Ahmed H. Mahmoud

CONTACT INFORMATION

Mobile: (530)-574-0901
E-mail: a.has.mahmoud@gmail.com
Website: ahdhn.github.io
Address: 32 Vassar Street, Room 32-D475 Cambridge, MA 02139

RESEARCH INTERESTS

Parallel computing, geometric data processing, 3D graphics, programming models, data structures, and simulation

EDUCATION

University of California, Davis, USA

Ph.D. in Electrical and Computer Engineering, (Spring 2024)
- Advisor: Prof. John D. Owens
- Dissertation: Unstructured Geometric Data Processing on the GPU: Data Structures & Programming Models

University of California, Davis, USA

M.Sc. in Electrical and Computer Engineering, (Fall 2020)

Alexandria University, Egypt

B.S. in Marine Engineering and Naval Architecture, (Spring 2013)
- Very good with honors—ranked first

RESEARCH EXPERIENCE

MIT CSAIL, Cambridge, MA (September 2024 - Present)

Postdoctoral Associate

Autodesk Research, Toronto, Canada (November 2020 - May 2024)

Senior Research Scientist

University of California, Davis, California, USA (Spring 2016 - October 2020)

Graduate Student Researcher

Autodesk Research, Toronto, Canada (June - December 2019, July - November 2020)

Intern, Numerical Analysis Research

Shenzhen University, Shenzhen, China (June 2018 - September 2018)

Research intern at the Visual Computing Research Center

REFEREED PUBLICATIONS

[1] **Ahmed H. Mahmoud**, Serban D. Porumbescu, and John D. Owens. *Dynamic Mesh Processing on the GPU*.

[2] **Ahmed H. Mahmoud**, Hesam Salehipour, and Massimiliano Meneghin. *Optimized GPU implementation of grid refinement in lattice Boltzmann method*. In Proceedings of the 38th IEEE International Parallel and Distributed Processing Symposium, IPDPS 2024, May 2024.

[3] Massimiliano Meneghin[†], **Ahmed H. Mahmoud**[†], Pradeep Kumar Jayaraman, and Nigel J. W. Morris. *Neon: A Multi-GPU Programming Model for Grid-based Computations*. In Proceedings of the 36th IEEE International Parallel and Distributed Processing Symposium, IPDPS 2022, June 2022.
[†] joint first author.

[4] **Ahmed H. Mahmoud**, Serban D. Porumbescu, and John D. Owens. *RXMesh: A GPU Mesh Data Structure*. ACM Transactions on Graphics, 40(4):104:1–104:16, August 2021 (SIGGRAPH 2021).

[5] Ahmed Abdelkader, Chandrajit L. Bajaj, Mohamed S. Ebeida, **Ahmed H. Mahmoud**, Scott A. Mitchell, John D. Owens and Ahmad A. Rushdi. *VoroCrust: Voronoi Meshing Without Clipping*. ACM Transactions on Graphics, 39(3):23:1–23:16, May 2020 (SIGGRAPH 2020).

[6] Ahmed Abdelkader, Chandrajit L. Bajaj, Mohamed S. Ebeida, **Ahmed H. Mahmoud**, Scott A. Mitchell, John D. Owens and Ahmad A. Rushdi. *Sampling Conditions for Conforming Voronoi Meshing by the VoroCrust Algorithm*. In Bettina Speckmann and Csaba D. Tóth, editors, 34th International Symposium on Computational Geometry (SoCG 2018), volume 99 of Leibniz International Proceedings in Informatics (LIPIcs), pages 1:1-1:16, Dagstuhl, Germany, June 2018. Schloss Dagstuhl-Leibniz-Zentrum für Informatik.

[7] Ahmed Abdelkader[†], **Ahmed H. Mahmoud**[†] Ahmad A. Rushdi, Scott A. Mitchell, John D. Owens, and Mohamed S. Ebeida. *A Constrained Resampling Strategy for Mesh Improvement*. Computer Graphics Forum, 36(5):189-201, July 2017. Proceedings of the Symposium on Geometry Processing.
[†] joint first author.

[8] Ahmad A. Rushdi, Scott A. Mitchell, **Ahmed H. Mahmoud**, Chandrajit L. Bajaj, and Mohamed S. Ebeida. *All-Quad Meshing without Cleanup*. Computer-Aided Design, 85:83-98, April 2017.

[9] Mohamed S. Ebeida, Ahmad Rushdi, Muhammad A. Awad, **Ahmed H. Mahmoud**, Dongming Yan, Shawn English, John D. Owens, Chandrajit Bajaj, and Scott A. Mitchell. *Disk Density Tuning of a Maximal Random Packing*. Computer Graphics Forum, 35(5):256-269, June 2016. Proceedings of the Symposium on Geometry Processing.

[10] Mohamed S. Ebeida, Scott A. Mitchell, Anjul Patney, Andrew A. Davidson, Stanley Tzeng, Muhammad A. Awad, **Ahmed H. Mahmoud**, and John D. Owens. *Exercises in High-Dimensional Sampling: Maximal Poisson-disk Sampling and k-d Darts*. In Janine Bennett, Fabien Vivodtzev, and Valerio Pascucci, editors, Topological and Statistical Methods for Complex Data: Tackling Large-Scale, High-Dimensional, and Multivariate Data Spaces, pages 221-238. Springer, November 2014.

[11] Scott A. Mitchell, Mohammed A. Mohammed, **Ahmed H. Mahmoud** and Mohamed S. Ebeida. *Delaunay Quadrangulation by Two-coloring Vertices*. Procedia Engineering, 82:364-376, October 2014. Proceedings of the 23rd International Meshing Roundtable.

[12] Mohamed S. Ebeida, Muhammad A. Awad, Xiaoyin Ge, **Ahmed H. Mahmoud**, Scott A. Mitchell, Patrick M. Knupp, and Li-Yi Wei. *Improving Spatial Coverage while Preserving the Blue Noise of Point Sets*. Computer-Aided Design, 46:25-36, January 2014. Proceedings of 2013 SIAM Conference on Geometric and Physical Modeling, SIAM GD/SPM13.

[13] Mohamed S. Ebeida, **Ahmed H. Mahmoud**, Muhammad A. Awad, Mohammed A. Mohammed, Scott A. Mitchell, Alex Rand, and John D. Owens. *Sifted Disks*. Computer Graphics Forum, 32(2):509-518, May 2013. Proceedings Eurographics 2013.

TALKS   **Brown Visual Computing Seminar**, Brown University (October 2024)

Unstructured Mesh Processing on the GPU

Adobe, Virtual (November 2023)

Unstructured Mesh Processing on the GPU

NVIDIA GTC, Virtual (March 2022)

RXMesh: A High-performance Mesh Data Structure and Programming Model on the GPU

NVIDIA GTC, Virtual (March 2022)

Neon: A Multi-GPU Programming Model for Grid-based Computations

ACM SIGGRAPH, Virtual (August 2021)

RXMesh: A GPU Mesh Data Structure

ACM SIGGRAPH, Virtual (August 2020)

VoroCrust: Voronoi Meshing Without Clipping

Symposium on Geometry Processing, London, UK (July 2017)

A Constrained Resampling Strategy for Mesh Improvement

TEACHING   **Course 6.S894 on Accelerated Computing**, MIT (Fall 2024)

Guest lecturer

SERVICE   **Paper Committee**

Eurographics Symposium on Geometry Processing (SGP) (2024), High Performance Graphics (HPG) (2024), and International Conference on Geometric Modeling and Processing (GMP) (2023, 2024)

Reviewer

SIGGRAPH Asia (2024), SIGGRAPH (2024), Computers & Graphics (2024), Transactions on Visualization and Computer Graphics (TVCG) (2023), Eurographics (2023), Computer Aided Geometric Design (CAGD) (2022), The SIAM International Meshing Roundtable Workshop (2022, 2023, 2024), International Meshing Roundtable (2019, 2021), and Computer-Aided Design (CAD) (2019)

Mentor

Summer Geometry Initiative (2024)
ECE Peer Mentoring Program (2021, 2023)
UCD SACNAS's Mentor Match Program (2023)

MEDIA COVERAGE   **Sandia LabNews**   **April 2020**
Automating complex 3D modeling[webpage, pdf]

TEACHING
ASSISTANTSHIPS   **University of California, Davis**   **Fall 2017**
Courses: Control Systems I (EEC 157A).

Alexandria University   **December 2014 - January 2016**
Courses: Computer Programming (CS224), Ships and Machines Drawing (MR111), Fluid Mechanics (MR231), Fluid Mechanics and Hydraulic Machines (MR232), Marine Hydrodynamics (OCE323), Theory of Machines (ME145), Material Technology (MR242), Marine Power Plants (MR352).

TECHNICAL
SKILLS   C/C++, CUDA, CMake, Git, LaTeX, OpenGL, Python, MATLAB.