Maria Cardei

E-mail: *cbr8ru@virginia.edu*
Website: *https://mariacardei.github.io/*
LinkedIn: *www.linkedin.com/in/mariacardei*

Education

- **Ph.D. in Computer Science (AI for Computational Behavior Modeling)** - Expected May 2028
  University of Virginia, Charlottesville, VA, USA (Advisor: Professor Afsaneh Doryab)
  - GPA: 4.0

- **Bachelor of Science in Biomedical Engineering, minor in Computer Science** - May 2023
  University of Florida, Gainesville, FL, USA
  - GPA: 3.94

Research Interests

AI for healthcare, computational behavior modeling, passive sensing, precision health

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Publications

- **M. Cardei**, A. Doryab, "Practical Heuristics for Victim Tagging During a Mass Casualty Incident Emergency Medical Response", paper in *2024 IEEE 20th International Conference on Automation Science and Engineering (CASE)*, Bari, Italy 2024.

- **M. Cardei**, A. Doryab, “Multi-Agent System for Optimizing Victim Tagging in Human/Autonomous Responder Team”, abstract/poster in *2024 15th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS)*, Hong Kong, China 2024.

- S. Davidashvilly, **M. Cardei**, M. Hssayeni, C. Chi, B. Ghoraani, “Deep neural networks for wearable sensor-based activity recognition in Parkinson's disease: investigating generalizability and model complexity”, paper in *Biomedical Engineering Online. 2024.*

Research Experience

- Graduate Research Assistant — August 2023-present
  University of Virginia, Charlottesville, VA, USA (Advisor: Professor Afsaneh Doryab)
  - Using novel imaging technique to represent walking trajectories, and Siamese Neural Networks and object detection techniques to analyze partial trajectory patterns
  - Formally defined victim tagging during a mass casualty incident and practical, heuristic solutions; used agent-based modeling to simulate various scenarios
  - Applied a novel image representation technique to human activity recognition data in hopes of divulging behavioral subtleties within a person and between people

- NSF REU Research Intern — May 2022-January 2023

Florida Atlantic University Institute for Sensing and Embedded Network Systems Engineering (I-SENSE), Boca Raton, FL, USA (Mentor: Professor Behnaz Ghoraani)
  - Researched/applied domain adaptation techniques for human activity recognition to generalize models to the Parkinson's population
  - Used Python and focused on data augmentation and various CNN models

- REU Research Intern — May-August 2021
  Wake Forest Center for AI Research, Winston Salem, NC, USA (Mentor: Professor Metin Gurcan)
  - Detected cell nuclei in medical pathology images using deep learning and image processing techniques
  - Implemented a Faster RCNN model using MATLAB and Python
  - Pre-processed input data for a neural network
  - Researched and presented on advanced object detection algorithms

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Teaching Experience

- Teaching Assistant — June-August 2023
  Girls Who Code Summer Immersion Program, Virtual
  - Virtually delivered an engaging game design curriculum to high school girls (JavaScript,p5.js library)
  - Collaborated with the teaching team to foster an inclusive environment for students to explore the STEM field
  - Debugged and checked over student projects during office hours, offering personalized assistance

- Content Co-developer and Co-teacher — June 2022
  Florida Atlantic University I-DeepLearn Summer Outreach Program, Boca Raton, FL, USA
  - Co-developed and delivered curriculum for I-DeepLearn summer outreach program
  - Introduced high school girls to deep learning through hands-on projects

- Teaching Assistant for Elements of Electrical Engineering (EEL3003) — August-December 2020
  University of Florida, Gainesville, FL, USA
  - Tutored students in course material at weekly office hours
  - Responsible for grading assignments and Arduino Build Reports

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Course Experience

Graduate:
Machine Learning; Human-Robot Interaction; Cyber-Physical Systems: Formal Methods, Safety and Security; Cyber-Physical Systems: Technology and Ethics; Computational Behavior Modeling; Signal Processing, Machine Learning, and Control

Undergraduate:
Introduction to Data Science, Introduction to Multimodal ML in Python, Operating Systems, Introduction to Computer Organization, Data Structures/Algorithms, Programming Fundamentals 1 & 2, Applied

Discrete Structures, Clinical Engineering Design, Quantitative Physiology, Computer Applications for Biomedical Engineering, Biosignals & Systems, Biomedical Instrumentation

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Service Experience

- Computer Science Graduate Student Group Social Chair — January 2024-present
  University of Virginia, Charlottesville, VA, USA
  - Coordinate, plan, and run 2-3 social events every month for CS graduate students
  - Elected by computer science graduate students for a one-year term

- Outreach Event Volunteer — January 2024-present
  University of Virginia, Charlottesville, VA, USA
  - Represented the CS graduate program at 3 graduate and faculty recruitment events

- Paper Reviewer — March 2024-present
  University of Virginia, Charlottesville, VA, USA
  - Provided reviews of 3 potential publications for ACM Health and IMWUT

- Wake Forest Biomedical Informatics Internship Alumni Panelist — June 2023
  Wake Forest University, Winston Salem, NC, USA
  - Invited to speak at "How to Find the Right Career Path" discussion panel for current undergraduate student interns
  - Sparked insightful discussion about career paths, and inspired students to consider the graduate school career path

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Projects

- Machine Learning Course Project — January 2024-present
  University of Virginia, Charlottesville, VA, USA
  - Perform image analysis techniques for partial trajectory matching and pattern detection

- Cyber-Physical Systems: Formal Methods, Safety and Security Course Project — January -May 2024
  University of Virginia, Charlottesville, VA, USA
  - Applied XAI techniques to depression detection models

- Human-Robot Interaction Course Project — January-May 2024
  University of Virginia, Charlottesville, VA, USA
  - Performed controlled user study with NAO robot to test robot persuasiveness in a customer service setting
  - Programmed NAO robot to recognize speech and have an interaction with participants
  - Use statistical analyses to determine robot persuasiveness

- Signal Processing, Machine Learning, and Control Course Project — August-December 2023
  University of Virginia, Charlottesville, VA, USA

- Used a smartwatch (ASUS Zenwatch 2) for human activity recognition
- Collected and pre-processed data, and implemented more than 10 machine learning models and feature selection to detect whether an individual climbed stairs

- Senior Design Project in Collaboration with HangTech LLC — August 2021-May 2022
  University of Florida, Gainesville, FL, USA
  - Designed device that detects and classifies tremors for Parkinson's and Essential Tremor patients
  - Collected accelerometer data with Arduino
  - Utilized MATLAB and Python to develop a machine learning classification model

- Shellhacks 2021 Hackathon — September 2021
  University of Florida, Gainesville, FL, USA
  - Collaborated to develop a website application that suggests recipes from input ingredient items to reduce food waste
  - Utilized HTML, JavaScript, CSS, Python

- Computer Applications for Biomedical Engineering Course Project — August-December 2020
  University of Florida, Gainesville, FL, USA
  - Detected Diabetic Retinopathy (DR) in fundus images using image processing techniques
  - Developed a MATLAB model to import dataset, preprocess images, eliminate vessels, subtract optic disks, segment exudates, and classify DR severities

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Accomplishments, Awards, and Honors

- President's Provost Fellowship — August 2023-August 2028
  University of Virginia, Charlottesville, VA, USA

- National Science Foundation National Research Traineeship (Cyber-Physical Systems) — August 2023-August 2024
  University of Virginia, Charlottesville, VA, USA

- Poster Presentation: **M. Cardei**, H. Binol, M. Gurcan, L. Cooper, D. Jaye, Nuclei Detection in Immunohistochemical Images of Diffuse Large B-Cell Lymphoma using Deep Learning, *Biomedical Engineering Society (BMES) Conference,* October 2021.
  Orlando, Florida, USA

- President's Honor Roll — May 2020
  University of Florida, Gainesville, FL, USA