



Keenan Crane

Curriculum Vitæ

<http://www.cs.cmu.edu/~kmc Crane>
5000 Forbes Ave, Pittsburgh PA 15213
kmc Crane@cs.cmu.edu
(412) 268-3454

Employment

Associate Professor with tenure (2024–)

Computer Science Department and Robotics Institute

Department of Electrical and Computer Engineering (courtesy) Carnegie Mellon University

Associate Professor without tenure (2021–2024)

Michael B. Donohue Career Development Professor

Computer Science Department and Robotics Institute

Department of Electrical and Computer Engineering (courtesy) Carnegie Mellon University

Assistant Professor (2015–2021)

Computer Science Department and Robotics Institute

Carnegie Mellon University

NSF Mathematical Sciences Postdoctoral Fellow (2013–2015)

Columbia University

Research Intern (Summer 2008)

Autodesk Research

Toronto, Canada

Demo Team Intern (Summer 2005, 2006)

NVIDIA Corporation

Santa Clara, CA

Architecture Intern (Summer 2004)

NVIDIA Corporation

Santa Clara, CA

Student Researcher (2000–2002)

Southwest Research Institute

Department of Space Studies

Education

PhD, Computer Science

California Institute of Technology (2010–2013)

MS, Computer Science

California Institute of Technology (2007–2010)

BS, Computer Science

University of Illinois at Urbana-Champaign (2002–2006)

Publications

BOOKS

1. Keenan Crane (ed.)
An Excursion into Discrete Differential Geometry
Proceedings of Symposia in Applied Mathematics (76) 2020

JOURNAL ARTICLES

2. Etienne Corman, Keenan Crane
Rectangular Surface Parameterization
ACM Transactions on Graphics (2025) [Best Paper, Honorable Mention]
3. Bailey Miller, Rohan Sawhney, Keenan Crane, Ioannis Gkioulekas
Monte Carlo PDE Simulation in Participating Media
ACM Transactions on Graphics (2025)
4. Hossein Baktash, Nicholas Sharp, Qingnan Zhou, Keenan Crane, Alec Jacobson
Putting Rigid Bodies to Rest
ACM Transactions on Graphics (2025)
5. Bailey Miller, Rohan Sawhney, Keenan Crane, Ioannis Gkioulekas
Differential Walk on Spheres
ACM Transactions on Graphics (2024)
6. Josua Sassen, Henrik Schumacher, Martin Rumpf, Keenan Crane
Repulsive Shells
ACM Transactions on Graphics (2024) [Best Paper]
7. Mark Gillespie, Denise Yang, Mario Botsch, Keenan Crane
Ray Tracing Harmonic Functions
ACM Transactions on Graphics (2024) [Best Paper, Honorable Mention]
8. Bailey Miller, Rohan Sawhney, Keenan Crane, Ioannis Gkioulekas
Walkin' Robin: Walk on Spheres with Robin Boundary Conditions
ACM Transactions on Graphics (2024) [Best Paper]
9. Yong Li, Shoaib Kamil, Keenan Crane, Alec Jacobson, Yotam Gingold
I<3Mesh: A DSL For Mesh Processing
ACM Transactions on Graphics (2024)
10. Nicole Feng, Keenan Crane
A Heat Method for Generalized Signed Distance
ACM Transactions on Graphics (2024)
11. Nicole Feng, Mark Gillespie, Keenan Crane
Winding Numbers on Discrete Surfaces
ACM Transactions on Graphics (2023)
12. Rohan Sawhney, Bailey Miller, Ioannis Gkioulekas, Keenan Crane
Walk on Stars: A Grid-Free Monte Carlo Method for PDEs with Neumann Boundary Conditions
ACM Transactions on Graphics (2023)
13. Derek Liu, Benjamin Chislett, Mark Gillespie, Alec Jacobson, Keenan Crane
Surface Simplification with Intrinsic Error Metrics
ACM Transactions on Graphics (2023)
14. Bailey Miller, Rohan Sawhney, Keenan Crane, Ioannis Gkioulekas
Boundary Value Caching for Walk on Spheres
ACM Transactions on Graphics (2023)
15. Rohan Sawhney, Dario Seyb, Wojciech Jarosz, Keenan Crane
Grid-Free Monte Carlo for PDEs with Spatially Varying Coefficients
ACM Transactions on Graphics (2022) [Best Paper, Honorable Mention]

16. Nicholas Sharp, Souhaib Attaiki, Keenan Crane, Maks Ovsjanikov
DiffusionNet: Discretization Agnostic Learning on Surfaces
ACM Transactions on Graphics (2022)
17. Mark Gillespie, Nicholas Sharp, Keenan Crane
Integer Coordinates for Intrinsic Geometry Processing
ACM Transactions on Graphics (2021)
18. Chris Yu, Caleb Brakensiek, Henrik Schumacher, Keenan Crane
Repulsive Surfaces
ACM Transactions on Graphics (2021)
19. Mark Gillespie, Boris Springborn, Keenan Crane
Discrete Conformal Equivalence of Polyhedral Surfaces
ACM Transactions on Graphics 40 (4) 2021
20. Chris Yu, Henrik Schumacher, Keenan Crane
Repulsive Curves
ACM Transactions on Graphics 40 (2) 2021
21. Nicholas Sharp, Keenan Crane
You Can Find Geodesic Paths in Triangle Meshes by Just Flipping Edges
ACM Transactions on Graphics 39 (6) 2020
22. Rohan Sawhney, Keenan Crane
Monte Carlo Geometry Processing: A Grid-Free Approach to PDE-Based Methods on Volumetric Domains
ACM Transactions on Graphics 39 (4) 2020
23. Nicholas Sharp, Keenan Crane
A Laplacian for Nonmanifold Triangle Meshes
SGP / Computer Graphics Forum 39 (5) 2020 [Best Paper Award]
24. Katherine Ye, Wode Ni, Max Krieger, Dor Ma'ayan, Jenna Wise, Joshua Sunshine, Jonathan Aldrich, Keenan Crane
Penrose: From Mathematical Notation to Beautiful Diagrams
ACM Transactions on Graphics 39 (4) 2020
25. Nicholas Sharp, Yousuf Soliman, Keenan Crane
Navigating Intrinsic Triangulations
ACM Transactions on Graphics 38 (4) 2019
26. Etienne Corman, Keenan Crane
Symmetric Moving Frames
ACM Transactions on Graphics 38 (4) 2019
27. Nicholas Sharp, Yousuf Soliman, Keenan Crane
The Vector Heat Method
ACM Transactions on Graphics 38 (3) 2019
28. Nicholas Sharp, Keenan Crane
Variational Surface Cutting
ACM Transactions on Graphics 37 (4) 2018
29. Yousuf Soliman, Dejan Slepčev, Keenan Crane
Optimal Cone Singularities for Conformal Flattening
ACM Transactions on Graphics 37 (4) 2018
30. Oded Stein, Eitan Grinspun, Keenan Crane
Developability of Triangle Meshes
ACM Transactions on Graphics 37 (4) 2018
31. Mina Konakovic, Julian Panetta, Keenan Crane, Mark Pauly
Rapid Deployment of Curved Surfaces via Programmable Auxetics
ACM Transactions on Graphics 37 (4) 2018

32. Alex Baden, Keenan Crane, Misha Kazhdan
Möbius Registration
SGP / Computer Graphics Forum 37 (5), 2018
33. Rohan Sawhney, Keenan Crane
Boundary First Flattening
ACM Transactions on Graphics 37 (1) 2017
34. Chris Yu, Keenan Crane, Stelian Coros
Computational Design of Telescoping Structures
ACM Transactions on Graphics 36 (4), 2017
35. Derek Liu, Alec Jacobson, Keenan Crane
A Dirac Operator for Extrinsic Shape Analysis
SGP / Computer Graphics Forum 36 (5), 2017
36. Mina Konakovic, Keenan Crane, Bailin Deng, Sofien Bouaziz, Daniel Piker, Mark Pauly
Beyond Developable: Computational Design and Fabrication with Auxetic Materials
ACM Transactions on Graphics 35 (4), 2016
37. Felix Knöppel, Keenan Crane, Ulrich Pinkall, Peter Schröder
Stripe Patterns on Surfaces
ACM Transactions on Graphics 34 (4), 2015
38. Keenan Crane, Clarisse Weischedel, Max Wardetzky
Geodesics in Heat: A New Approach to Computing Distance Based on Heat Flow
ACM Transactions on Graphics 32 (5), 2013
39. Keenan Crane, Ulrich Pinkall, Peter Schröder
Robust Fairing via Conformal Curvature Flow
ACM Transactions on Graphics 32 (4), 2013
40. Felix Knöppel, Keenan Crane, Ulrich Pinkall, Peter Schröder
Globally Optimal Direction Fields
ACM Transactions on Graphics 32 (4), 2013
41. Keenan Crane, Ulrich Pinkall, Peter Schröder
Spin Transformations of Discrete Surfaces
ACM Transactions on Graphics 30 (4), 2011
42. Keenan Crane, Mathieu Desbrun, Peter Schröder
Trivial Connections on Discrete Surfaces
SGP / Computer Graphics Forum 29 (5), 2010 [Best Paper Award]
43. Patrick Mullen, Keenan Crane, Dmitry Pavlov, Yiyang Tong, Mathieu Desbrun
Energy-Preserving Integrators for Fluid Animation
ACM Transactions on Graphics 28 (3), 2009
44. Marin Kobilarov, Keenan Crane, Mathieu Desbrun
Lie Group Integrators for Animation and Control of Vehicles
ACM Transactions on Graphics 28 (2), 2009
45. Ryan White, Keenan Crane, David Forsyth
Capturing and Animating Occluded Cloth
ACM Transactions on Graphics 26 (3), 2007
46. Eliot Young, Richard Binzel, Keenan Crane
A Two-color Map of Pluto's Sub-Charon Hemisphere
The Astronomical Journal 121 (1), 2001

OTHER REFEREED PUBLICATIONS

47. Jiří Minarčík, Sam Estep, Wode Ni, Keenan Crane
Minkowski Penalties: Robust Differentiable Constraint Enforcement for Vector Graphics
SIGGRAPH 2024
48. Nicholas Sharp, Mark Gillespie, Keenan Crane
Geometry Processing with Intrinsic Triangulations
ACM SIGGRAPH Course Notes, 2021
49. Keenan Crane
Conformal Geometry of Simplicial Surfaces
Proceedings of Symposia in Applied Mathematics (2020)
50. Wode Ni, Katherine Ye, Joshua Sunshine, Jonathan Aldrich, Keenan Crane
SUBSTANCE and STYLE: Domain-Specific Languages for Mathematical Diagrams
DSLDI (Domain-Specific Language Design and Implementation) 2017
51. Katherine Ye, Keenan Crane, Jonathan Aldrich, and Joshua Sunshine
Designing Extensible, Domain-Specific Languages for Mathematical Diagrams
ACM SIGPLAN POPL - Off the Beaten Track 2017
52. Keenan Crane, Fernando de Goes, Mathieu Desbrun, Peter Schröder
Digital Geometry Processing with Discrete Exterior Calculus
ACM SIGGRAPH Course Notes, 2013
53. Michael Glueck, Keenan Crane, Sean Anderson, Andres Rutnik, Azam Khan
Multiscale 3D Reference Visualization
Proceedings of the Symposium on Interactive 3D Graphics, 2009
54. Keenan Crane, Ignacio Llamas, Sarah Tariq
Real Time Simulation and Rendering of 3D Fluids
GPU Gems 3 (Addison-Wesley), 2007
55. Ryan White, Keenan Crane, David Forsyth
Data Driven Cloth Animation
ACM SIGGRAPH Technical Sketches, 2007
56. Nathan Carr, Jared Hoberock, Keenan Crane, John Hart
Rectangular Multi-Chart Geometry Images
Proceedings of the Symposium on Geometry Processing, 2006
57. Nathan Carr, Jared Hoberock, Keenan Crane, John Hart
Fast GPU Ray Tracing of Dynamic Meshes
Proceedings of Graphics Interface, 2006

TECHNICAL REPORTS AND MANUSCRIPTS

58. Keenan Crane, Marco Livesu, Enrico Puppo, Yipeng Qin
A Survey of Algorithms for Geodesic Paths and Distances
arXiv:2007.10430, 2020
59. Justin Solomon, Keenan Crane, Adrian Butscher, Chris Wojtan
A General Framework for Bilateral and Mean Shift Filtering
arXiv:1405.4734, 2014

INVITED PAPERS

60. Keenan Crane, Max Wardetzky *A Glimpse into Discrete Differential Geometry*
Notices of the AMS, November 2017
61. Keenan Crane, Clarisse Weischedel, Max Wardetzky
The Heat Method for Distance Computation
Communications of the ACM (CACM) Research Highlights, November 2017

62. Keenan Crane
Conformal Geometry Processing
Caltech PhD thesis, 2013
63. Keenan Crane
Discrete Connections for Geometry Processing
Caltech MS thesis, 2010

Professional Activities

Technical Papers co-Chair - Symposium on Geometry Processing (2021)
Steering Committee - Curves and Surfaces (2024–2026)
Associate Editor - ACM Transactions on Graphics (2017–2020)
Steering Committee - Summer Geometry Initiative (2021–2023)
Steering Committee - Illustrating Mathematics (2019–)
Inaugural Committee Member - ACM SIGGRAPH Doctoral Consortium (2018)
Technical Papers Committee - SIGGRAPH (2015, 2016, 2021, 2024), SIGGRAPH Asia (2014, 2019, 2020)
Committee Member - AMS Short Course Subcommittee (2019–2022)
Co-Organizer - ICERM Workshop on Illustrating Geometry & Topology (2019)
Organizer - AMS Short Course on Discrete Differential Geometry, Joint Mathematics Meeting (2018)
Program Committee - Symposium on Geometry Processing (SGP 2013, 2014, 2015, 2018, 2019, 2020)
Program Committee - Conference on Computer Vision & Pattern Recognition (CVPR 2013)
Program Committee - Tiny Transactions on Computer Science (TinyToCS 2013)
Program Committee - Midwest Conference on Computer Graphics (MIDGRAPH 2005)
Chair - ACM SIGGRAPH Student Chapter at UIUC (2005)
Reviewer: SIGGRAPH 2006–2025; SIGGRAPH Asia 2008, 2010, 2013–2024; ACM Transactions on Graphics 2007, 2008, 2012, 2014–2020; Eurographics 2006, 2007, 2011, 2013, 2016, 2017; Pacific Graphics 2013, 2014; IEEE TVCG 2009, 2011, 2012, 2014, 2015; Computers & Graphics 2011, 2012; ECCV 2012; CVPR 2013; GMOD 2013; Graphics Interface 2006; MIDGRAPH 2005; SIAM SIIMS 2011, 2012; Computer Aided Design 2013; Computer Graphics Forum 2013; Origami6 2015.
Panelist - NSF core programs

YouTube (<https://www.youtube.com/keenancrane>) — 1.7 million views as of April 2025.
Twitter (<https://twitter.com/keenanisalive>) — 35k followers as of April 2025.

Press Coverage

Ars Technica, “Your Next Gaming Dice Could Be Shaped Like a Dragon or Armadillo” (May 2025)
New Scientist, “You Can Make Fair Dice from Any Shape You Like” (May 2025)
SCS News, “Revisiting Fundamental Equations in Computer Graphics” (August 2024)
The Aperiodical, “ $-e^{i\pi}$ to Watch: Keenan Crane” (November 2023)
New York Times, “They’re Taking Jigsaws to Infinity and Beyond” (December 2022)
Dartmouth University, “Shining Light on Hard Math to Recreate Reality” (August 2022)
WIRED, “Computer Scientist Explains Fractals in 5 Levels of Difficulty” (May 2022)
Hackaday, “This Spherical Lamps Pieces Ship Flat, Thanks to Math” (May 2022)
SCS News, “Repulsive Energies Lead CMU Researchers To Rethink Computer Graphics” (December 2021)
Tech XPlore, “Analysis of Complex Geometric Models Made Simple” (July 2020)
Popular Mechanics, “Finally, Software That Turns Confusing Math Equations Into Simple Images” (June 2020)
Notices of the AMS, “Packard Fellowships Awarded” (February 2019)
ACM News, “2018 Packard Fellowships Include 2 Computer Scientists” (October 2018)
ZDNet, “Telescoping Robots Can Shrink to Travel” (August 2017)
90.5 WESA, “CMU Researchers Put A Twist On Telescoping Structures” (August 2017)
ACM SIGGRAPH Press Release, “Making Telescopes that Curve and Twist” (July 2017)
WIRED, “A Freaky Anti-Rubber Is Still Weirding Scientists Out” (August 2016)
NSF Science Now, “Computational Design Tool Transforms Flat Materials into 3-D Shapes” (August 2016)
3DPrint.com, “These 3D Printed Porcelain Coffee Mugs & Donuts are Clever Topology-Related Joke” (August 2015)
Scientific American Blog, “In Love with Geometry” (September 2013)

National Public Radio, “*Digital Domain Grapples with Fur, Feathers*” (June 2012)
Engineering & Science Magazine, “*Conquering Shapes*” (Spring 2012)

Awards & Honors

Packard Fellowship (2018–2023)

Awarded to 18 faculty/year across all areas of science and engineering; \$875,000 over 5 years.

NSF CAREER Award (2020–2025)

Awarded to ~100 computer science faculty/year; \$519,154 over 5 years.

Michael B. Donohue Career Development Professorship (2021–2024)

Awarded to one junior faculty member in the CMU School of Computer Science every 3 years.

NSF Mathematical Sciences Postdoctoral Fellowship (2013–2015; NSF Award #1304254)

Awarded to top 15% of applicants across all areas of pure & applied mathematics; \$150,000 over 2 years.

Google PhD Fellowship (2010–2013)

Awarded to ~15 students/year across all disciplines of computer science; 3-years tuition & stipend.

2021 Early Career Academic Achievement Alumni Award

Awarded annually by the UIUC Department of Computer Science.

2020 Eurographics Junior Fellow

About 2–4 new fellows elected annually across computer graphics.

2013 Heidelberg Laureate Forum

2012 Oberwolfach Graduate Student Fellow

2012 Everhart Distinguished Speaker

2011 NSF Junior Oberwolfach Fellow

2024 SIGGRAPH Best Paper Award for “*Repulsive Shells*”

Given to 5 papers out of about 840 submissions

2024 SIGGRAPH Best Paper Award for “*Walk on Stars with Robin Boundary Conditions*”

Given to 5 papers out of about 840 submissions

2024 SIGGRAPH Best Paper Award, Honorable Mention for “*Ray Tracing Harmonic Functions*”

Given to 12 papers out of about 840 submissions

2022 SIGGRAPH Best Paper Award, Honorable Mention for “*Grid-Free Monte Carlo for PDEs with Spatially Varying Coefficients*”

2020 Symposium on Geometry Processing Best Paper Award for “*A Laplacian for Nonmanifold Triangle Meshes*”

2019 Symposium on Geometry Processing Software Award for “*Boundary First Flattening*”

One award per year; €1000 prize.

2010 Symposium on Geometry Processing Best Paper Award for “*Trivial Connections on Discrete Surfaces*”

CSRankings.org: 6th most productive Computer Graphics researcher in US (of 153) during time at CMU (2015–2024)

ScholarGPS.com: top-10 researcher worldwide in Computer Graphics during the period 2020–2025

Invited Talks

February 14, 2025

Some Recent Developments in Geometry Processing
Meta Reality Labs
Pittsburgh, PA

April 10, 2025

Some Recent Developments in Geometry Processing
Roblox Corporation
San Mateo, CA

June 27, 2025

Repulsive Shells
Harvard University
Cambridge, MA

February 27, 2024

Shape Spaces for Biomembranes?
Interpretable Quantitative Cell Representations Summit
Allen Institute for Cell Science

September 7, 2023

Walk on X: Simulating Nature without Simplifying the Geometry
Packard Fellows Meeting
Colorado Springs, CO

August 22, 2022

Monte Carlo Geometry Processing
Oberwolfach Mathematical Research Institute
Oberwolfach, Germany

June 16, 2022

Repulsive Shape Optimization
Mathematical Institute
University of Oxford (remote)

November 18, 2021

Repulsive Shape Optimization
Center on Frontiers of Computing Studies
Peking University (remote)

July 6–9, 2020

(Postponed due to COVID)
SIAM Conference on Imaging Science
Toronto, Canada

March, 2020

Symmetric Moving Frames
University of Göttingen
Göttingen, Germany

September 2, 2019

Intrinsic Triangulations [Keynote]
International Geometry Workshop
Strobl, Austria

August 1, 2024

Repulsive Shells
SIGGRAPH 2024
Denver, CO

March 3, 2024

Walk on X: Simulating Nature without Simplifying the Geometry
University of California, San Diego
La Jolla, CA

February 23, 2024

Monte Carlo Geometry Processing
University of Washington
Seattle, Washington

July 6, 2023

Monte Carlo Geometry Processing [Keynote]
International Geometry Summit
Genoa, Italy

June 20, 2022

Intrinsic Geometry Processing [Plenary]
International Conference on Curves & Surfaces
Arcachon, France

April 27, 2022

Geometry Processing & Differential Geometry
Unity, Inc. (remote)
Conversations with Research Pioneers

May 7–9, 2021

Intrinsic Triangulations [Keynote]
Center of Mathematics Sciences and Applications
Harvard University (remote)

June 15–24, 2020

(Postponed due to COVID)
FoCM'20 Computational Topology & Geometry Workshop
Vancouver, Canada

September 5, 2019

Discrete Differential Geometry
Packard Fellows Meeting
Monterey, CA

April 1, 2019

Heat Methods in Geometry Processing
IPAM Workshop on Geometric Processing
Los Angeles, CA

October 17, 2018

Differential Geometry and Digital Fabrication

G. Milton Wing Lectures

University of Rochester

October 19, 2018

Discrete Conformal Geometry II: Beyond Uniformization

G. Milton Wing Lectures

University of Rochester

July 10, 2017

Extrinsic Conformal Geometry

FoCM'17 Computational Topology & Geometry Workshop

Barcelona, Spain

November 18, 2016

Differential Geometry and Developability [Keynote]

Symposium on Geometry & Computational Design

Vienna, Austria

June 17, 2016

Laplace-Beltrami: The Swiss Army Knife of Geometry Processing

EU Regional School

Aachen, Germany

October 14, 2015

Line Bundles in Geometry Processing

Oberwolfach Mathematical Research Institute

Oberwolfach, Germany

April 27, 2015

Illustrating Geometry

Princeton University

Princeton, NJ

March 10, 2015

Spin Transformations and Geometry Processing

Technische Universität Berlin

Berlin, Germany

April 8, 2014

Optimizing Algorithms at the Level of Geometry

Carnegie Mellon School of Computer Science

Pittsburgh, PA

March 20, 2014

Optimizing Algorithms at the Level of Geometry

University of Toronto, Department of Computer Science

Toronto, Canada

February 27, 2014

Optimizing Algorithms at the Level of Geometry

Georgia Tech College of Computing

Atlanta, GA

December 12, 2013

Fast Algorithms for Geometry Processing

Blue Sky Studios

Greenwich, CT

October 18, 2018

Discrete Conformal Geometry I: Uniformization

G. Milton Wing Lectures

University of Rochester

September 21, 2017

Boundary First Flattening

International Geometry Workshop

Obergurgl, Austria

November 16, 2016

Boundary First Flattening

IST Austria

Klosterneuburg, Austria

July 1, 2016

Conformal Geometry and Auxetic Linkages

Brown University / ICERM

Providence, RI

January 28, 2016

Linear Conformal Parameterization with Boundary Control

Oberwolfach Mathematical Research Institute

Oberwolfach, Germany

July 10, 2015

Developable Surface Flow

International Geometry Workshop

Seggau, Austria

April 19, 2015

Line Bundles in Geometry Processing

Columbia University

New York, NY

June 27, 2014

Optimizing Algorithms at the Level of Geometry

Google

Mountainview, CA

April 1, 2014

Optimizing Algorithms at the Level of Geometry

Stanford University, Department of Computer Science

Stanford, CA

March 19, 2014

Optimizing Algorithms at the Level of Geometry

Autodesk Research

Toronto, Canada

February 24, 2014

Optimizing Algorithms at the Level of Geometry

UCSD Department of Computer Science and Engineering

San Diego, CA

September 3, 2013

Geodesics in Heat

Institute of Science and Technology Austria

Klosterneuburg, Austria

August 31, 2013

Globally Optimal Direction Fields
International Geometry Workshop
Strobl, Austria

August 31, 2012

Optimal Algorithms for Vector Field Design and Editing
Rhythm and Hues Studios
El Segundo, California

June 18, 2012

Manipulating Geometry via Extrinsic Curvature
DDG Workshop @ SoCG
Chapel Hill, North Carolina

May 9, 2012

Helping Machines (and People) Think About Shape
Caltech Everhart Lecture Series
Pasadena, California

March 27, 2012

Robust Fairing using Conformal Surface Flows
Hausdorff Research Institute for Mathematics
Bonn, Germany

July 11, 2011

Spin Transformations of Discrete Surfaces
École Polytechnique Fédérale de Lausanne (EPFL)
Lausanne, Switzerland

June 21, 2011

Conformal Surface Flows
International Geometry Workshop
Obergurgl, Austria

May 24, 2011

Recent Developments in Discrete Differential Geometry
California Institute of Technology
Pasadena, CA

February 2, 2011

Spin Transformations of Discrete Surfaces
Oberwolfach Mathematical Research Institute
Oberwolfach, Germany

May 20, 2010

Trivial Connections on Discrete Surfaces
Barrett Memorial Lectures
Knoxville, TN

November 18, 2012

Manipulating Geometry via Extrinsic Curvature
Johns Hopkins University
Baltimore, Maryland

July 11, 2012

The Heat Method
Oberwolfach Mathematical Research Institute
Oberwolfach, Germany

May 19, 2012

Helping Machines (and People) Think About Shape
Caltech Alumni Association Seminar Day
Pasadena, California

April 19, 2012

Optimal Algorithms for Vector Field Design and Editing
Digital Domain
Venice, California

December 13, 2011

Helping Machines Think About Shape
Johns Hopkins Center for Imaging Science
Baltimore, Maryland

June 28, 2011

Spin Transformations of Discrete Surfaces
Institute of Science and Technology Austria
Klosterneuburg, Austria

June 17, 2011

Recent Developments in Discrete Differential Geometry
Institute of Science and Technology Austria
Klosterneuburg, Austria

April 13, 2011

Spin Transformations of Discrete Surfaces
Stanford University
Stanford, CA

September 30, 2010

Trivial Connections on Discrete Surfaces
Freie Universität Berlin
Berlin, Germany

July 7, 2009

Lie Group Integrators for Animation and Control of Vehicles
Technische Universität Berlin
Berlin, Germany

Teaching and Education

At CMU:

TERM	COURSE	NUMBER	FCE	FCE
			OVERALL TEACHING	DEPT. AVG.
Fall 2015	Computer Graphics Seminar	15-869J	4.9	4.3
Fall 2015	Computer Graphics	15-462/662	4.8/4.9	4.3
Spring 2016	Discrete Differential Geometry	15-869J	4.8	4.3
Fall 2016	Computer Graphics	15-462/662	4.7/4.9	4.3
Fall 2017	Discrete Differential Geometry	15-458/858	4.1/4.7	4.2
Fall 2017	Computer Graphics	15-462/662	4.7/4.6	4.2
Fall 2018	Computer Graphics	15-462/662	4.9/4.8	4.2
Spring 2019	Discrete Differential Geometry	15-458/858	5.0/4.8	4.2
Spring 2020	Computer Graphics	15-462/662	4.5/4.7	4.4
Spring 2020	Discrete Differential Geometry	15-458/858	4.9/4.5	4.4
Fall 2020	Computer Graphics	15-462/662	4.7/5.0	3.5
Spring 2021	Discrete Differential Geometry	15-458/858	4.2/4.8	4.3
Fall 2021	Computer Graphics	15-462/662	4.1/4.4	4.3
Spring 2022	Discrete Differential Geometry	15-458/858	4.8/4.6	4.3
Spring 2023	Discrete Differential Geometry	15-458/858	4.2/4.9	4.2
Fall 2023	Monte Carlo Methods	15-327/627/860, 21-387	4.1/5.0/4.3	4.3
Spring 2024	Discrete Differential Geometry	15-458/858	5.0/4.8	4.2
Fall 2024	Monte Carlo Methods	15-327/627/860, 21-387	5.0/4.8/5.0,4.7	4.2
Spring 2025	Discrete Differential Geometry	15-458/768	4.7/4.9	4.1

At previous institutions:

Teaching Assistant — Caltech CS 177 (Discrete Differential Geometry), 2011, 2012

Teaching Assistant — Caltech CS 101.4 (Algorithms in Geometry and Topology), 2009

External Teaching Activities:

August 9, 2021

Geometry Processing with Intrinsic Triangulations

ACM SIGGRAPH Courses

Virtual/Online

June 21, 2021

Geometry Processing with Intrinsic Triangulations

International Meshing Roundtable

Virtual/Online

July 7, 2018

Conformal Geometry Processing

Symposium on Geometry Processing Grad School

Paris, France

January 5–6, 2018

Discrete Conformal Geometry

Joint Mathematics Meeting

San Diego, CA

July 1, 2017

Conformal Geometry Processing

Symposium on Geometry Processing Grad School

London, UK

July 6, 2017

Conformal Geometry Processing

AICES EU Regional School

Aachen, Germany

July 11, 2014

Geometry Processing with Laplace-Beltrami

Symposium on Geometry Processing Grad School

Cardiff, Wales

July 22, 2013

Geometry Processing with Discrete Exterior Calculus

SIGGRAPH Courses

Anaheim, CA

July 8, 2013

Geometry Processing with Discrete Exterior Calculus

Symposium on Geometry Processing Grad School

Genova, Italy

July 14, 2012

Differential Geometry and Discrete Curvature Flows

Symposium on Geometry Processing Grad School

Tallinn, Estonia

University, College, Department Service

CSD Department Head Pre-Search Committee (2025)
CSD PhD Admissions Committee (2022–2023)
Computational and Applied Mathematics Faculty Search Committee (2022–2023)
Chair of CSD Faculty Search Committee (2020–2021)
RI Faculty Mentor 2019
CSD PhD Fellowships Committee (2019–2020)
Chair of CSD Faculty Search Committee (2019–2020)
CSD Fellowship Nomination Committee (2019–2020)
CSD Faculty Search Committee (2018–2019)
CSD Open House (2018)
CSD Faculty Search Committee (2017–2018)
CSD Open House (2017)
RI Reviewer for Undergrad Additional Majors (2017)
Official “Dice Roller” for the Random Distance Run. Solicited prize donation from *The Dice Lab* (2017)

Advising

CURRENT

PhD: Nicole Feng (*CMU CSD 2020–*), Olga Gutan (*CMU CSD 2022–*), Hossein Baktash (*CMU ECE 2022–*), Zoë Marschner (*CMU CSD 2023–*)

PAST

Postdoc: Etienne Corman (2017–2018) → Permanent researcher, French National Centre for Scientific Research (CNRS).

PhD: Mark Gillespie (PhD CMU CSD 2024) → Assistant Professor, University of Utah; Rohan Sawhney (PhD CMU CSD 2022) → Senior Research Scientist at NVIDIA AI; Nicholas Sharp (PhD CMU CSD 2021) → Senior Research Scientist at NVIDIA AI, Chris Yu (PhD CMU CSD 2021) → Pixar Animation Studios; Kai Ye (CMU CSD 2022) → Research Scientist at Basis AI.

Thesis Committee: Péter Borosán (PhD, Rutgers University CS, 2013) → Google; Mina Konakovic (PhD, EPFL 2019) → Assistant Professor, MIT EECS; Philipp Herholz (PhD, TU Berlin CS, 2019) → Meta Reality Labs; Hana Kouimská (PhD, TU Berlin Mathematics, 2020) → Postdoc, Institute of Science and Technology Austria (ISTA), Shumian Xin (PhD, CMU Robotics, 2022) → Adobe Research; Vidya Narayanan (PhD, CMU Computer Science, 2022) → Amazon; Marcel Padilla (PhD, TU Berlin Mathematics, 2023) → Postdoc, ETH Zürich.

MS: Derek Liu (*CMU MechE MS 2017*) → CS PhD at UToronto, Denise Yang (*CMU ECE 2023*) → Pixar Animation Studios.

Undergrad: Pooja Mathur (*UIUC Intel/Lockheed Martin URSP, 2005–2006*), Isaac Kim (*Caltech SURF, 2011*), Joaquín Ruales (*Columbia REU, 2014*) → Microsoft Software Engineer, Rohan Sawhney (*Columbia independent study, 2014*) → CMU CS PhD, Henrique Maia (*Columbia independent study, 2014*) → Columbia University CS PhD, Kevin Li (*Columbia REU 2015*) → Stanford CS PhD, Lucas Schuermann (*Columbia REU 2015*), Bryce Summers (*CMU Senior Thesis, 2015*) → NYU IDM MS, Kai Kang (*CMU independent study, 2015*), Surbhi Inani (*CMU SURF, 2016*), Chris Kaffine (*CMU independent study 2017*), Wode Ni (*CMU REUSE 2017*) → CS PhD at CMU, Connor Lin (*CMU 15-300 research project*) → CS PhD at Stanford, Joel Loo (*CMU independent research 2018*), Lily Shellhammer (*CMU REUSE 2018*), Christina Vaz (*CMU independent study, Google Summer of Code 2018*) → Amazon, Yousuf Soliman (*CMU Independent Study 2016–2018*) → Applied Math PhD at Caltech, Joshua Brakensiek (*CMU independent study 2017–2018*) → CS PhD at Stanford, Yumeng (Rain) Du (*CMU BCSA*), Joshua Kalapos (*CMU CS*), Ruihao (Ray) Ye (*CMU Physics*), Alex Havrilla (*CMU CS/Math*), Helena Yang (*CMU CS*), Sahra Yusuf (*Summer Geometry Institute 2021*), Tal Rastopchin (*Summer Geometry Institute 2021*), Joana Portmann (*Summer Geometry Institute 2021*), Daniel Li (*CMU CS Independent Study*), Hesper Yin (*CMU CS Independent Study*) → UCSD CS PhD, Maxwell Slater (*CMU CS independent study*) → Jane Street, Ethan Lu (*CMU Independent Study 2019–2022*) → PhD Stanford Mathematics, Thomas Carey (CMU Independent Study 2021), Hyojae Park (CMU Independent Study 2025)

High School: Caleb Brakensiek (Independent Study 2020–2021) → University of Arizona.