

Haley Duba Sullivan

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EDUCATION

Ph.D. Mathematics, *Purdue University*, West Lafayette, IN Exp. May 2026

- Computational Interdisciplinary Graduate Program: Computational Science and Engineering
- GPA: 4.0/4.0

M.S. Mathematics, *Purdue University*, West Lafayette, IN May 2023

- GPA: 4.0/4.0

B.S. Mathematics; Minor Computer Science, *Wheaton College*, Wheaton, IL May 2020

- Major GPA: 3.82/4.0

Budapest Semesters of Mathematics Participant, Budapest, Hungary Fall Semester 2019

- Study abroad opportunity in which upper-level mathematics courses are taught by instructors from Eötvös University, the Mathematical Institute of the Hungarian Academy of Sciences, and Budapest University of Technology and Economics, institutions known for educating more than half of Hungary's highly acclaimed mathematicians.

PROFESSIONAL POSITIONS

Junior Data Scientist, *Oak Ridge National Lab*, Oak Ridge, TN Aug 2023 – present

Radar and Computational Imaging Group, National Security Sciences Directorate

- Develop, refine, and deploy novel algorithms for solving inverse problems in computational imaging of various image modalities with a focus on artificial intelligence/machine learning
- Engage with multidisciplinary teams, including partnerships with academic institutions, to drive forward imaging innovations that support national security and scientific research goals
- Create and contribute to proposals which attract new sponsors and collaborators, ensuring continued support for research initiatives in imaging, artificial intelligence, and high-performance computing
- Regularly publish findings through technical reports, conference presentations, and peer-reviewed journal publications, contributing to the broader scientific community and supporting ORNL's research objectives in advancing imaging technologies

Graduate Research Summer Intern, *Oak Ridge National Lab*, Oak Ridge, TN May – Aug 2023

Cyber Identity and Biometrics Group, National Security Sciences Directorate

- Developed residual-based method for super-resolution of multispectral images that outperforms state-of-the-art methods both in performance and speed
- Authored journal paper outlining our developed super-resolution method

Research Assistant, *Purdue University*, West Lafayette, IN May – August 2021 / Jan 2022 – May 2023

- Worked on extending methods of image super-resolution to multispectral imagery
- Advised by Dr. Gregory Buzzard (Mathematics Department, Purdue), Dr. Charles Bouman (Electrical Computer Engineering Department, Purdue), and Dr. Sophie Voisin (Augmented Analyst Intelligence group, ORNL)

Mathematics Research Experience for Undergraduate Participant, *Iowa State University*, Ames, IO May – Aug 2019

- Developed mathematical research experience through investigating the Distributed Kaczmarz Algorithm as an extension of previous publications by faculty mentor Dr. Eric Weber
- Collaborated daily with three other undergraduate participants, as well as faculty mentor and numerous PhD student mentors, both in mathematical research and co-authoring two papers documenting our results

Summer Intern, *General Dynamics Electric Boat*, New London, CT May – Aug 2018

- Utilized MATLAB and Simulink to produce formal engineering calculations based on prior reports, outlining and analyzing results from key submarine elements to be sent to the U.S. Navy for implementation

- Distilled complex engineering concepts into functional knowledge by initiating conversation, researching best practices, and reading relevant scholarly literature to meet and surpass project expectations

ACADEMIC POSITIONS

Teaching Assistant, *Purdue University*, West Lafayette, IN Aug 2020 – May 2021 / Aug – Dec 2021
Plane Analytic Geometry and Calculus II

- Solidified students' understanding of course material through instructing recitation sessions and writing quizzes

Teaching Assistant, *Wheaton College*, Wheaton, IL Jan – Dec 2017 / Jan – May 2019
Discrete Mathematics and Functional Programming/Calculus I

- Assisted students through facilitating small group study sessions for two hours per week
- Developed organizational skills and professional discretion through grading assignments completed by peers

Teaching Assistant, *Adventures with Mr. Math*, Oakbrook, IL Aug 2017 – May 2018

- Managed classroom of gifted students ranging from 1st to 8th grade fostering a welcoming and safe atmosphere
- Facilitated group work between students during class, and offered one-on-one instruction after class
- Constructed curricula to challenge students to grow as mathematicians, specifically in competition math

HONORS AND AWARDS

- Supplemental Performance Award (*Oak Ridge National Laboratory*) Jul 2024
- Kunze Scholarship (*Purdue University*) Aug 2020
- Honorable Mention Student Poster (*JMM 2020*) Jan 2020
- Bonnie Brabenec Memorial Scholarship (*Wheaton College*) Aug 2019
- Charles Blanchard Award (*Wheaton College*) Aug 2016

JOURNAL PUBLICATIONS

- Duba-Sullivan, H., Reid, E. J., Voisin, S., Bouman, C. A., Buzzard, G. T. *ResSR: A Residual Approach to Super-Resolving Multispectral Images*, submitted August 2024.
- Khristy, J., Sullivan, H. D., Karnowski, T., Moresco, P., and Jodoin, V. *Physical Feature Extraction and Yield Estimation via Image Segmentation of Nuclear Cloud Films*, submitted June 2024.
- Lloyd, C., Moresco, P., Karnowski, T., Jodoin, V., Khristy, J., Sullivan, H. *Automated Nuclear Cloud Feature Extraction*, submitted April 2024.
- Borgard, R., Duba, H., Harding, S., Makdad, C., Mayfield, J., Tuggle, R., and Weber, E. *Accelerating the Distributed Kaczmarz Algorithm by Strong Over-relaxation*, *Linear Algebra and its Applications*, vol. 611 (2021), 334-355.

CONFERENCE PROCEEDINGS

- Duba-Sullivan, H., Rahman, O., Venkatakrishnan, S., Ziabari, A. *2.5D Super-Resolution Approaches for X-ray Computed Tomography-based Inspection of Additively Manufactured Parts*, to appear in 2024 Asilomar Conference on Signals, Systems, and Computers.

PRESENTATIONS

- Invited speaker for 2025 Electronic Imaging Conference Feb 2025
- Invited speaker for 2025 Joint Mathematics Meetings Jan 2025
- Accepted poster for 2024 Asilomar Conference on Signals, Systems, and Computers Oct 2024
- Accepted speaker for 2024 International Conference on Advanced Manufacturing Oct 2024
- Presented poster for 2024 National Security Sciences Directorate Scientific Advisory Board Oct 2024
- Accepted speaker for 2024 Signal Processing for Nonproliferation Workshop Aug 2024
- Presented poster at 2024 ORNL MDF Innovation Day May 2024
- Accepted speaker for 2024 DTRIAC Film Working Group Technical Interchange Meeting Apr 2024

- Presented poster for 2024 National Security Sciences Directorate Scientific Advisory Board Feb 2024
- Presentation at Purdue Student Colloquium Feb 2023
- Accepted speaker at 2020 Joint Mathematics Meetings Jan 2020
- Presented poster at 2020 Joint Mathematics Meetings Jan 2020

TECHNICAL SKILLS

- Known Programming Languages: Python (Pytorch and Tensorflow), MATLAB, C, Java
- Known Software: Git, LaTeX, Simulink, Excel
- Background: machine learning, computer vision, computational imaging, image processing, remote sensing imagery, super-resolution, and optimization

LEADERSHIP AND SERVICE

tnAchieves, Clinton, TN Jan 2025 – present

- Mentor high school seniors through their transition to college by ensuring that they meet college enrollment requirements and proactively supporting them through earning their secondary degree

Hour of Code, Oak Ridge, TN Dec 2024

- Delivered engaging and accessible coding workshops to elementary schoolers during the global Hour of Code initiative
- Taught fundamental programming concepts, including loops and functions, using interactive tools and activities tailored to beginner levels

Oak Ridge Computer Science Girls Volunteer, Oak Ridge, TN Jul 2024 – present

- Support ORCSGirls' mission to empower future careers for young women in East Tennessee and beyond by volunteering with engaging learning events, including events focused on fractals, cookies, and JavaScript
- Mentor girls one-on-one during coding exercises, fostering critical thinking and problem-solving skills

Women in Science Program Leadership Team, *Purdue University*, West Lafayette, IN Aug 2021 – May 2023

- Organize events focused on encouraging diversity in STEM fields and developing necessary skills for success in STEM graduate programs

Academic Mentor, *Marian Park Apartments*, Wheaton, IL Aug 2016 – May 2017

- Supported multiple high school students in various academic subjects, including mathematics, reading, and writing
- Developed positive academic and lifestyle habits in students and motivated them in future aspirations