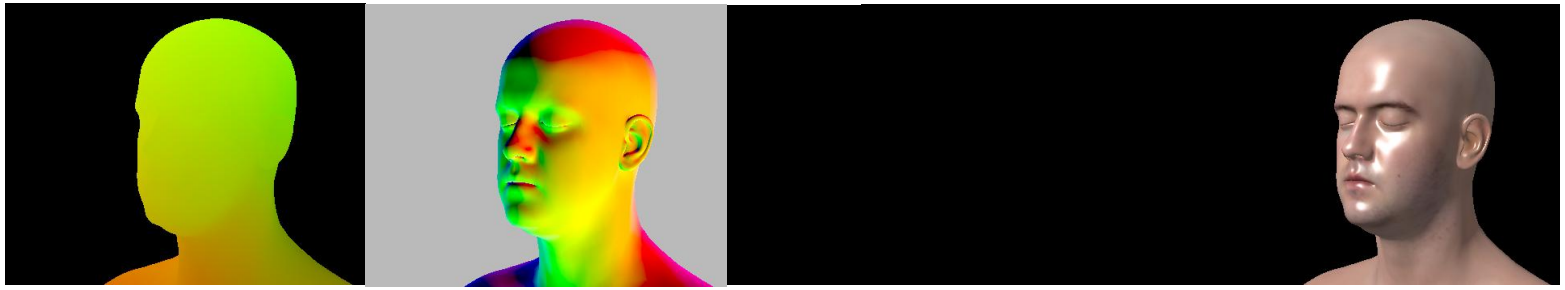
Part B

Software Rendering

Focus on understanding.

Topics

- Shading
- Projections
- Clipping
- Occlusion
- Culling
- Filtering



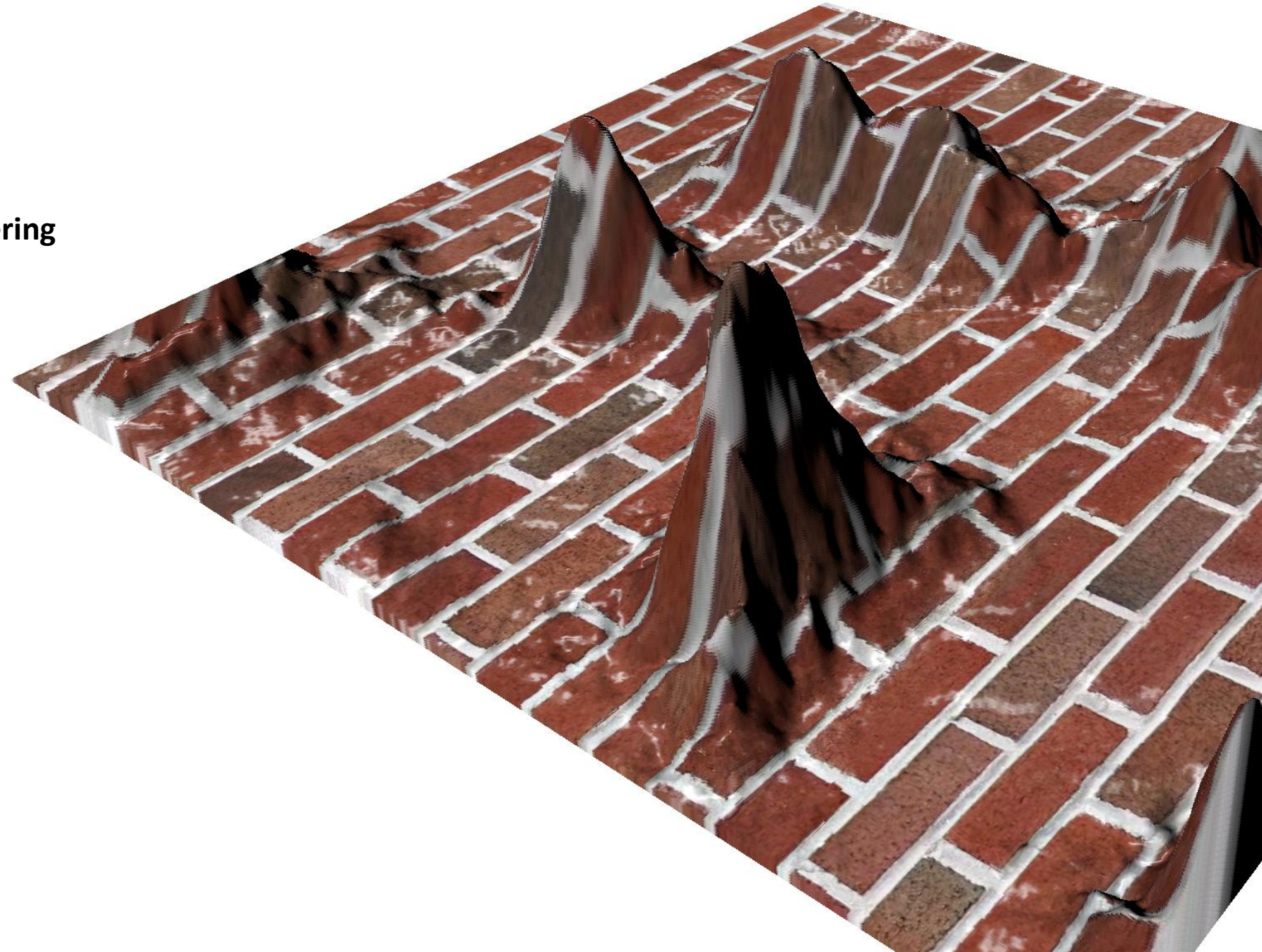
Part C

Hardware-Accelerated Rendering

Focus on performance.

Topics

- OpenGL
- Other APIs
- Setup
- Performance
- Current trends



Projects

2025-10-11 23:59:00 Part A	2025-11-15 23:59:00 Part B	2026-01-03 23:59:00 Part C

At the end of each part, submit a .ZIP containing

- the final C#, Java, C or C++ code
- the generated images (A) or videos (B, C) for every week

Copying of third-party code, **even if declared**, or a delayed submission **means failing the class**.

Using provided code and LLM tools is fine.

Exam

Mid-term Exam
Parts A, B

2025-11-10

90 minutes

Bring notes on a single-sided A4 page