# Tyler LaBonte

Ph.D. Student & NDSEG Fellow
Georgia Institute of Technology
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## Research Interests

**Mathematical Foundations of Machine Learning**
Generalization Theory of Deep Learning
Convex and Non-Convex Optimization
Robustness and Scalability of Deep Learning

## Education

GEORGIA INSTITUTE OF TECHNOLOGY — 2021–Present
Ph.D., Machine Learning — GPA: 4.0/4.0
*Advisors: Prof. Jacob Abernethy* and *Prof. Vidya Muthukumar*

UNIVERSITY OF SOUTHERN CALIFORNIA — 2017–2021
B.S., Applied and Computational Mathematics, *magna cum laude* — GPA: 3.73/4.0
Minor in Computer Science — Ph.D. courses: 4
*Thesis: Finding the Needle in a High-Dimensional Haystack: Oracle Methods for Convex Optimization*
*Advisor: Prof. Shaddin Dughmi*

## Publications

JOURNAL ARTICLES

1. Michael C. Krygier, **Tyler LaBonte**, Carianne Martinez, Chance Norris, Krish Sharma, Lincoln N. Collins, Partha P. Mukherjee, and Scott A. Roberts. Quantifying the Unknown: Impact of Segmentation Uncertainty on Image-Based Simulations. *Nature Communications*, 12(5414), 2021.

THESES

1. **Tyler LaBonte**. Finding the Needle in a High-Dimensional Haystack: Oracle Methods for Convex Optimization. Senior Thesis, 2021. Winner of the USC Discovery Scholar distinction.

MANUSCRIPTS

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

ACKNOWLEDGMENTS

1. Aashutosh Mistry, Alejandro A. Franco, Samuel J. Cooper, Scott A. Roberts, and Venkatasubramanian Viswanathan. How Machine Learning Will Revolutionize Electrochemical Sciences. *ACS Energy Letters*, 6:1422–1431, 2021.

2. David Kempe. Communication, Distortion, and Randomness in Metric Voting. In *Proceedings of AAAI 2020*.

## Awards

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

NSF Graduate Research Fellowship ($138,000—declined) 2021

USC Discovery Scholar (Research distinction for <100 USC graduates) 2021

USC Viterbi & USC Dornsife Dean's List 2017–2021

Neo Scholar (Top ~100 CS undergraduates in America) – NEO 2020

U.S.S. Bowfin Memorial Scholarship ($5,000) 2020

SIMLR Award for Outstanding Intern – SANDIA NATIONAL LABORATORIES 2020

1st Place Computer Vision Project – TREEHACKS, STANFORD UNIVERSITY 2019

1st Place Healthcare AI Project – TREEHACKS, STANFORD UNIVERSITY 2019

1st Place Data Analytics Project – HACKSC, USC 2019

Admiral Bernard Clarey Memorial Scholarship ($7,000) 2018

National Top 20 Ethical Hacking Finalist – MAJOR LEAGUE HACKING 2018

USC Trustee Scholar (Full scholarship worth $250,000) 2017

USC Viterbi Fellow (Research funding worth $24,000) 2017

Dolphin Scholarship ($13,600) 2017

Rear Admiral Paul Lacy Memorial Scholarship ($6,500) 2017

National Merit Scholar ($3,000) 2017

## Research Experience

MICROSOFT RESEARCH Redmond, WA
*Machine Learning Research Intern* 2021
*Advisor: Neel Joshi*
Developed Transformer model for weakly supervised object detection with multiple instance learning.

UNIVERSITY OF SOUTHERN CALIFORNIA Los Angeles, CA
*Convex Optimization Undergraduate Researcher* 2020–2021
*Advisor: Prof. Shaddin Dughmi*
Developed an efficient algorithm to solve the convex feasibility problem with a distance oracle.

GOOGLE X Mountain View, CA
*Machine Learning Research Intern* 2020

*Advisor: Daniel R. Silva*
Invented novel deep learning architecture for temporal identity preservation in object tracking.

SANDIA NATIONAL LABORATORIES — Albuquerque, NM
*Machine Learning Research Intern* — 2019–2020
*Advisors: Carianne Martinez and Scott A. Roberts*
Invented novel Bayesian deep learning architecture for credible geometric uncertainty.

UNIVERSITY OF SOUTHERN CALIFORNIA — Los Angeles, CA
*Machine Learning Undergraduate Researcher* — 2019
*Advisor: Prof. Jason D. Lee*
Investigated generalization and linearization of overparameterized deep neural networks.

UNIVERSITY OF SOUTHERN CALIFORNIA — Los Angeles, CA
*Mechanism Design Undergraduate Researcher* — 2018
*Advisor: Prof. David Kempe*
Investigated distortion bounds in limited-communication metric voting.

## Talks and Presentations

1. Microsoft Research ML Area Intern Symposium – REDMOND, WA — 2021
   Weakly Supervised Detection Transformers for Effortless Computer Vision
2. USC Computer Science Theory Group – LOS ANGELES, CA — 2021
   The Distance Oracle for Convex Optimization
3. Mineral Tech Talks at Google X – MOUNTAIN VIEW, CA — 2020
   Temporal Identity Preservation in Multiple Object Tracking
4. USC Computer Science Theory Group – LOS ANGELES, CA — 2019
   3D Bayesian CNNs for Credible Geometric Uncertainty
5. USC Center for Artificial Intelligence in Society – LOS ANGELES, CA — 2019
   3D Bayesian CNNs for Credible Geometric Uncertainty
6. Sandia National Laboratories Summer Research Symposium – ALBUQUERQUE, NM — 2019
   3D Bayesian CNNs for Credible Geometric Uncertainty
7. USC Center for Artificial Intelligence in Society – LOS ANGELES, CA — 2019
   Machine Learning Fairness in Word Embeddings

## Open Source Software

1. BCNN: 3D Bayesian CNNs for credible geometric uncertainty — 2019–2020
   `https://github.com/sandialabs/bcnn` — ★ 43 — 13
   Transitioned to a production environment by Sandia National Laboratories
   10th most starred Sandia repository (out of 130)
2. Tendies: Decoupling deep learning development and deployment — 2018
   `https://github.com/tmlabonte/tendies` — ★ 37 — 10

Transitioned to a production environment by the Air Force Research Laboratory

## Advising

1. Pratik Deolasi – Georgia Tech undergrad 2021–2022
2. Rishit Mohan Ahuja – Georgia Tech undergrad 2021–2022

## Teaching

1. Undergraduate Teaching Assistant | University of Southern California 2021
   CSCI 270: Introduction to Algorithms and Theory of Computing
2. Curriculum Lead | USC Center for Artificial Intelligence in Society 2019
   Introduction to Machine Learning
3. Undergraduate Teaching Assistant | University of Southern California 2018
   CSCI 170: Discrete Methods in Computer Science

## Service and Leadership

1. House Chair and Vice President of Finance | USC Hawaii Club 2018–2021
2. Projects Lead | USC Center for Artificial Intelligence in Society 2019
3. Associate Director of Robotics Outreach | USC Viterbi K-12 STEM Outreach 2018
4. Volunteer VEX Robotics Mentor | USC Viterbi K-12 STEM Outreach 2017–2018