

# Tyler LaBonte

Ph.D. Student  
Georgia Institute of Technology  
School of Industrial & Systems Engineering  
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## Research Interests

I am interested in foundational aspects of **generalization in machine learning**. My research goal is to advance our scientific and mathematical understanding of deep learning and leverage theoretical insights to design practical algorithms. My current focus includes:

- Generalization theory of neural networks and feature learning
- Robustness under distribution shift, task shift, and spurious correlations
- Reasoning capabilities of large-scale vision and language models

## Education

GEORGIA INSTITUTE OF TECHNOLOGY	2021–Present
Ph.D., Machine Learning	
Minor in Mathematics	
Advisors: <a href="#">Vidya Muthukumar</a> and <a href="#">Jacob Abernethy</a>	
UNIVERSITY OF SOUTHERN CALIFORNIA	2017–2021
B.S., Applied and Computational Mathematics, <i>magna cum laude</i>	
Minor in Computer Science	
Advisor: <a href="#">Shaddin Dughmi</a>	

## Publications

An asterisk (\*) denotes equal contribution.

### CONFERENCE ARTICLES

1. [Task Shift: From Classification to Regression in Overparameterized Linear Models](#)  
Tyler LaBonte\*, Kuo-Wei Lai\*, and Vidya Muthukumar  
**AISTATS 2025**
2. [The Group Robustness is in the Details: Revisiting Finetuning under Spurious Correlations](#)  
Tyler LaBonte, John C. Hill, Xincheng Zhang, Vidya Muthukumar, and Abhishek Kumar  
**NeurIPS 2024**
3. [Towards Last-layer Retraining for Group Robustness with Fewer Annotations](#)  
Tyler LaBonte, Vidya Muthukumar, and Abhishek Kumar  
**NeurIPS 2023**
4. [Scaling Novel Object Detection with Weakly Supervised Detection Transformers](#)  
Tyler LaBonte, Yale Song, Xin Wang, Vibhav Vineet, and Neel Joshi

**WACV 2023****JOURNAL ARTICLES**

1. [Student Misconceptions of Dynamic Programming: A Replication Study](#)  
Michael Shindler, Natalia Pinpin, Mia Markovic, Frederick Reiber, Jee Hoon Kim, Giles Pierre Nunez Carlos, Mine Dogucu, Mark Hong, Michael Luu, Brian Anderson, Aaron Cote, Matthew Ferland, Palak Jain, Tyler LaBonte, Leena Mathur, Ryan Moreno, and Ryan Sakuma.  
**Computer Science Education**, 32(3):288–312, 2022
2. [Quantifying the Unknown Impact of Segmentation Uncertainty on Image-Based Simulations](#)  
Michael C. Krygier, Tyler LaBonte, Carianne Martinez, Chance Norris, Krish Sharma, Lincoln N. Collins, Partha P. Mukherjee, and Scott A. Roberts  
**Nature Communications**, 12(1):5414, 2021

**WORKSHOP ARTICLES**

1. [On the Unreasonable Effectiveness of Last-layer Retraining](#)  
John C. Hill, Tyler LaBonte, Xinchun Zhang, and Vidya Muthukumar  
**ICLR 2025 Workshop on Spurious Correlations and Shortcut Learning**
2. [Saving a Split for Last-layer Retraining can Improve Group Robustness without Group Annotations](#)  
Tyler LaBonte, Vidya Muthukumar, and Abhishek Kumar  
**ICML 2023 Workshop on Spurious Correlations, Invariance, and Stability**
3. [Dropout Disagreement: A Recipe for Group Robustness with Fewer Annotations](#)  
Tyler LaBonte, Vidya Muthukumar, and Abhishek Kumar  
**NeurIPS 2022 Workshop on Distribution Shifts**
4. [Scaling Novel Object Detection with Weakly Supervised Detection Transformers](#)  
Tyler LaBonte, Yale Song, Xin Wang, Vibhav Vineet, and Neel Joshi  
**CVPR 2022 Workshop on Transformers in Vision**

**THESES**

1. [Finding the Needle in a High-Dimensional Haystack: Oracle Methods for Convex Optimization](#)  
Tyler LaBonte  
Undergraduate Thesis, University of Southern California, 2021  
Winner of the USC Discovery Scholar distinction

**MANUSCRIPTS**

1. [We Know Where We Don't Know: 3D Bayesian CNNs for Credible Geometric Uncertainty](#)  
Tyler LaBonte, Carianne Martinez, and Scott A. Roberts  
Manuscript, 2019

**Awards**

- |   |      |
|---|------|
| 1. 2 <sup>nd</sup> Place Research Talk/Poster Presentation – DoD NDSEG CONFERENCE | 2023 |
| 2. Simons Institute Deep Learning Theory Workshop Travel Grant (\$2,000)          | 2022 |
| 3. DoD National Defense Science and Engineering Graduate Fellowship (\$170,000)   | 2021 |
- One of two undergraduates to receive both DoD NDSEG and NSF GRFP in Computer Science

4. NSF Graduate Research Fellowship (\$138,000—declined)	2021
5. USC Discovery Scholar (Research distinction for <100 USC graduates)	2021
6. USC Viterbi & USC Dornsife Dean’s List	2017–2021
7. Neo Scholar (Top ~100 CS undergraduates in America) – NEO	2020
8. U.S.S. Bowfin Memorial Scholarship (\$5,000)	2020
9. 1 <sup>st</sup> Place Computer Vision Project – TREEHACKS, STANFORD UNIVERSITY	2019
10. 1 <sup>st</sup> Place Healthcare AI Project – TREEHACKS, STANFORD UNIVERSITY	2019
11. 1 <sup>st</sup> Place Data Analytics Project – HACKSC, USC	2019
12. Admiral Bernard Clarey Memorial Scholarship (\$7,000)	2018
13. National Top 20 Ethical Hacking Finalist – MAJOR LEAGUE HACKING	2018
14. USC Trustee Scholar (\$250,000)	2017
15. USC Viterbi Fellow (\$24,000)	2017
16. Dolphin Scholarship (\$13,600)	2017
17. Rear Admiral Paul Lacy Memorial Scholarship (\$6,500)	2017
18. National Merit Scholar (\$3,000)	2017

## Industry Research Experience

1. MICROSOFT RESEARCH Redmond, WA  
*Machine Learning Research Intern* 2025  
*Advisor: Vibhav Vineet*  
 Investigated reasoning proficiency of multimodal vision-language models.
2. GOOGLE Sunnyvale, CA  
*Machine Learning Research Intern* 2023  
*Advisor: Kun Lin*  
 Developed techniques to leverage Gemini LLM to improve hardware-software code design.
3. MICROSOFT RESEARCH Redmond, WA  
*Machine Learning Research Intern* 2021–2022  
*Advisor: Neel Joshi*  
 Designed Transformer for weakly supervised object detection via multiple instance learning.
4. GOOGLE X Mountain View, CA  
*Machine Learning Research Intern* 2020  
*Advisor: Daniel R. Silva*  
 Designed CNN-LSTM architecture for temporal identity preservation in object tracking.
5. SANDIA NATIONAL LABORATORIES Albuquerque, NM  
*Machine Learning Research Intern* 2019–2020  
*Advisors: Carianne Martinez and Scott A. Roberts*  
 Developed Bayesian deep learning model for geometric uncertainty in engineering applications.

## Talks

1. Georgia Tech School of Industrial & Systems Engineering – ATLANTA, GA 2024  
Task Shift: From Classification to Regression via Benign Overfitting
2. Georgia Tech Machine Learning Center – ATLANTA, GA 2024  
Task Shift: From Classification to Regression via Benign Overfitting
3. Google DeepMind – MOUNTAIN VIEW, CA 2023  
Towards Last-layer Retraining for Group Robustness with Fewer Annotations
4. Google Cloud Technical Infrastructure – SUNNYVALE, CA 2023  
Large Language Models for Hardware-Software Code Design
5. DoD NDSEG Conference – SAN ANTONIO, TX 2023  
Towards Last-layer Retraining for Group Robustness with Fewer Annotations
6. Microsoft Research – REDMOND, WA 2021  
Weakly Supervised Detection Transformers for Effortless Computer Vision
7. USC Computer Science Theory Group – LOS ANGELES, CA 2021  
The Distance Oracle for Convex Optimization
8. Google X – MOUNTAIN VIEW, CA 2020  
Temporal Identity Preservation in Multiple Object Tracking
9. USC Computer Science Theory Group – LOS ANGELES, CA 2019  
3D Bayesian CNNs for Credible Geometric Uncertainty
10. USC Center for Artificial Intelligence in Society – LOS ANGELES, CA 2019  
3D Bayesian CNNs for Credible Geometric Uncertainty
11. USC Center for Artificial Intelligence in Society – LOS ANGELES, CA 2019  
Machine Learning Fairness in Word Embeddings

## Advising

1. Xincheng Zhang – Georgia Tech MS 2024–2025
2. John C. Hill – Georgia Tech BS/MS → Georgia Tech PhD 2022–2024

## Teaching

1. Lecturer/Teaching Assistant (8 lectures) | Georgia Institute of Technology 2024  
[CS 7545: Machine Learning Theory](#)
2. Lecturer/Teaching Assistant (12 lectures) | Georgia Institute of Technology 2023  
[CS 7545: Machine Learning Theory](#)
3. Undergraduate Teaching Assistant | University of Southern California 2021  
CSCI 270: Introduction to Algorithms and Theory of Computing
4. Instructor | [USC Center for Artificial Intelligence in Society](#) 2019  
Introduction to Machine Learning

5. Undergraduate Teaching Assistant | University of Southern California  
CSCI 170: Discrete Methods in Computer Science 2018

## Academic Service

1. Program Committee, [ICLR Workshop on Spurious Correlations and Shortcut Learning](#) 2025
2. Reviewer, International Conference on Machine Learning 2025
3. Organizer, [Georgia Tech ML Theory Reading Group](#) 2021–2023, 2025
4. System Administrator, Georgia Tech ML Theory GPU Cluster 2022–2025
5. Reviewer, International Conference on Learning Representations 2024
6. Reviewer, Conference on Neural Information Processing Systems 2023, 2024
7. Student Organizer, [Learning Theory Alliance Mentorship Workshop](#) 2023

## Open Source Software

1. Milkshake: Quick and extendable experimentation with classification models 2023  
<https://github.com/tmlabonte/milkshake> ★ 5 📄 3
2. WS-DETR: Weakly supervised Transformers for scaling novel object detection 2021–2022  
<https://github.com/tmlabonte/weakly-supervised-detr> ★ 10 📄 6
3. BCNN: 3D Bayesian CNNs for credible geometric uncertainty 2019–2020  
<https://github.com/sandialabs/bcnn> ★ 62 📄 19  
Transitioned to a production environment by Sandia National Laboratories  
19<sup>th</sup> most starred Sandia repository out of 693 (March 2025)
4. Tendies: Decoupling deep learning development and deployment 2018  
<https://github.com/tmlabonte/tendies> ★ 37 📄 11  
Transitioned to a production environment by the Air Force Research Laboratory

## Other Activities

1. Fleet Captain, [Georgia Tech Sailing Club](#) 2023–2025
2. House Chair, [USC Hawai'i Club](#) 2020–2021
3. Vice President of Finance, [USC Hawai'i Club](#) 2019–2020