



# Eric Wallace

536 Raymond Drive, West Chester, PA 19380 ♦ ewallac2@umd.edu ♦ (484)-844-0776

[ericswallace.com](http://ericswallace.com) ♦  [Eric-Wallace](https://github.com/Eric-Wallace) ♦  [ericswallace](https://www.linkedin.com/in/ericswallace)

## EDUCATION

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**University of Maryland, College Park — A. James Clark School of Engineering** **GPA:** 3.94/4.00  
B.S. Computer Engineering **GRE:** 170/170Q, 168/170V, 6/6W  
Entrepreneurship and Innovation Honors Program Graduation: Dec 2018

## RESEARCH EXPERIENCE

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**Allen Institute for Artificial Intelligence (AI2) — Research Intern** Irvine, CA  
**Topic:** Deep Learning for NLP, **Advisors:** Matt Gardner, Sameer Singh (UC Irvine) Jan 2019- July 2019

- Joining AI2 to work on question answering, adversarial examples in NLP, and model interpretability

**University of Maryland: CLIP NLP Group — Undergraduate Research Assistant** College Park, MD  
**Topic:** Deep Learning for NLP, **Advisor:** Jordan Boyd-Graber Jan 2018- Dec 2018

- Focus on the intersection between deep learning and NLP, research topics include:
- Robust NLP systems, models that can handle out-of-domain inputs such as adversarial examples and noisy users
- Interpretation methods for neural networks and how to properly evaluate interpretability
- Human-in-the-loop ML, models that can learn, interact, and collaborate with humans
- Meta-learning for NLP, how to quickly adapt models to new domains (low-resource languages, custom users)

**University of Maryland: Alfred Gessow Rotorcraft Center — Undergraduate Research Assistant** College Park, MD  
**Topic:** GPU Acceleration of Helicopter Simulations, **Advisors:** Inderjit Chopra, Ananth Sridharan Oct 2016- May 2017

- Accelerated helicopter physics simulations using GPU parallelism, reached 30x speedup over previous state-of-the-art runtime
- Utilized NVIDIA CUDA, OpenMP, OpenACC, and other SIMD/parallel acceleration libraries (e.g., cuBLAS, Thrust)
- Packaged simulator into physics engine currently used at US Army Research Lab for helicopter design and training

**NASA: Technology Transfer Research — Undergraduate Team Lead** College Park, MD  
**Topic:** Wireless Power for Implantable Medical Devices Apr 2016- Nov 2016

- Led a NASA competition team designing power supplies using a piezoelectric film for implantable medical devices
- Designed hardware system architecture with UMD and NASA researchers, reached competition finals

## WORK EXPERIENCE

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**Lyft, Self-Driving Car Program — Software Engineering Intern** Palo Alto, CA  
**Topic:** Deep Learning for Computer Vision tasks on Lyft's self-driving car team June 2018- Aug 2018

- Developed neural network models for Computer Vision tasks on Lyft's self-driving car team
- Reimplemented state-of-the-art CNN models for binary semantic segmentation and object detection
- Contributed to vehicle simulator by integrating perception and control systems with physical hardware

**Intel — Software Engineering Intern (Co-op)** Folsom, CA  
**Topic:** Designing Arithmetic Logic Units (ALUs) for use in the i7/i9 10nm microarchitecture Aug 2017- Dec 2017

- Designed Arithmetic Logic Units (ALUs) for use in the i7/i9 10nm microarchitecture
- Developed internal testing suite for static power checks in system on a chip (SOC) and ASIC designs

**Appian — Software Engineering Intern** Reston, VA  
**Topic:** Implemented a ResNet-50 model pretrained on ImageNet for internal image recognition system May 2017- Aug 2017

- Implemented a ResNet-50 model pretrained on ImageNet for internal image recognition system
- Prototyped functionality for sentiment analysis, NER, and topic modeling using Stanford CoreNLP, MALLETT, and NLTK

**Textron Systems: UAV Systems — Computer Engineering Intern** Baltimore, MD  
**Topic:** Developed C firmware for embedded Microchip PIC32 processor on the Aerosonde UAV June 2016- Aug 2016

- Developed C firmware for embedded Microchip PIC32 processor on the Aerosonde UAV
- Added voltage/current monitoring integrated circuits and created driver software using peripheral busses (CAN Bus, I2C)

## PUBLICATIONS

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[Preprint]: Sahil Singla\*, **Eric Wallace\***, Shi Feng\*, and Soheil Feizi. Interpreting Deep Learning Using Context-Aware Second-Order Importance Functions. Will submit to ICML 2019. [Preprint available]

[1] Shi Feng, **Eric Wallace**, Alvin Grissom II, Mohit Iyyer, Pedro Rodriguez, and Jordan Boyd-Graber. Pathologies of Neural Models Make Interpretations Difficult. **EMNLP 2018** (oral presentation). [Paper]

[2] **Eric Wallace\***, Shi Feng\*, and Jordan Boyd-Graber. Interpreting Neural Networks With Nearest Neighbors. **EMNLP 2018 Workshop** on Analyzing and Interpreting Neural Networks for NLP. [Paper], [Blog], [Code]

[3] **Eric Wallace**, Pedro Rodriguez, Shi Feng, and Jordan Boyd-Graber. Trick Me If You Can: Adversarial Writing of Trivia Challenge Questions. Under re-review at TACL, **ACL 2018 Student Research Workshop**, also appeared in *Mid-Atlantic Student Colloquium on Speech, Language and Learning 2018*, *UMD Research Day 2018*. [Paper], [Website], [Code]

[4] **Eric Wallace** and Ananth Sridharan. GPU Acceleration of Helicopter Flow Field Simulation. **2018 AIAA SciTech**, also appeared in *AIAA 2017 Region 1 Student Conference (Best Paper Award)*, *UMD Research Day 2017*.

## PROJECTS AND VENTURES

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### Provable Adversarial Defenses – CMSC498V: Professor Furong Huang

Nov 2018- Present

- Scaled existing methods which guarantee robustness against norm-bounded adversarial examples
- Pretrained models using PGD adversarial training, performed model compression, and then fine-tuned with robust bound
- Reduced cost of provable robust training by ~5x, allowing usage of deeper models (work ongoing, targeting ICML 2019)

### Reimplementation of Deep k-Nearest Neighbors (DkNN) [Original Paper] [Code]

July 2018

- Reimplemented DkNN, which creates interpretable and robust neural models using classic ideas from conformal prediction
- Extended original algorithm to NLP tasks using a “soft” k-nearest neighbor metric

### Social Impact Startup - Pinpointer, Co-Founder and Software Design Lead

Jan 2016- Dec 2017

- Co-founded a seed funded social impact startup (left to pursue academic research interests)
- Pinpointer is a crowdsourced application that helps to navigate in developing cities which lack a standard address system
- Integrated Google Maps API, OpenStreetMap, and AWS services to aggregate user data from mobile and web
- Pitched company to win numerous awards (Temple University Be Your Own Boss Bowl, UMD Do Good Challenge, USASBE Finalist, Under Armour Startup Expo, UMD EECS Fishbowl, EIP Terp Tank, Temple Innovative Idea Competition)

### DeepMind/Blizzard StarCraft II Reinforcement Learning Agent (A3C)

Aug 2017

- Implemented RL agent using Google DeepMind’s python API for playing StarCraft II
- Replicated DeepMind’s initial published results using A3C with a CNN + LSTM policy/value network

### Motion Planning – ENEE 324: Professor Gilmer Blankenship [Report] [Code]

Nov 2016

- Developed MATLAB simulator for autonomous cars tasked with communication and self-organization
- Incorporated physics/dynamics model based on Dubin’s Car state space equations
- Implemented a path tracking navigation algorithm using the pure pursuit method with adaptive look-ahead distance

## SERVICE, TALKS, AWARDS, AND MEDIA

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**Service:** Reviewer for **EMNLP 2018 (Best Reviewer Award)**, Reviewer for SemEval 2018

**Talks:** **EMNLP 2018 (oral)** — *Pathologies of Neural Models Make Interpretations Difficult* (2018)

UMD Computer Science Advisory Board — *Generalization in Deep Learning for Language* (2018)

Adobe Labs Visit at UMD — *Generalization in Deep Learning for Language* (2018)

Google DeepMind StarCraft AI Workshop — *Learning Macro-Based RL Policies* (2017)

UMD Aerospace Advisory Board — *Computational Methods for Simulating Helicopter Aerodynamics* (2017)

**Academic Awards:** EMNLP Best Reviewer Award (2018)

National Science Foundation REU Award (2018)

AIAA Student Conference Best Paper Award (2017)

Lockheed Martin Corporate Partners Scholarship (2017)

Yurie/Jeong H. Kim Scholarship (2016)

Leidos Corporate Partners Scholarship (2016)

University of Maryland Presidential Scholarship (2014)

**Media Coverage/Outreach:** [Personal Website], [Blog], [UMD Podcast], [NLP Highlights Podcast], [Quiz Bowl]

## TECHNICAL SKILLS AND INTERESTS

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**Software:** Python, Java, C/C++, MATLAB **General:** Git, Unix, LaTeX, AWS/Google Cloud

**Frameworks:** PyTorch, CUDA, Chainer, Scikit-Learn **Open-Source Contributions:** PyTorch, TorchText, PySC2

**Campus Involvement:** Technica (largest all-women’s hackathon), Machine Learning @ Maryland, Startup Shell, Club Cross Country and Track & Field, Machine Learning Reading Group, Maryland Honors College

**General Research Interests:** Machine Learning, Natural Language Processing, Reinforcement Learning, Deep Learning