ALLEN TU

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EDUCATION

University of Maryland, College Park   College Park, MD
Ph.D. in Computer Science   *January 2025 – May 2027 (Expected)*

- Advised by Professor Tom Goldstein, 4.00 GPA

University of Maryland, College Park   College Park, MD
M.S. in Computer Science   *August 2023 – December 2024*

- Advised by Professor Tom Goldstein, 3.84 GPA

University of Maryland, College Park   College Park, MD
B.S. in Computer Science, Minor in Statistics   *August 2019 – December 2022*

- National Merit Scholarship Winner
- President's Scholarship, 3.89 GPA

WORK EXPERIENCE

Graduate Research Assistant   College Park, MD
University of Maryland Institute of Advanced Computer Studies   *September 2023 – Present*

- Researching novel view synthesis under Prof. Tom Goldstein, Prof. Matthias Zwicker, Prof. Abhinav Shrivastava, and Prof. Rama Chellappa for IARPA Walkthrough Rendering of Images from Varying Altitude (WRIVA)
- Published three state-of-the-art approaches for vastly improving the rendering speed, model size, and training time of static and dynamic 3D Gaussian Splatting (3D-GS) while retaining visual fidelity [1, 2, 3]
- Developing large artifact datasets, diffusion model priors (Stable Video Diffusion, CAT3D, Diffix3D+), and uncertainty quantification techniques for 3D-GS and Neural Radiance Fields (NeRF)
- Enabled on-device 3D-GS rasterization with the Meta Quest 3, probed the memory efficiency of large language models (LLMs) via memorization, and implemented mixture-of-experts (MOE) heads for large vision encoders

Computer Vision Research Intern   Arlington, VA
Systems & Technology Research   *May 2025 – Present*

- Researching face, body, and gait recognition under Dr. Josh Gleason, Dr. Jennifer Xu, Prof. Vishal Patel, and Prof. Rama Chellappa for IARPA Biometric Recognition and Identification at Altitude and Range (BRIAR)
- Creating biometric recognizability prediction algorithms for face, body, and gait recognition models

Computer Vision Research Intern   Arlington, VA
Systems & Technology Research   *May 2024 – August 2024*

- Researched face recognition under Dr. Jennifer Xu, Dr. Nathan Shnidman, Prof. Vishal Patel, and Prof. Rama Chellappa for IARPA Biometric Recognition and Identification at Altitude and Range (BRIAR)
- Created a face chip quality estimator that achieved 0.8534 correlation with probe-to-gallery feature cosine similarities in early experiments by distilling a SWIN vision transformer
- Prototyped a network that clusters and aggregates video frame features to improve the performance of the state-of-the-art face recognition system by an empirical upper bound of 11.54%
- Implemented detection quality filtering and loss functions for face encoder training and evaluation

Computer Vision Research Co-op   Arlington, VA
Systems & Technology Research   *January 2023 – August 2023*

- Researched face recognition and multimodal fusion under Noam Eshed, Dr. Nathan Shnidman, Prof. Vishal Patel, and Prof. Rama Chellappa for IARPA Biometric Recognition and Identification at Altitude and Range (BRIAR)
- Created a mixed voting model ensembling approach that boosted open search performance by 24.24% for face recognition, 39.18% for body recognition, and 49.10% for multimodal fusion
- Developed a self-supervised Barlow Twins network for training face recognition models to be invariant to operating conditions and raised rank-1 accuracy by over 52.10%
- Improved system performance by training face encoders with hard examples, implementing pose-aware feature template compilation algorithms, and filtering detections with no-reference image quality estimation

Undergraduate Researcher   College Park, MD
University of Maryland Department of Computer Science   *January 2021 – December 2022*

- Designed a technique for controlling generative adversarial network (GAN) output quality and a human study to evaluate the alignment of metrics for generative models like FID with human judgment under Prof. Tom Goldstein
- Implemented a GAN that synthesizes a video of a realistic talking head given a face image and corresponding speech audio clip under Dr. Raymond Tu (no relation) [Poster]
- Identified behavioral trends of data analysts through a statistical analysis of 2.3 million dataset-visualization pairs in the Plotly Community Feed under Prof. Dave Levin and Prof. Leilani Battle [arXiv:2203.04937]

Computer Vision Research Intern   Woburn, MA
Systems & Technology Research   *June 2022 – August 2022*

- Researched body recognition under Matt Meyn, Dr. Mark Keck, and Prof. Rama Chellappa for IARPA Biometric Recognition and Identification at Altitude and Range (BRIAR)
- Created a 3D reclothing approach that trains whole-body recognition models to be invariant to clothing changes by realistically transferring garments between multiple subjects in the training data
- Fused dense human pose estimation, GAN-based novel view synthesis, semantic segmentation, and inpainting to produce reclothed image distributions that achieve an FID of 12.93 while preserving identity biometrics

Software Engineering Intern   Wilmington, NC
nCino, Inc.   *June 2021 – August 2021*

- Fulfilled bug and feature tickets across 3 nCino Cloud Bank Operating System data integration packages using Java, JavaScript, and SQL
- Securely integrated the Salesforce platform with 5 partner credit, loan, and insurance services using Informatica, REST, and SOAP
- Implemented regression testing suites with 100% coverage for 9 packages

PUBLICATIONS

1. **Allen Tu***, H. Ying*, A. Hanson, Y. Lee, T. Goldstein, and M. Zwicker, 'Speedy Deformable 3D Gaussian Splatting: Fast Rendering and Compression of Dynamic Scenes', *arXiv preprint arXiv:2506.07917*, 2025.

2. A. Hanson, **Allen Tu**, G. Lin, V. Singla, M. Zwicker, and T. Goldstein, 'Speedy-Splat: Fast 3D Gaussian Splatting with Sparse Pixels and Sparse Primitives', in *Proceedings of the Computer Vision and Pattern Recognition Conference (CVPR)*, 2025, pp. 21537–21546.

3. A. Hanson*, **Allen Tu***, V. Singla, M. Jayawardhana, M. Zwicker, and T. Goldstein, 'PUP 3D-GS: Principled Uncertainty Pruning for 3D Gaussian Splatting', in *Proceedings of the Computer Vision and Pattern Recognition Conference (CVPR)*, 2025, pp. 5949–5958.

* denotes equal contribution

Teaching Experience

Peer Research Mentor (Capital One Machine Learning) College Park, MD
First Year Innovation and Research Experience *January 2021 – December 2022*
- Mentored 2 cohorts of 80 students in a 3-semester introduction to machine learning research experience that is accessible to freshmen from all backgrounds under Dr. Raymond Tu (no relation)
- Produced project-based coursework, created code tutorials, tutored students during office hours, graded assignments, and taught classes on peer-reviewed machine learning publications
- Guided scrum teams of 3-6 students to choose a research problem, conduct a literature review, design and implement a machine learning network, and then release their project with pretrained weights on [GitHub]
- Presented posters for machine learning text-to-audio generation, image super-resolution, and face attribute classification at the 2021 and 2022 FIRE Summits

Technical Skills

Languages: Python, CUDA, C/C#/C++, Shell, Java, SQL, MATLAB, SAS, R, OCaml, Ruby, JavaScript, HTML

Libraries: PyTorch, TensorFlow, NumPy, SciPy, scikit-learn, Matplotlib, OpenCV, pandas, NerfStudio, Unity, OpenGL

Selected Graduate Coursework: Advanced Computer Graphics, Advances in XR, Computational Geometry, Foundations of Deep Learning, Physically-based Modeling, Simulation and Animation, Natural Language Processing, Interactive Technologies in Human-Computer Interaction

Selected Undergraduate Coursework: Advanced Data Structures, Applications of Linear Algebra, Applied Probability and Statistics, Capstone in Machine Learning, Computer Vision, Database Design, Design and Analysis of Algorithms, Introduction to Data Science, Introduction to Machine Learning, Introduction to Parallel Computing, Introduction to Probability Theory, Introduction to Statistical Computation, Programming Language Technologies and Paradigms, Programming Handheld Systems (Android)