Liam Collins

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EDUCATION

University of Texas at Austin, Austin, Texas   Starting August 2019
Ph. D. Candidate, Electrical Engineering; Decision, Information, and Communication Engineering Track
Research Focus: Theoretical machine learning

Princeton University, Princeton, NJ; 3.90 GPA, Magna Cum Laude   Graduated June 2019
B.S.E.; Concentration: Electrical Engineering
Certificates: Applications of Computing, Statistics and Machine Learning

PROFESSIONAL EXPERIENCE

Research Intern, *Advanced RF Techniques and Systems Group, MIT Lincoln Laboratory*   June 2019-July 2019
- Leveraged recent advances in modulation classification via deep learning to develop novel beamformers.
- Presented a new, effective 2-step deep beamforming strategy to colleagues in my group and division.

Research Intern, *Advanced RF Techniques and Systems Group, MIT Lincoln Laboratory*   June 2018-Aug 2018
- Determined optimal locations of four antennae in 2D aperture using information-theoretic methods.
- Demonstrated near-optimal performance of least-squares beamformer for adaptive processing.
- Shared results in an hour-long talk to over 20 researchers in my group and division.

Research Intern, *Embedded Security Chair, Ruhr Universität Bochum, Bochum, Germany*   June 2017-Aug 2017
- Wrote Java algorithm that successfully implanted an antenna on an FPGA.

Strategy Intern, *Parametric Technology Corporation (PTC), Needham, MA*   May 2016-Aug 2016
- Researched and presented findings on customer usage of PTC's IoT software platforms.

INDEPENDENT RESEARCH

Senior Thesis: Analysis of Algorithms for Nonnegative Matrix Factorization (NMF)   Sep 2018-May 2019
- Evaluated over 26 NMF algorithms and initializations, including recently published techniques.
- Established conditional performance characteristics through both theoretical and experimental justification.
- Presented findings at two poster sessions attended by over 100 faculty and students.

Graduate Course Project: Interpretable Gradients with Adversarial Training   Spring 2019
- Studied the open question of why robust training of deep learning models induces interpretable gradients.
- Provided theoretical results explaining the contrasting behavior of standard and robustly-trained gradients of a linear binary classifier.

Junior Independent Work: MATLAB Library for Quantum Machine Learning Circuits   Spring 2018
- Designed MATLAB library to specify quantum machine learning circuits at the elementary gate level.

Undergraduate Course Project: Electrical Engineering Car Lab   Spring 2018
- Built small car with speed and direction control, RF localization, and obstacle avoidance capabilities.

AWARDS

G. David Forney Jr. Prize, Exceptional Senior Thesis in Signal Processing and Communications   June 2019
Phi Beta Kappa, Academic honor society (top 10% of Princeton graduates by GPA)   June 2019
Sigma Xi, Research honor society   June 2019
Tau Beta Pi, Engineering honor society (top 1/8th of Princeton engineers by GPA)   Nov 2017, Nov 2018
Club Cross Country All-American, Top 15 male in the country   Nov 2017, Nov 2018

LEADERSHIP AND ACTIVITIES

President and Captain, *Princeton Running Club*   Dec 2015-May 2019
Service and Justice Team Leader, *Princeton Faith and Action*   Feb 2017-Jan 2019
Trip Leader, *Princeton Outdoor Action*   Aug 2016-Sep 2018

RELEVANT COURSEWORK

Graduate: Theoretical ML, Mathematics of High-Dimensional Data, ML and Pattern Recognition
Undergraduate: Probability, Info. Theory, Theory of Algorithms, Image Processing, Numerical Methods

TEACHING

COS 306 Logic Design (Lab TA Fall 17, Fall 18); MAT 201 Multivariable Calculus (Tutor Fall 16-Spring 19)

SKILLS

Java, Python, PyTorch, Tensorflow, Keras, Julia, MATLAB, C