

# Guangyan Cai

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## Education

### University of California, Irvine

*Ph.D Candidate in Computer Science*

◦ Advisor: Shuang Zhao

Irvine, CA

2020–Present

### University of California, San Diego

*B.S. in Computer Science*

◦ Advisor: Ravi Ramamoorthi

◦ Cumulative GPA: 3.6 / 4.0 (Major GPA: 3.9 / 4.0)

◦ Undergraduate Awards for Excellence in Research: 2020

◦ Provost's Honors: 2016-2020

La Jolla, CA

2016–2020

## Experience

### Adobe Research

*Research Scientist Intern, Graphics*

◦ Proposed a light-weight lighting representation suitable for representing both distant and non-distant illumination.

◦ Designed a pipeline to jointly reconstruct the shape and material of glossy objects as well as their surrounding lighting using physics-based differentiable rendering and the proposed light representation.

◦ Submitted to arXiv [1].

San Jose, CA

Jun 2023 - Sep 2023

### Meta Reality Labs

*Research Scientist Intern, Graphics*

◦ Investigated the baking artifacts in material reconstruction with inverse rendering and proposed a method to mitigate them.

◦ Participated in building a hybrid pipeline that combines NeuS and physics-based differentiable rendering to do high quality 3D reconstruction.

◦ Showcased our reconstruction results at Meta Connect 2022 (starting at 1:13:20).

◦ Co-authored a paper [2] and it is accepted to ICCV 2023.

Redmond, WA

Jun 2022 - Sep 2022

## Publications

- [1] **Guangyan Cai**, Fujun Luan, Miloš Hašan, Kai Zhang, Sai Bi, Zexiang Xu, Iliyan Georgiev, and Shuang Zhao. 2024. PBIR-NIE: Glossy Object Capture under Non-Distant Lighting. (August 2024).
- [2] Cheng Sun\*, **Guangyan Cai\***, Zhengqin Li, Kai Yan, Cheng Zhang, Carl Marshall, Jia-Bin Huang, Shuang Zhao, and Zhao Dong. 2023. Neural-PBIR Reconstruction of Shape, Material, and Illumination. In *2023 IEEE/CVF International Conference on Computer Vision (ICCV)*. \* equal contribution. (October 2023), 18000–18010.

- [3] **Guangyan Cai**, Kai Yan, Zhao Dong, Ioannis Gkioulekas, and Shuang Zhao. 2022. Physics-Based Inverse Rendering using Combined Implicit and Explicit Geometries. *Computer Graphics Forum*, 41, 4, (July 2022).
- [4] Lifan Wu\*, **Guangyan Cai\***, Ravi Ramamoorthi, and Shuang Zhao. 2021. Differentiable time-gated rendering. *ACM Transactions on Graphics*, 40, 6, (December 2021), 287:1–287:16. \* equal contribution.
- [5] Lifan Wu, **Guangyan Cai**, Shuang Zhao, and Ravi Ramamoorthi. 2020. Analytic spherical harmonic gradients for real-time rendering with many polygonal area lights. *ACM Transactions on Graphics*, 39, 4, (August 2020).

## Projects

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### irtk:

- o Inverse Rendering Toolkit (irtk) is a Python library built upon PyTorch that facilitates building inverse rendering pipelines.
- o Supports multiple (non-neural) differentiable renderers with a unified front end.
- o Applied to several research projects and significantly eased the development process.
- o Link to the project: <https://uci-rendering.github.io/irtk/>

### isoext:

- o A Python/C++ library that provides efficient implementations of isosurface extraction algorithms, such as Marching Cubes, on GPU.
- o Uses Thrust for GPU acceleration and nanobind for Python binding.
- o Link to the project: <https://github.com/GuangyanCai/isoext>

### psdr-jit:

- o Made significant contribution to psdr-jit, a physics-based differentiable renderer written in C++ with a Python interface.
- o Link to the project: <https://github.com/andyankai/psdr-jit>

## Reviewer

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**Eurographics:** 2022

**The Visual Computer:** 2024

## Teaching

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<b>CS112 Introduction to Computer Graphics:</b> TA	2021 Fall, UCI
<b>CS143A Principles of Operating Systems:</b> TA	2021 Spring, UCI
<b>CS143B Project in Operating System Organization:</b> TA	2021 Winter, UCI
<b>CS143B Project in Operating System Organization:</b> Reader	2020 Fall, UCI
<b>CSE168 Computer Graphics II - Rendering:</b> Tutor	2020 Spring, UCSD
<b>CSE167 Computer Graphics:</b> Tutor	2019 Fall & 2020 Winter, UCSD