

# Dane Williamson

PhD. Candidate, University of Virginia

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## Research Interest

*My research is in robust, interpretable machine learning, with a focus on representation learning for high-dimensional data. My work Leverages Deep Generative Models to uncover meaningful latent structures, with applications in various complex domains. With the goal of developing scalable, interpretable frameworks that enhance model robustness and bridge theoretical advances with real-world impact.*

## Education

AUG. 2020 – **Ph.D. (UVA) University of Virginia, Charlottesville, VA**, Major: Computer Science  
CURRENT Advisor: Yangfeng Ji

May 2020 **B.Sc. (VSU) Virginia State University, Petersburg, VA**, Major: Computer Science  
Capstone Project: Cross Platform Mobile Application  
Advisor: Prof. Ahmed Mohammed

## Experience

May – Aug. **Ph.D. Research Intern, Oracle Machine Learning Research Group**, Burlington, MA

- 2022 ○ Developed Named Entity Extraction System for Oracle Intelligent Document Recognition.
- Implemented 2 Dimensional Positional Embeddings to leverage document layout information.
- Introduced Special tokens to BERT tokenizer to prevent fragmentation of numerical tokens.
- Improved F-1 Score on identifying 29/36 Entities over Conditional Random Fields (CRFs).

May – Aug. **Ph.D. Research Intern, Oracle Machine Learning Research Group**, Burlington, MA

- 2021 ○ Pretrained BERT transformers using internal toolkit.
- Designed and implemented Probes for knowledge and language understanding in BERT transformers.
- Evaluated model performance on GLUE benchmarks using the Jiant toolkit.

May – Aug. **Software Engineering Intern, Apple**, Cupertino, CA

- 2019 ○ Developed Python Desktop Application to simulate Host Stack of third party BLE Devices.
- Developed Web-Scraper to populate MongoDB database with SIG Bluetooth Specifications.
- Utilized internal Python-based framework to communicate with BLE controller via HCI commands.
- Simulated BLE GATT Server using database containing specifications and HCI Commands.

May – Aug. **Software Engineering Intern, IBM**, Raleigh, NC

- 2018 ○ Wrote automated end-to-end user-interface tests in Protractor Framework for Watson Content Hub.
- Utilized JavaScript/TypeScript to conduct automated API testing in Staging and Production environments.
- Configured Continuous Integration (CI) testing jobs with Jenkins pipeline builds for Docker and NPM registries.

## Profile Summary

### Selected Awards

2019 **Best Paper Award for the Human-Computer Interaction Thematic Area, HCI International 2019**, Orlando, FL, USA, July 16-31, 2019

Awarded for exceptional research contribution in the Human-Computer Interaction thematic area.

2018 **Highest Ranking Junior in Department of Engineering and Computer Science, Virginia State University, VSU**

Recognized as the highest-ranking junior in the department.

- 2017 **Highest Ranking Sophomore in Department of Engineering and Computer Science, Virginia State University, VSU**  
Recognized as the highest-ranking sophomore in the department.
- 2016 **Presidential STEM Scholar, Virginia State University, VSU**  
Awarded to outstanding students in STEM fields based on academic excellence.
- Grants, Scholarships & Fellowships
- 2016-2020 **EST-Univ STEM Scholarship**
- 2016-2020 **CIAA Scholarship**
- 2019 **Apple Engineering Scholarship**

## Publications

### Summary

○ In Submission

- 2025 **D. Williamson, Y. Ji, M. Dwyer, CASE: Contrastive Activation for Saliency Estimation**  
*Preprint available at arXiv:2506.07327*
- 2025 **D. Williamson, Y. Ji, M. Dwyer, Optimizing Latent Dimension Allocation in Hierarchical VAEs: Balancing Attenuation and Information Retention for OOD Detection**  
*Preprint available at arXiv:2506.10089*
- Peer Reviewed
- 2019 **G. Cowart, D. Williamson, N. Farhat, and J.S. Lee, 'Do Humans STILL Have a Monopoly on Creativity or Is Creativity Overrated ??', Human-Computer Interaction. Perspectives on Design - Thematic Area, HCI 2019, 21st HCI International Conference, HCII 2019, Orlando, FL, USA**  
Presented at HCI 2019, July 26-31, 2019, and published in the Proceedings, Part I.

## Mentorship and Teaching

### Mentorship

- May 2022 – **Andrew Kelly, Morgan State University, Undergraduate Student**  
August 2022 Interpretability project on saliency analysis for Image Classifiers

### Teaching Experience

- January 2022 – May 2024 **Graduate Teaching Assistant, School of Engineering and Applied Science, University of Virginia**
- CS 6316: Machine Learning, **Spring 2022**
  - CS 4774: Machine Learning, **Spring 2023**
  - CS 6501: Natural Language Processing, **Fall 2023**
  - CS 4710: AI, **Spring 2024**
- Aug. 2019 – May 2020 **Undergraduate Teaching Assistant, Engineering and Computer Science Department, Virginia State University**
- CSCI 120: Introduction to Programming, **Spring 2019**
  - CSCI 150: Programming I, **Spring 2019**
  - CSCI 151: Programming I Lab, **Spring 2019**
  - CSCI 250: Programming II, **Spring 2019**
  - CSCI 251: Programming II Lab, **Spring 2019**
  - CSCI 287: Data Structures, **Spring 2019**
  - CSCI 296: Web Programming, **Spring 2019**

## Membership and Professional Service

### Reviewer

- 2024 **EMNLP, Empirical Methods in Natural Language Processing, Miami, Florida**

2023 - **ACL ARR**, *Association for Computational Linguistics*, Rolling Present

Member

2016 - **ACM**, *Association for Computing Machinery*

2016 - **NSBE**, *National Society of Black Engineers*

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## References

### **Ahmed F. Mohammed**

Associate Professor of Computer Science and Director of the Software Engineering and Applied Learning Techniques Laboratory (SEAL-T Lab) at Virginia State University

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### **Dawit Haile**

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### **Matthew Dwyer**

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### **Yangeng Ji**

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