

# Ahmed H. Mahmoud

*Curriculum Vitae*

<https://ahdhn.github.io>  
D475-32 Vassar Street  
Cambridge, MA 02139  
ahdhn@mit.edu  
a.has.mahmoud@gmail.com  
(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

September 2020

**Alexandria University, Egypt**  
B.S. in Marine Engineering and Naval Architecture  
– Very good with honors—ranked first

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] *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 2025).
- [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<sup>†</sup>, **Ahmed H. Mahmoud**<sup>†</sup>, Pradeep Kumar Jayaraman, and Nigel J. W. Morris.  
International Parallel and Distributed Processing Symposium (IPDPS 2022)  
<sup>†</sup> 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<sup>†</sup>, **Ahmed H. Mahmoud**<sup>†</sup> 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)  
<sup>†</sup> 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 Multivariate 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**

---

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

## **ACADEMIC SERVICE**

---

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

---

|  |                  |
|--|------------------|
| <b>SIGGRAPH</b>  | 2024, 2025       |
| <b>SIGGRAPH Asia</b>                                       | 2024             |
| <b>Computers &amp; Graphics</b>                            | 2024             |
| <b>Transactions on Visualization and Computer Graphics</b> | 2023             |
| <b>Eurographics</b>  | 2023             |
| <b>Computer Aided Geometric Design</b>                     | 2022             |
| <b>The SIAM International Meshing Roundtable Workshop</b>  | 2022, 2023, 2024 |
| <b>International Meshing Roundtable</b>                    | 2019, 2021       |
| <b>Computer-Aided Design</b>                               | 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*