Michael Cardei

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Education

University of Virginia, | Ph.D. in Computer Science   August 2024 – Expected May 2028
School of Engineering and Applied Science | **NSF GRFP Fellow**
Research Focus: Responsible Generative AI (Advisor: Professor Ferdinando Fioretto)

University of Florida, | B.S in Computer Science, *Cum Laude*   June 2020 – May 2024
Herbert Wertheim College of Engineering | **GPA:** 3.92/4.00

Research Experience

Graduate Research Assistant   August 2024 – Present
University of Virginia, RAISE Lab, Advised by Dr. Ferdinando Fioretto
- Researching the topics of Generative AI for Scientific and Engineering Applications in addition to Responsible Generative AI.
- Developing foundational methodologies to enable the integration of **constrained optimization within Diffusion Models**.

Staff Machine Learning Research Scientist Intern   May 2025 – August 2025
Visa, Foster City, California (On-site)
- Research cutting-edge diffusion-based Generative AI methods for constrained financial synthetic data generation

Research Intern   August 2023 – May 2024
University of Florida, Adaptive Learning and Optimization Lab, Advised by Dr. My Thai
- Investigating **privacy vulnerabilities** and exploring implementation strategies within Federated Learning for **Large Language Models**.
- Examining neuron-based explainable AI methods for network intrusion anomaly detection mechanism analysis.

AI Research Intern (Robotics Institute Summer Scholars (RISS))   June 2023 – August 2023
Carnegie Mellon University Robotics Institution, ILIM Lab, Advised by Dr. Srinivasa Narasimhan
- Researched methods for context-driven road work-zone detection and localization for autonomous vehicles.
- Leveraged advanced **Computer Vision, Deep Learning, and NLP** techniques—including detection, instance segmentation, scene text recognition, and transfer learning.

Research Intern   August 2022 – June 2023
Wake Forest University, Advised by Dr. Umit Topaloglu
- Researched novel methods for **bias mitigation and fairness** in medical deep learning applications
- Implemented, optimized, and tested deep learning algorithms while also performing feature engineering, model creation, and model evaluation
- Used multiple Machine Learning frameworks such as TensorFlow, PyTorch, and Keras for the creation and implementation of Deep Neural Networks

Research Intern (REU)   May 2022 – August 2022
Wake Forest University School of Medicine, Advised by Dr. Umit Topaloglu
- Researched novel approaches for **Privacy Preserved Machine Learning** based upon data frequency domain transformations
- Created and tested multiple adversarial attacks along with implementing the privacy methods in a **Federated learning** environment. Utilized TensorFlow Federated and TensorFlow Privacy along with other machine learning libraries.

Publications

In computer science, peer-reviewed conference proceedings are the primary venue for disseminating research, acceptance is highly competitive.

Conference Papers

- **M. Cardei**, J. K. Christopher, T. Hartvigsen, B. Kailkhura, and F. Fioretto, "Constrained Discrete Diffusion ", *Advances in Neural Information Processing Systems (NeurIPS) 2025.* Available: https://arxiv.org/abs/2503.09790

- **M. Cardei**, J. M. Munoz, O. Barrera, S. K. Chandrahas, P. Saha, "Constrained Tabular Diffusion for Finance," *ACM International Conference on AI in Finance (ICAIF) 2025*

- J. Christopher, **M. Cardei**, J. Liang, F. Fioretto, Neuro-symbolic Generative Diffusion Models for Physically Grounded, Robust, and Safe Generation, *2nd International Conference on Neuro-symbolic Systems (NeuS) 2025* **DARPA Disruptive Idea Award (Best Paper)**.

- J. Christopher, B. Bartoldson, T. Ben-Nun, **M. Cardei**, B. Kailkhura, F. Fioretto, Speculative Diffusion Decoding: Accelerating Language Generation through Diffusion, *Annual Conference of the Nations of the Americas Chapter of the Association for Computational Linguistics (NAACL) 2025* **Oral**.

- A. Ghosh, R. Tamburo, S. Zheng, J. Alvarez-Padilla, H. Zhu, **M. Cardei**, N. Dunn, C. Mertz, S. Narasimhan, "ROADWork Dataset: Learning to Recognize, Observe, Analyze and Drive Through Work Zones", *International Conference on Computer Vision (ICCV) 2025.*

- S. Ay, **M. Cardei**, A. Meyer, W. Zhang and U. Topaloglu, "Improving Equity in Deep Learning Medical Applications with the Gerchberg-Saxton Algorithm," in *2023 IEEE 11th International Conference on Healthcare Informatics (ICHI)*, Houston, TX, USA, 2023 pp. 692-694. doi: 10.1109/ICHI57859.2023.00123

- S. Narasimhan, R. Tamburo, C. Mertz, D. Reddy, K. Vuong, A. Ghosh, S. Srivastava, N. Boloor, T. Ma, **M. Cardei**, N, Dunn, H Zhu, Automatic Detection and Localization of Roadwork, *Mobility21, Carnegie Mellon University, 2023.*

Journal Articles

- S. Ay, **M. Cardei**, AM. Meyer, et al. "Improving Equity in Deep Learning Medical Applications with the Gerchberg-Saxton Algorithm". *Journal of Healthcare Informatics Research* (2024). https://doi.org/10.1007/s41666-024-00163-8

Workshop Papers

- **M. Cardei**, J. K. Christopher, T. Hartvigsen, B. Kailkhura, and F. Fioretto, "Constrained Molecular Generation with Discrete Diffusion for Drug Discovery," *AI Virtual Cells and Instruments: A New Era in Drug Discovery and Development Workshop (NeurIPS 2025)*. **Best Student Paper Award**.

- **M. Cardei**, J. M. Munoz, O. Barrera, S. K. Chandrahas, P. Saha, "Compliant Tabular Diffusion for Finance," *Generative AI in Finance Workshop (NeurIPS 2025)*.

Preprints / Under Review

- A. Seha, U. Can-Bora, **M. Cardei**, S. Rajendran, W. Zhang, and U. Topaloglu, "Advancing Privacy in Deep Learning Through Data Transformations", Preprint available Here.

Achievements and Awards

Best Student Paper Award, NeurIPS 2025 AI4D3 Workshop, "Constrained Molecular Generation with Discrete Diffusion for Drug Discovery"

NeurIPS 2025 Scholar Award

Awarded the National Science Foundation Graduate Research Fellowship (NSF GRFP) - 2025

NeuS Best Paper Award - Disruptive Idea Award (DARPA & NeuS), May 2025

Best Paper at UVA LLM Workshop 2024: *Speculative Diffusion Decoding: Accelerating Language Generation through Diffusion*

University of Virginia Computer Science Scholar (2024-2025)

Carnegie Mellon University Robotics Institute Summer Scholar

WeatherOrNot, University of Florida Artificial Intelligence Hackathon Finalist, 3rd Place

2nd place research presentation in the "Cancer, Imaging, and Informatics" category at the Wake Forest Summer Symposium

Wake Forest University BME and Informatics Summer Research Scholar

Teaching Assistant

Teaching Assistant — CS4710 Artificial Intelligence   University of Virginia   Fall 2025

- Conducting weekly office hours and responding to student queries via Piazza, providing academic support to 75 students on course concepts and assignments
- Grading assignments, midterm, and final exams, ensuring accuracy, consistency, and constructive feedback to enhance student understanding

Relevant Courses

University of Virginia (Ph.D.)
Graph Machine Learning, Natural Language Processing, Machine Learning in Systems Security, Machine Learning for Image Analysis, Machine Learning for Software Reliability

University of Florida (B.S.)
Trustworthy Machine Learning (Graduate Course), Applied Machine Learning, Natural Language Processing, Introduction to Multi-Modal Machine Learning, Programming Language Concepts, Engineering Statistics, Operating Systems, Data Structures and Algorithms

Skills

- Core Competencies in AI: Generative AI, Large Language Models, Diffusion Models, Privacy, Bias Reduction, Deep Learning, Computer Vision, Federated Learning, Constrained Optimization
- Languages: Python, C++, Java, R, SQL
- Tools/Frameworks: Pytorch, TensorFlow, Keras, MMDetection, Mask2Former, Scikit-Learn, TensorFlow Federated, TensorFlow Privacy, MongoDB, GitHub, Huggingface Transformers