

Ahmed H. Mahmoud

Curriculum Vitae

<https://ahdhn.github.io>
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Cambridge, MA 02139
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(530)-574-0901

RESEARCH EXPERIENCE

Massachusetts Institute of Technology, CSAIL
Postdoctoral Associate

September 2024 – present

- Advisor: Professor Justin Solomon & Professor Jonathan Ragan-Kelley

Autodesk Research, Toronto, Canada
Senior Research Scientist

November 2020 – May 2024

University of California, Davis
Graduate Student Researcher

March 2016 – October 2020

Autodesk Research, Toronto, Canada
Intern, Numerical Analysis Research

June–December 2019, July – November 2020

Shenzhen University, China
Research intern at the Visual Computing Research Center

June – September 2018

EDUCATION

University of California, Davis
Ph.D. in Electrical and Computer Engineering
– Advisor: Professor John D. Owens
– Dissertation: Unstructured Geometric Data Processing on the GPU: Data Structures & Programming Models

June 2024

University of California, Davis
M.Sc. in Electrical and Computer Engineering
Alexandria University, Egypt
B.S. in Marine Engineering and Naval Architecture
– Very good with honors—ranked first

September 2020

May 2013

FUNDING

- [1] *OAC Core: OAC Core Projects: GPU Geometric Data Processing*
National Science Foundation (Award # OAC-2403239)
PI. Jonathan Ragan-Kelley, co-PI. Justin Solomon
Amount: \$600,000
July 1, 2024–June 30, 2027
Role: The primary author of the technical description
- [2] *Efficient GPU Sparse Automatic Differentiation for Scientific Computing*
MIT Generative AI Impact Consortium (MGAIC)
PI. Justin Solomon, co-PI. Jonathan Ragan-Kelley
Amount: \$150,000
June 1, 2025–May 31, 2026
Role: The primary author of the technical description

PUBLICATIONS

- [1] *Locality-Aware Automatic Differentiation on the GPU for Mesh-Based Computations*
Ahmed H. Mahmoud, Rahul Goel, Jonathan Ragan-Kelley, and Justin Solomon.
In submission (arXiv: 2509.00406).
- [2] *Fast Sparse Matrix Permutation for Mesh-Based Direct Solvers*
Behrooz Zarebavami[†], **Ahmed H. Mahmoud**[†], Ana Dodik, Changcheng Yuan, Serban D. Porumbescu, John D. Owens, Maryam Mehri Dehnava, and Justin Solomon.
In submission (arXiv: 2602.00898).
[†] joint first author
- [3] *iskra: A System for Inverse Geometry Processing*
Ana Dodik, **Ahmed H. Mahmoud**, and Justin Solomon.
In submission
- [4] *Low-Rank Adaptation of Neural Fields*
Anh Truong, **Ahmed H. Mahmoud**, Mina Konaković Luković, and Justin Solomon.
SIGGRAPH Asia 2025.
- [5] *Dynamic Mesh Processing on the GPU*
Ahmed H. Mahmoud, Serban D. Porumbescu, and John D. Owens.
ACM Transactions on Graphics (SIGGRAPH 2025).
- [6] *Disaggregated Design for GPU-Based Volumetric Data Structures*
Massimiliano Meneghin and **Ahmed H. Mahmoud**.
European Conference on Parallel and Distributed Computing (EuroPar 2025)
- [7] *Optimized GPU implementation of grid refinement in lattice Boltzmann method*
Ahmed H. Mahmoud, Hesam Salehipour, and Massimiliano Meneghin
International Parallel and Distributed Processing Symposium (IPDPS 2024)
Open Source Contribution Award
- [8] *Neon: A Multi-GPU Programming Model for Grid-based Computations*
Massimiliano Meneghin[†], **Ahmed H. Mahmoud**[†], Pradeep Kumar Jayaraman, and Nigel J. W. Morris.
International Parallel and Distributed Processing Symposium (IPDPS 2022)
[†] joint first author
- [9] *RXMesh: A GPU Mesh Data Structure*
Ahmed H. Mahmoud, Serban D. Porumbescu, and John D. Owens
ACM Transactions on Graphics (SIGGRAPH 2021)
- [10] *VoroCrust: Voronoi Meshing Without Clipping*
Ahmed Abdelkader, Chandrajit L. Bajaj, Mohamed S. Ebeida, **Ahmed H. Mahmoud**, Scott A. Mitchell, John D. Owens and Ahmad A. Rushdi
ACM Transactions on Graphics (SIGGRAPH 2020)
- [11] *Sampling Conditions for Conforming Voronoi Meshing by the VoroCrust Algorithm*
Ahmed Abdelkader, Chandrajit L. Bajaj, Mohamed S. Ebeida, **Ahmed H. Mahmoud**, Scott A. Mitchell, John D. Owens and Ahmad A. Rushdi
International Symposium on Computational Geometry (SoCG 2018)
- [12] *A Constrained Resampling Strategy for Mesh Improvement*
Ahmed Abdelkader[†], **Ahmed H. Mahmoud**[†] Ahmad A. Rushdi, Scott A. Mitchell, John D. Owens, and Mohamed S. Ebeida
Computer Graphics Forum (presented at ACM/Eurographics Symposium on Geometry Processing SGP 2017)
[†] joint first author
- [13] *All-Quad Meshing without Cleanup*
Ahmad A. Rushdi, Scott A. Mitchell, **Ahmed H. Mahmoud**, Chandrajit L. Bajaj, and Mohamed S. Ebeida
Computer-Aided Design (CAD 2017)

- [14] *Disk Density Tuning of a Maximal Random Packing*
Mohamed S. Ebeida, Ahmad A. Rushdi, Muhammad A. Awad, **Ahmed H. Mahmoud**, Dongming Yan, Shawn English, John D. Owens, Chandrajit L. Bajaj, and Scott A. Mitchell
Computer Graphics Forum (presented at ACM/Eurographics Symposium on Geometry Processing SGP 2016)
- [15] *Exercises in High-Dimensional Sampling: Maximal Poisson-disk Sampling and k-d Darts*
Mohamed S. Ebeida, Scott A. Mitchell, Anjul Patney, Andrew A. Davidson, Stanley Tzeng, Muhammad A. Awad, **Ahmed H. Mahmoud**, and John D. Owens
Book chapter in Topological and Statistical Methods for Complex Data: Tackling Large-Scale, High-Dimensional, and Multivariate Data Spaces (2014)
- [16] *Delaunay Quadrangulation by Two-coloring Vertices*
Scott A. Mitchell, Mohammed A. Mohammed, **Ahmed H. Mahmoud** and Mohamed S. Ebeida
International Meshing Roundtable (IMR 2014)
- [17] *Improving Spatial Coverage while Preserving the Blue Noise of Point Sets*
Mohamed S. Ebeida, Muhammad A. Awad, Xiaoyin Ge, **Ahmed H. Mahmoud**, Scott A. Mitchell, Patrick M. Knupp, and Li-Yi Wei
SIAM Conference on Geometric and Physical Modeling (SIAM GD/SPM13)
- [18] *Sifted Disks*
Mohamed S. Ebeida, **Ahmed H. Mahmoud**, Muhammad A. Awad, Mohammed A. Mohammed, Scott A. Mitchell, Alex Rand, and John D. Owens
Eurographics 2013.

PATENTS

- [1] *Optimized GPU Implementation of Grid Refinement in the Lattice Boltzmann Method*
Ahmed H. Mahmoud, Hesam Salehipour, and Massimiliano Meneghin
Filed on January 29, 2025 by Autodesk, Inc.

SELECTED TALKS

Accelerating Irregular Computation by Exploiting Hidden Structures
University of Victoria (November 2025 - Victoria, BC, Canada)

Dynamic Mesh Processing on the GPU
SIGGRAPH (August 2025 - Vancouver, Canada)
Highlights of Parallel Computing (July 2025 - Portland, Oregon)
Brown Visual Computing Seminar (October 2024 - Brown University)
Adobe (November 2023 - Virtual))

RXMesh: A High-performance Mesh Data Structure and Programming Model on the GPU
NVIDIA GTC (March 2022 - Virtual)

Neon: A Multi-GPU Programming Model for Grid-based Computations
NVIDIA GTC (March 2022 - Virtual)

RXMesh: A GPU Mesh Data Structure
SIGGRAPH (August 2021 - Virtual)

A Constrained Resampling Strategy for Mesh Improvement
ACM/Eurographics Symposium on Geometry Processing (July 2017 - London, UK)

MENTEES

Behrooz Zarebavani (Ph.D. Student, University of Toronto)
Project: Fast Sparse Matrix Permutation for Mesh-Based Direct Solvers

Anh Truong (Ph.D. Student, MIT) → First SIGGRAPH Asia paper
Project: Parameter-efficient Updates of Neural Fields using LoRA

Sachin Kishan (SGI Fellow) → Ph.D. Student at New York University
Project: GPU Geometric Multigrid on Triangle Mesh

Changcheng (Eric) Yuan (M.Sc. Student, UC Davis) → Ph.D. Student, Texas A&M University
Project: GPU Sparse Matrix Reordering

Brooke Dolny (Autodesk Research intern) → M.Sc. Student, University of Waterloo
Project: GPU-accelerated Lattice-Boltzmann Fluid Simulation

TEACHING

Accelerated Computing (6.S894)	<i>Fall 2024, Fall 2025</i>
MIT	
Guest Lecturer	
Control Systems I (EEC 157A)	<i>Fall 2017</i>
University of California, Davis	
Teaching Assistant	
Computer Programming (CS224)	<i>Fall 2015</i>
Alexandria University, Egypt	
Assistant Lecturer	
Ships and Machines Drawing (MR111)	<i>Fall 2015</i>
Alexandria University, Egypt	
Assistant Lecturer	
Fluid Mechanics (MR231)	<i>Fall 2015</i>
Alexandria University, Egypt	
Assistant Lecturer	
Fluid Mechanics and Hydraulic Machines (MR232)	<i>Spring 2014</i>
Alexandria University, Egypt	
Assistant Lecturer	
Marine Hydro-dynamics (OCE323)	<i>Spring 2014</i>
Alexandria University, Egypt	
Assistant Lecturer	
Theory of Machines (ME145)	<i>Spring 2014</i>
Alexandria University, Egypt	
Assistant Lecturer	
Material Technology (MR242)	<i>Fall 2013</i>
Alexandria University, Egypt	
Assistant Lecturer	
Marine Power Plants (MR352)	<i>Fall 2013</i>
Alexandria University, Egypt	
Assistant Lecturer	

ACADEMIC SERVICE

SIGGRAPH Technical Papers	<i>2026</i>
Committee Member	

SIGGRAPH Posters	2025, 2026
Juror	
MIT Summer Geometry Initiative	2025
Admission Committee and mentor	
New England Symposium on Graphics	2025, 2026
Organizing Committee	
ACM/Eurographics Symposium on Geometry Processing	2024, 2025
Technical Papers Committee	
MIT Summer Geometry Initiative	2024
Mentor	
High Performance Graphics	2024
International Paper Committee	
International Conference on Geometric Modeling and Processing	2023, 2024
Technical Program Committee	
ECE Peer Mentoring Program at UC Davis	2021, 2023
Mentor	
UC Davis SACNAS's Mentor Match Program	2023
Mentor	

REFeree SERVICE

ACM Transactions on Parallel Computing	2026
SIGGRAPH	2024, 2025
SIGGRAPH Asia	2024
Computers & Graphics	2024
Transactions on Visualization and Computer Graphics	2023
Eurographics	2023
Computer Aided Geometric Design	2022
The SIAM International Meshing Roundtable Workshop	2022, 2023, 2024
International Meshing Roundtable	2019, 2021
Computer-Aided Design	2019

MEDIA COVERAGE

Sandia LabNews	<i>April 2020</i>
Automating complex 3D modeling (webpage , pdf)	

REFERENCES

John D. Owens

Child Family Professor of Engineering and Entrepreneurship – University of California, Davis
jowens@ece.ucdavis.edu

Justin Solomon

Associate Professor – Massachusetts Institute of Technology
jsolomon@mit.edu

Jonathan Ragan-Kelley

Associate Professor – Massachusetts Institute of Technology

jrk@mit.edu

Mohamed S. Ebeida

Founder and CEO – Discretize. Previously, a Principal Member Of Technical Staff – Sandia National Laboratories

msebeida@gmail.com