Shaden Alshammari

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Education

Massachusetts Institute of Technology (MIT) — Cambridge, MA

PhD. in Electrical Engineering and Computer Science — Sep. 2025 – Jun. 2029
Advisor: Prof. Antonio Torralba and Prof. William T. Freeman

M.Eng. in Computer Science and Engineering — Sep. 2023 – Jun. 2025
Advisor: Prof. William T. Freeman - GPA: 5.0/5.0
Awarded Research and Teaching Assistantships (total value of $230,000)

B.S. in Computer Science and Engineering & Mathematics — Sep. 2019 – Jun. 2023
GPA: 5.0/5.0

Technical Skills

Domains in Deep Learning Computer Vision, Natural Language Processing (NLP), Robotics, Health Applications
Subdomains Self-Supervised Learning, Imbalanced Learning, Vision Language Models, Generative Models, Networks
Languages Python, Julia, MATLAB, Java, JavaScript, C, LaTeX.
Frameworks PyTorch, TensorFlow, Keras, Scikit-learn, OpenCV, CUDA, Microsoft Azure, AWS.

Research Experience

MIT Computer Science & Artificial Intelligence Laboratory (CSAIL) — **Sep. 2023 – present**
Research Assistant with Prof. William T. Freeman - [website, GitHub, paper] — *Cambridge, MA*

- Introduced a general framework for representation learning methods, achieving state-of-the-art results on unsupervised clustering benchmarks such as ImageNet 1K.

MIT Sloan School of Management — **Mar. 2022 - May 2022**
Research Assistant w. Prof. Abdullah Almaatouq — *Cambridge, MA*

- Developed predictive models to forecast trends using machine learning, enhancing robustness to new data and variables with dimensionality reduction for improved accuracy.
- Built a statistical pipeline to translate survey data into insights, visually summarizing key properties to guide business leaders in data-driven decisions.

Robotics Institute - Carnegie Mellon University (CMU) — **Jun. 2022 – Aug. 2022**
Research Intern with Prof. Victoria Dean and Prof. Abhinav Gupta [abstract, poster] — *Pittsburgh, PA*

- Led a project on using contact microphones for robot manipulation instead of regualr microphone, reducing reliance on visual data and improving accuracy in tasks.
- Collaborated with cross-functional teams to implement algorithms on robotic systems (Franka arm, Piezo microphones) to demonstrate results.

CMU Argo AI Center for Autonomous Vehicle Research — **Jun. 2021 – Mar. 2022**
Research Intern with Prof. Deva Ramanan - [GitHub, poster, paper] — *virtual*

- Developed weight-balancing techniques to address long-tailed class distributions, boosting model accuracy by up to 20% on benchmarks like iNaturalist 2018, ImageNet-LT, and CIFAR100-LT. These techniques can seamlessly integrate with existing long-tailed recognition (LTR) methods to enhance performance.
- Published findings at CVPR, including a comprehensive open-source tutorial that received 100+ stars on GitHub and accumulated over 200 citations. Our approach demonstrated effectiveness in improving class balance in real-world scenarios, such as species classification and visual recognition in autonomous driving.

Harvard-MIT Health Sciences and Technology — **Jan. 2021– May 2021**
Undergraduate Researcher with Dr. Li-wei Lehman — *virtual*

- Developed gradient-based models for delayed linear dynamical systems (dLDS), achieving lower error rates compared to traditional analytical methods for dLDS approximations.

Teaching Experience

MIT Department of Mathematics **Sep. 2022 – Dec. 2024**
Lead Instructor-Graduate for Linear Algebra and Optimization (18.C06) *Cambridge, MA*

- Taught two weekly recitations, simplifying complex concepts through interactive sessions for a class of 38 students. Developed structured handouts and problem sets for over 180 students.
- Led a team of five TAs and three Grader, coordinating course support and standardizing grading for consistency.
- Earned a 6.9/7.0 teaching rating and was nominated for the Teaching Awards based on student feedback.

MIT Department of Electrical Engineering and Computer Science (EECS) **Jan. 2024 – May 2024**
Teaching Assistant for Introduction to Machine Learning (6.036) *Cambridge, MA*

- Worked with a team of seven professors and lecturers to organize technical materials on various ML topics.
- Conducted weekly recitations and lab sessions, and hosted office hours to support student learning.

Leadership & Mentorship

Undergraduate Research Mentor, MIT UROP **2025 – Present**
Supervised two MIT undergraduate researchers on projects in computer vision and deep learning: *Cambridge, MA*

- Project 1: Leveraging Linear RNNs for efficient visual understanding of images and video.
- Project 2: Utilizing synthetic datasets generated by procedural programs as image priors.

Onsite Coordinator, Open World Vision Workshop @ CVPR **Jun. 2022**
Managed onsite logistics, speaker coordination, and attendee engagement *New Orleans, LA*

Deputy Leader, European Girls' Mathematical Olympiad (EGMO) **2019–2023**
Represented and supported the national delegation during international competitions *Ukraine*

Observer, International Mathematical Olympiad (IMO) **2019–2023**
Participated in delegation support and international coordination during IMO events *UK and Japan*

Publications

[1] **A Unifying Framework for Representation Learning**
Shaden Alshammari, Mark Hamilton, A. Feldmann, John Hershey, William T. Freeman.
International Conference on Learning Representations (ICLR), 2025.

[2] **Long-tailed Recognition via Weight Balancing**
Shaden Alshammari, Yu-Xiong Wang, Deva Ramanan, Shu Kong.
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2022. **(+200 citations)**

[3] **Vision-Language Models Do Not Understand Negation**
Kumail Alhamoud, **Shaden Alshammari**, Yonglong Tian, Philip Torr, Yoon Kim, Marzyeh Ghassemi
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2025.

[4] **Using Contact Microphones for Robot Manipulation**
Shaden Alshammari, Victoria Dean, Tess Hellebrekers, Pedro Morgado, Abhinav Gupta.
Women in Machine Learning Workshop at NeurIPS, 2022.

[5] **Continual Long-Tailed Recognition Framework**
Yanan Li, **Shaden Alshammari**, Bin Liu, Shu Kong
Preprint.

Scholarships and Fellowships

The Schwarzman College of Computing Fellowship for Ph.D. ($120,000)	2025 - 2026	International
Stanford Edge and SAIL Fellowships for Ph.D. ($127,000)	2025 (declined)	International
Princeton Gordon Wu Fellowship for Ph.D. ($123,000)	2025 (declined)	International

Awards and Honors

Bronze Medal at the International Mathematical Olympiad (IMO)	2017	International
Gold Medal at the European Girls Mathematical Olympiad (EGMO)	2017	International
Gold Medal at the Balkan Mathematical Olympiad (BMO)	2016	International
Honorable mentions from the American Mathematical Society presented at Intel ISEF	2016	International