

# Ahmed H. Mahmoud

*Curriculum Vitae*

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## RESEARCH EXPERIENCE

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- 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

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- University of California, Davis** *Spring 2024*  
Ph.D. in Electrical and Computer Engineering  
– Advisor: Prof. John D. Owens  
– Dissertation: Unstructured Geometric Data Processing on the GPU: Data Structures & Programming Models
- University of California, Davis** *Fall 2020*  
M.Sc. in Electrical and Computer Engineering
- Alexandria University, Egypt** *Spring 2013*  
B.S. in Marine Engineering and Naval Architecture  
– Very good with honors—ranked first

## PUBLICATIONS

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- [1] *Low-Rank Adaptation of Neural Fields*  
Anh Truong, **Ahmed H. Mahmoud**, Mina Konaković Luković, and Justin Solomon.  
To appear in ACM Transactions on Graphics (SIGGRAPH Asia 2025).
- [2] *Locality-Aware Automatic Differentiation on the GPU for Mesh-Based Computations*  
**Ahmed H. Mahmoud**, Jonathan Ragan-Kelley, and Justin Solomon.  
Under review
- [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<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 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.

## FUNDING

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- [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  
**Note: I am the primary author of the technical description of this grant**
- [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  
**Note: I am the primary author of the technical description of this grant**

## PATENTS

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- [1] *Optimized GPU Implementation of Grid Refinement in the Lattice Boltzmann Method*  
**Ahmed H. Mahmoud**, Hesam Salehipour, and Massimiliano Meneghin  
Filed on January 29, 2005 by Autodesk, Inc.

## TALKS

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**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)

## TEACHING

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<b>Accelerated Computing (6.S894)</b> MIT Guest Lecturer	<i>Fall 2024</i>
<b>Control Systems I (EECS 157A)</b> University of California, Davis Teaching Assistant	<i>Fall 2017</i>
<b>Computer Programming (CS224)</b> Alexandria University, Egypt Assistant Lecturer	<i>Fall 2015</i>

<b>Ships and Machines Drawing (MR111)</b> Alexandria University, Egypt Assistant Lecturer	<i>Fall 2015</i>
<b>Fluid Mechanics (MR231)</b> Alexandria University, Egypt Assistant Lecturer	<i>Fall 2015</i>
<b>Fluid Mechanics and Hydraulic Machines (MR232)</b> Alexandria University, Egypt Assistant Lecturer	<i>Spring 2014</i>
<b>Marine Hydro-dynamics (OCE323)</b> Alexandria University, Egypt Assistant Lecturer	<i>Spring 2014</i>
<b>Theory of Machines (ME145)</b> Alexandria University, Egypt Assistant Lecturer	<i>Spring 2014</i>
<b>Material Technology (MR242)</b> Alexandria University, Egypt Assistant Lecturer	<i>Fall 2013</i>
<b>Marine Power Plants (MR352)</b> Alexandria University, Egypt Assistant Lecturer	<i>Fall 2013</i>

## ACADEMIC SERVICE

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

## REFEREE SERVICE

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<b>SIGGRAPH</b>	2024, 2025
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<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

## MENTEES

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Anh Truong (Ph.D. Student, MIT) → First SIGGRAPH Asia paper  
 Sachin Kishan (SGI Fellow) → Ph.D. Student at New York University  
 Changcheng (Eric) Yuan (M.Sc. Student, UC Davis) → Ph.D. Student, Texas A&M University  
 Brooke Dolny (Autodesk Research intern) → M.Sc. Student, University of Waterloo

## MEDIA COVERAGE

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**Sandia LabNews** *April 2020*  
 Automating complex 3D modeling ([webpage](#), [pdf](#))

## REFERENCES

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### John D. Owens

Child Family Professor of Engineering and Entrepreneurship – University of California, Davis  
[jowens@ece.ucdavis.edu](mailto:jowens@ece.ucdavis.edu)

### Justing Solomon

Associate Professor – Massachusetts Institute of Technology  
[jsolomon@mit.edu](mailto:jsolomon@mit.edu)

### Jonathan Ragan-Kelley

Associate Professor – Massachusetts Institute of Technology  
[jrk@mit.edu](mailto:jrk@mit.edu)

### Mohamed S. Ebeida

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