

Ahmed H. Mahmoud

Curriculum Vitae

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RESEARCH EXPERIENCE

- Massachusetts Institute of Technology, CSAIL** *September 2024 – present*
Postdoctoral Associate
- Autodesk Research, Toronto, Canada** *November 2020 – May 2024*
Senior Research Scientist
- University of California, Davis** *Spring 2016 – October 2020*
Graduate Student Researcher
- Autodesk Research, Toronto, Canada** *June–December 2019, July – November 2020*
Intern, Numerical Analysis Research
- Shenzhen University, China** *June – September 2018*
Research intern at the Visual Computing Research Center

EDUCATION

- University of California, Davis** *June 2024*
Ph.D. in Electrical and Computer Engineering
– Advisor: Professor John D. Owens
– Dissertation: Unstructured Geometric Data Processing on the GPU: Data Structures & Programming Models
- University of California, Davis** *September 2020*
M.Sc. in Electrical and Computer Engineering
- Alexandria University, Egypt** *May 2013*
B.S. in Marine Engineering and Naval Architecture
– 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)
- [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

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

Fall 2024, Fall 2025

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

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

Justing Solomon

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

Jonathan Ragan-Kelley

Associate Professor – Massachusetts Institute of Technology
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Mohamed S. Ebeida

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