Rohan Sawhney

Computer Science Department
Carnegie Mellon University
Pittsburgh, PA 15213

rohansawhney@cs.cmu.edu
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

2016-2023	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

2022	SIGGRAPH Best Paper Honorable Mention
2021-2022	Nvidia Graduate Fellowship
2019-2020	Presidential Fellowship *Carnegie Mellon University*
2019	Outstanding Software Project Award (Boundary First Flattening) *Symposium on Geometry Processing*

Employment

2021-2022	**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.

Publications

Journal Papers

2023 **Decorrelating ReSTIR Samplers via MCMC Mutations**
Rohan Sawhney, Daqi Lin, Markus Kettunen, Benedikt Bitterli, Ravi Ramamoorthi, Chris Wyman and Matt Pharr
ACM Transactions on Graphics
Paper

2023 **Walk on Stars: A Grid-Free Monte Carlo Method for PDEs with Neumann Boundary Conditions**
Rohan Sawhney*, Bailey Miller*, Ioannis Gkioulekas† and Keenan Crane†
ACM Transactions on Graphics
Paper | Project Page | Talk

2023 **Boundary Value Caching for Walk on Spheres**
Bailey Miller*, Rohan Sawhney*, Keenan Crane† and 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† and Keenan Crane†
ACM Transactions on Graphics (Honorable Mention)
Paper | Project Page

2020 **Monte Carlo Geometry Processing: A Grid-Free Approach to PDE-Based 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

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

Teaching

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 2023-2020; SIGGRAPH Asia 2023-2021; 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)