

Guangyan Cai

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EDUCATION

University of California, Irvine	Sep 2020 - Jun 2025
Ph.D. in Computer Science	Irvine, CA
University of California, San Diego	Sep 2016 - Jun 2020
B.S. in Computer Science	San Diego, CA
<ul style="list-style-type: none">• Cumulative GPA: 3.6 / 4.0 (Major GPA: 3.9 / 4.0)• Undergraduate Awards for Excellence in Research: 2020• Provost's Honors: 2016-2020	

RESEARCH INTERESTS

My research interests are in the field of Computer Graphics, specifically physically-based rendering. I have been exploring differentiable rendering and time-gated rendering recently.

PUBLICATIONS

Analytic Spherical Harmonic Gradients for Real-Time Rendering with Many Polygonal Area Lights

Lifan Wu, **Guangyan Cai**, Shuang Zhao, Ravi Ramamoorthi

ACM Transactions on Graphics (SIGGRAPH 2020), 39(4), July 2020

RESEARCH EXPERIENCE

Product Important Sampling	Jun 2019 - Jun 2020
Advisor: Prof. Ravi Ramamoorthi	San Diego
<ul style="list-style-type: none">• Explored product important sampling in Monte Carlo light-transport simulation under the framework provided in the paper <i>Practical Path Guiding for Efficient Light-Transport Simulation</i>.• Modified the Mitsuba renderer that comes with the paper to experiment with new data structures and algorithms.• Investigated different methods for approximating BRDFs and ways to compute their product with local incident radiance.	
Time of Flight Imaging Simulation	Jun 2019 - Sep 2019
Advisor: Prof. Ravi Ramamoorthi	San Diego
<ul style="list-style-type: none">• Simulated a non-line-of-sight imaging system in a confocal setting to gain insight into the problem.• Proposed a rejection sampling scheme to numerically verify a theoretical differential framework for time of flight imaging.• Created a time of flight imaging simulation in a confocal setting using the new method.	
Improving Naive Bayes Classifier	Jan 2018 - Jun 2018
Advisor: Prof. Jerzy Lewak	San Diego, CA
<ul style="list-style-type: none">• Analyzed vehicle complaint data and vehicle recall data provided by NHTSA and explored their relation.• Implemented Naive Bayes Classifier in Python to predict the possibility of future vehicle recalls based on current customer complaints.• Investigated the feasibility of using phrases instead of words as the basic elements to implement Naive Bayes Classifier.• Presented final work as a poster at the 2018 FMP Symposium.	

TEACHING EXPERIENCE

CSE 167: Computer Graphics
Tutor

Sep 2019 - Mar 2020
San Diego, CA

- Updated the starter code to use modern C++ and OpenGL and wrote the reference code for each assignment to facilitate students' understanding of the goals of the assignment.
- Led discussion sessions and held office hours to answer students' questions on assignments and course materials.
- Participated in grading homework and exams.

CSE 168: Computer Graphics II - Rendering

Apr 2019 - Jun 2020

Course Staff

San Diego, CA

- Created the starter code for a path tracer, which is the main focus of the course, using OptiX, Nvidia's ray tracing framework, and C++ and CUDA.
- Implemented the assignments to examine the validity and intelligibility of the writeups, which covers techniques such as area lights, next event estimation, Russian roulette, and multiple importance sampling.

PROJECTS

Ocean Water Simulator

Oct 2019 - Mar 2020

Side Project

San Diego, CA

- Followed the paper *Simulating Ocean Water* to create an ocean simulator using a fast Fourier transform.
- Utilized C++, OpenGL, and Cinder to render the ocean and create a GUI for manipulating parameters that control the waves.

Marching Terrain

Mar 2019 - Jun 2019

Course Project

San Diego, CA

- Created a VR application on Oculus Rift using C++ and OpenGL for the final project of a Virtual Reality course, which can generate random 3D terrain and allow users to travel inside and edit it with their partners.
- Utilized 3D Perlin noise to procedurally generate the terrain and the marching cube algorithm to construct the surface of the terrain.

SPH Fluid Simulator

Mar 2019 - Jun 2019

Course Project

San Diego, CA

- Built an SPH fluid simulator in C++ for the final project of a physics simulation course.
- Simulated the motion of fluid and the generation of foam and display the fluid as particles using OpenGL.

WORK EXPERIENCE

Nanome

Nov 2019 - Jun 2020

Intern

San Diego, CA

- Nanome is a software company that utilizes virtual reality technology to help advance the understanding of life science and mathematics.
- Assisted in porting CalcFlow, a VR application that helps to visualize vector calculus, to a recently released VR headset Oculus Quest.

SAIC Maxus Automotive Co. Ltd.

Aug 2018 - Sep 2018

Intern

Shanghai

- Participated in the development of a virtual agent that guides users to customize their orders for the featured SUV.
- Designed web crawlers in Python to gather textual data including the definitions of vehicle components and Q&A about SUV.
- Cooperated with engineers from Ruyi.ai to create a knowledge graph based on the data collected and develop the virtual agent using their platform and the knowledge graph.