

Ahmed H. Mahmoud

Curriculum Vitae

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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

June 2024

- Advisor: Professor John D. Owens
- Dissertation: Unstructured Geometric Data Processing on the GPU: Data Structures & Programming Models

University of California, Davis
M.Sc. in Electrical and Computer Engineering

September 2020

Alexandria University, Egypt
B.S. in Marine Engineering and Naval Architecture

May 2013

- Very good with honors—ranked first

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] *Low-Rank Adaptation of Neural Fields*
Anh Truong, **Ahmed H. Mahmoud**, Mina Konaković Luković, and Justin Solomon.
SIGGRAPH Asia 2025.
- [2] *Locality-Aware Automatic Differentiation on the GPU for Mesh-Based Computations*
Ahmed H. Mahmoud, Jonathan Ragan-Kelley, and Justin Solomon.
In submission (arXiv: 2509.00406).
- [3] *Dynamic Mesh Processing on the GPU*
Ahmed H. Mahmoud, Serban D. Porumbescu, and John D. Owens.
ACM Transactions on Graphics (SIGGRAPH 2021).
- [4] *Disaggregated Design for GPU-Based Volumetric Data Structures*
Massimiliano Meneghin and **Ahmed H. Mahmoud**.
European Conference on Parallel and Distributed Computing (EuroPar 2025)
- [5] *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
- [6] *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
- [7] *RXMesh: A GPU Mesh Data Structure*
Ahmed H. Mahmoud, Serban D. Porumbescu, and John D. Owens
ACM Transactions on Graphics (SIGGRAPH 2021)
- [8] *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)
- [9] *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)
- [10] *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
- [11] *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)
- [12] *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)
- [13] *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 Multi-variate Data Spaces (2014)

- [14] *Delaunay Quadrangulation by Two-coloring Vertices*
Scott A. Mitchell, Mohammed A. Mohammed, **Ahmed H. Mahmoud** and Mohamed S. Ebeida
International Meshing Roundtable (IMR 2014)
- [15] *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)
- [16] *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

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: Fast Sparse Matrix Reordering on GPU for Cholesky Based Solvers

Brooke Dolny (Autodesk Research intern) → M.Sc. Student, University of Waterloo

Project: GPU-accelerated Lattice-Boltzmann fluid simulation

TEACHING

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

ACADEMIC SERVICE

SIGGRAPH Posters Juror	<i>2025</i>
Summer Geometry Initiative Admission Committee and mentor	<i>2025</i>
New England Symposium on Graphics Organizing Committee	<i>2025</i>
ACM/Eurographics Symposium on Geometry Processing Technical Papers Committee	<i>2024, 2025</i>
Summer Geometry Initiative Mentor	<i>2024</i>
High Performance Graphics International Paper Committee	<i>2024</i>

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

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	April 2020
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

Principal Member Of Technical Staff – Sandia National Laboratories
msebeid@sandia.gov