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 *Advisor: Keenan Crane*	Carnegie Mellon University
2020	MS in Computer Science	Carnegie Mellon University
2015	BA in Physics and Computer Science	Columbia University

Honors and awards

2024	Dissertation Award Honorable Mention *School of Computer Science, Carnegie Mellon University*
2024	SIGGRAPH Best Paper
2022	SIGGRAPH Best Paper Honorable Mention
2021-2022	NVIDIA Graduate Fellowship
2019-2020	Presidential Fellowship *Computer Science Department, Carnegie Mellon University*
2019	Outstanding Software Project (Boundary First Flattening) *Symposium on Geometry Processing*

Publications

2024

Differential Walk on Spheres
Bailey Miller, Rohan Sawhney, Keenan Crane, Ioannis Gkioulekas
ACM Transactions on Graphics
Paper | Project Page

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

Employment

2023- **NVIDIA Corporation**
Senior Research Scientist, High Fidelity Physics Research

2021 **NVIDIA Corporation**
Research Intern, mentored by Matt Pharr
Conducted research on real-time raytracing, culminating in an ACM TOG publication.

2020 **nTopology**
Software Engineer Intern
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 **Adobe Systems Inc.**
Research Intern, worked with Noam Aigerman, Danny Kaufman, Vladimir Kim and Nathan Carr
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.

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
GPU accelerated C++ and Python library for fast closest point and ray intersections queries.

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

Decorrelating ReSTIR Samplers via MCMC Mutations
2024 SIGGRAPH

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.

2024   Eurographics 2025 International Program Committee

2017-2018   PhD Admissions Committee Member at Carnegie Mellon University

Student Mentoring
2024   Zihong Zhou (Dartmouth CS)
2021   Max Slater (CMU CS)
2020   Ray Ye (CMU Physics)
2018-2019   Joshua Kalapos (CMU CS)