

# Rohan Sawhney

<http://www.rohansawhney.io>

## Skill set

Computer Graphics, Geometry Processing, Monte Carlo Methods, Partial Differential Equations, Real-time Rendering, Differential Geometry, Stochastic Calculus, Numerical Analysis & Optimization.

## Education

2016-2022	PhD in Computer Science <i>Advisor: Keenan Crane</i>	Carnegie Mellon University
2020	MS in Computer Science	Carnegie Mellon University
2015	BA in Physics and Computer Science	Columbia University

## Honors and awards

2024	SIGGRAPH Best Paper
2022	SIGGRAPH Best Paper Honorable Mention
2021-2022	NVIDIA Graduate Fellowship
2019-2020	Presidential Fellowship <i>Carnegie Mellon University</i>
2019	Outstanding Software Project (Boundary First Flattening) <i>Symposium on Geometry Processing</i>

## Employment

2023-	<b>NVIDIA Corporation</b> <i>Senior Research Scientist, High Fidelity Physics Research</i>
2021	<b>NVIDIA Corporation</b> <i>Research Intern, mentored by Matt Pharr</i> Conducted research on real-time raytracing, culminating in an ACM TOG <a href="#">publication</a> .
2020	<b>nTopology</b> <i>Software Engineer Intern</i> Implemented grid-free Monte Carlo methods to solve partial differential equations on complex implicit geometry without mesh generation, enabling alternative workflows to finite element analyses and field driven design that provide immediate feedback for modeling applications.
2018	<b>Adobe Systems Inc.</b> <i>Research Intern, worked with Noam Aigerman, Danny Kaufman, Vladimir Kim and Nathan Carr</i> Conducted research on fast updates to finite element matrix factorizations in geometry processing

and simulation applications such as surface parameterization and fracture involving topological operations (cuts, edge flips, subdivision) on the underlying mesh.

2015-2016

#### **IrisVR Inc.**

*Graphics Engineer*

Designed workflows to optimize mesh and texture data from architectural CAD tools for real-time VR walkthroughs in [IrisVR Prospect](#). Implemented critical algorithms for efficient data processing such as mesh repair, segmentation, simplification, remeshing, occlusion culling and texture compression.

2014

#### **Dreamworks Animation SKG**

*Research & Development Intern*

Restructured the server client model of the Moonlight renderer and Torch lighting application to enable remote rendering of large scenes on the campus render-farm. Also developed a Lua based programming interface for the Moonlight renderer to enable fast prototyping of scene geometry and lighting.

## Publications

### JOURNAL PAPERS

2024

#### **Walkin' Robin: Walk on Stars with Robin Boundary Conditions**

Bailey Miller\*, Rohan Sawhney\*, Keenan Crane†, Ioannis Gkioulekas†

*ACM Transactions on Graphics (Best Paper)*

[Paper](#) | [Project Page](#)

2023

#### **Decorrelating ReSTIR Samplers via MCMC Mutations**

Rohan Sawhney, Daqi Lin, Markus Kettunen, Benedikt Bitterli, Ravi Ramamoorthi, Chris Wyman, Matt Pharr

*ACM Transactions on Graphics*

[Paper](#) | [Video](#)

2023

#### **Walk on Stars: A Grid-Free Monte Carlo Method for PDEs with Neumann Boundary Conditions**

Rohan Sawhney\*, Bailey Miller\*, Ioannis Gkioulekas†, Keenan Crane†

*ACM Transactions on Graphics*

[Paper](#) | [Project Page](#) | [Talk](#)

2023

#### **Boundary Value Caching for Walk on Spheres**

Bailey Miller\*, Rohan Sawhney\*, Keenan Crane†, Ioannis Gkioulekas†

*ACM Transactions on Graphics*

[Paper](#) | [Talk](#)

2022

#### **Grid-Free Monte Carlo for PDEs with Spatially Varying Coefficients**

Rohan Sawhney\*, Dario Seyb\*, Wojciech Jarosz†, Keenan Crane†

*ACM Transactions on Graphics (Best Paper Honorable Mention)*

[Paper](#) | [Project Page](#)

2020

#### **Monte Carlo Geometry Processing: A Grid-Free Approach to PDE Methods on Volumetric Domains**

Rohan Sawhney and Keenan Crane

*ACM Transactions on Graphics*

[Paper](#) | [Project Page](#) | [Talk](#)

2018

#### **Boundary First Flattening**

Rohan Sawhney and Keenan Crane

*ACM Transactions on Graphics*

[Paper](#) | [Project Page](#) | [Talk](#) | [Web Demo](#)

## Open-source software

### [boundary-first-flattening](#)

Highly optimized state-of-the-art surface parameterization tool for interactive editing of meshes with millions of triangles.

### [Zombie](#)

Header only C++ library for Monte Carlo PDE Solvers.

### [FCPW: Fastest Closest Points in the West](#)

Header only C++ library for fast vectorized closest point queries. 3-4x faster than Embree.

### [geometry-processing-js](#)

Fast and flexible framework for 3D geometry processing on the web. Suitable for mobile apps, online demos, and course content. Performance within striking distance of native C++ code.

### [linear-algebra-js](#)

Optimized linear algebra library in pure Javascript. Supports sparse and dense matrix routines with Cholesky, LU and QR support.

## Invited talks

### **Monte Carlo Geometry Processing: Building “Renderers” for Problems Beyond Light Transport**

2024 Stanford, Gordon Wetzstein Computational Imaging Lab  
2023 University of California San Diego, Center of Visual Computing  
2021 Massachusetts Institute of Technology, Computational Design and Fabrication Group  
2021 NVIDIA Research Graphics Forum  
2020 SIGGRAPH  
2020 Massachusetts Institute of Technology, Geometric Data Processing Group  
2020 Florida State University  
2020 Toronto Geometry Colloquium

### **Walk on Stars: A Grid-Free Monte Carlo Method for PDEs with Neumann Boundary Conditions**

2023 SIGGRAPH

### **Grid-Free Monte Carlo for PDEs with Spatially Varying Coefficients**

2022 SIGGRAPH  
2022 Florida State University

### **Boundary First Flattening**

2018 SIGGRAPH  
2017 Carnegie Mellon University Graphics Group

## Courses & Teaching

2024 *Monte Carlo Geometry Processing*, Symposium on Geometry Processing Graduate School  
[Project Page](#)

### **Teaching assistant**

2020 *Computer Graphics 15-462*, Carnegie Mellon University  
2017 *Discrete Differential Geometry 15-858*, Carnegie Mellon University

## Professional Services

### Journal & Conference reviewing

SIGGRAPH 2024-2020; SIGGRAPH Asia 2024-2021; Eurographics 2021, 2019-2018; Graphics Interface 2021, 2019; Pacific Graphics 2018.

2017-2018 PhD Admissions Committee Member at Carnegie Mellon University

### Undergraduate Student Mentoring

2021 Max Slater (CMU CS)

2020 Ray Ye (CMU Physics)

2018-2019 Joshua Kalapos (CMU CS)