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Daniel Joseph Williams

Education

Expected Graduation: May 2024

BS in Computer Science (AI/ML and Data Science Tracks)
University of Maryland, Baltimore County (UMBC)
Accelerated BS/MS Program
GPA: 3.55

Research Experience

June 2023 - Present

Princeton Plasma Physics Laboratory (PPPL)
Princeton, NJ
Multi-Objective Numerical Optimization of Permanent Magnet Stellarators for Nuclear Fusion

- Developed global search framework to find better initial conditions for stellarator optimization.
- Collaborated with plasma physics scientists, applying AI methods to fusion reactor design.

June 2022 - April 2023

Massachusetts Institute of Technology (MIT)
Cambridge, MA
Deep Learning Based Surrogate Models for Nuclear Fission Reactor Parameter Prediction

- Created convolutional neural network models for nuclear reactor design optimization.
- Focused on multi-objective optimization and evaluation of deep learning methods.

April 2021 - May 2022

Johns Hopkins Applied Physics Laboratory (JHU APL)
Laurel, MD
Discovery of AI/ML Supply Chain Vulnerabilities within Self Driving Vehicles

- Developed a data analysis pipeline for assessing machine learning vulnerabilities in self-driving car software stacks.
- Investigated adversarial attacks and AI software stack vulnerabilities.

April 2021 - May 2021

UMBC
Catonsville, MD
Reinforcement Learning for Static Malware Detection

- Implemented deep reinforcement learning algorithms for malware detection strategies.
- Studied proximal policy optimization (PPO) and Q-learning for cybersecurity.

Publications

2022 **D. Williams**, C. Clark, R. McGahan, B. Potteiger, D. Cohen, and P. Musau, "Discovery of AI/ML Supply Chain Vulnerabilities within Automotive Cyber-Physical Systems," 2022 IEEE International Conference on Assured Autonomy (ICAA), Fajardo, PR, USA, 2022, pp. 93-96, doi: 10.1109/ICAA52185.2022.00020.

2022 **D. Williams**, C. Clark, R. McGahan, B. Potteiger, L. Gonzalez, P. Musau, N. Potteiger, & R. Cohen, "Reachability-Based Monitoring for Protection against AI/Machine Learning Supply Chain Vulnerabilities within Cyber-Physical Systems," Decoded – JHU APL Reverse Engineering Magazine, Issue 7, pp. 45-52, February 2022.

Posters

2023 "Optimizing Permanent Magnet Stellarators with Machine Learning," NSBE Fall Regional Conference (Award Winning Poster).

2023 "Optimizing Permanent Magnet Stellarators with Machine Learning," American Physics Society Division of Plasma Physics (APS DPP) Meeting. *Accepted abstract and poster available upon request.*

2023 "Optimizing MUSE: The World's First Quasi-Axisymmetric Stellarator with Permanent Magnets," PPPL Summer Research Symposium.

2022 "Accelerating Core Loading Pattern Optimization with Deep Learning," UMBC Meyerhoff Research Showcase and MIT MSRP Summer Symposium.

2021 "Autonomous Framework for Android Reverse Engineering," JHU APL Summer Symposium.

Presentations

2023 "A Novel Framework for Accelerating Core Loading Pattern Optimization with Deep Learning Surrogate Models," American Nuclear Society (ANS) Student Conference (Award Winning Research Talk). *Accepted 4-page summary available upon request.*

2022 "AI/ML Supply Chain Vulnerabilities in Automotive Cyber-Physical Systems," IEEE ICAA (30 min. Technical Presentation). *Refer to the Publications section for conference details.*

2021 "AI/ML Supply Chain Vulnerabilities in Automotive Cyber-Physical Systems," UMBC Meyerhoff Research Showcase.

Honors/Awards

- 1st Place – Technical Research Exhibition at NSBE Fall Regional Conference
- 1st Place - Best Undergraduate Lightning Talk in AI at ANS Student Division
- Carmi Family Endowment Scholarship (UMBC)
- UMBC President's List – (semester 4.0 GPA)
- University of Washington Reality Lab – CSNext Computer Vision Workshop (Invitation)
- Google's CS Research Mentorship Program Scholar
- UMD Gemstone Program Project Grant Recipient
- UMBC Meyerhoff Scholar (UMBC)
- Princeton Prize in Race Relations, Certificate of Accomplishment - Washington, D.C. (2020)

Technical Inventory

Languages Python, C/C++, Java, Swift, JavaScript (Node.js)

Software ML/CV libraries (TensorFlow, PyTorch, Sci-kit Learn, Pandas, OpenCV), Linux/Windows Administration, Docker, AWS EC2, MongoDB, Node.js/Express, Twilio SMS, Neo4j, Git/GitHub, Ghidra, XCode, Android Studio

Skills Raspberry Pi 3s, Nvidia Jetson Nanos, Arduino microcontrollers

Academic Leadership

- UMBC CMSC 201 – Computer Science I Tutor
- UMBC CMSC 491 – Active Cyber Defense Unofficial TA
- UMBC CMSC 341 – Data Structures Tutor
- UMBC PHYS 121 – Introductory Physics I Tutor

Service

- NSBE Pre-Collegiate Initiative Chair - Led STEM initiatives for pre-college students.
- Science Fair Judge, Prince George's County - Evaluated student research projects.
- UMBC Meyerhoff Scholar Peer Advisor - Mentored five students.
- K-12 Mentor, Next Generation Leadership Academy - Taught coding and app development.
- Math/Science Tutor, Howard County Schools - Tutored K-12 students.

Co-Curriculars & Leadership

- National Society of Black Engineers (NSBE) - **Vice President** 2023-Present, **Pre-College Initiative Chair (Executive Board)** 2022-2023
- Meyerhoff Council - **Representative** 2022-Present
- UMBC Cyber Defense Club (Cyber Dawgs) - **President** 2022-2023, **Team Member** 2021-2023
  - Lead Windows Administrator, Mid-Atlantic Collegiate Cyber Defense Competition '23 (Regional Qualifiers).
  - Lead Windows Administrator + Presenter, Department of Energy Cyber-Force Security Competition '22 (Top 20 finish out of 144 teams).
  - Windows Administrator, MACCDC 2022 (5th place out of 8 teams).
  - Participant, Rochester Institute of Technology Information Security Talent Search, 2022.
  - Windows Administrator, Department of Energy Cyber-Force Security Competition '21 (Top 20 finish out of 120 teams).
  - Participant, MACCDC Regional Qualifiers '21.
  - Windows Administrator, CMSC 491 Active Cyber Defense Class Exercise, 2020.

Notable Projects

COVID-19 Risk Data Analytics — Evaluating Random Forest Decision Trees and SVMs to classify and understand COVID Risk by U.S County

First-Aid Medical SMS Chat Bot — Developed during the height of the Black Lives Matter protests, 'Mediconnect' is an efficient dispatch system that connects on-site medics with injured protestors via text messages

Memberships

- American Physics Society (APS)
- American Nuclear Society (ANS)
- National Society of Black Engineers (NSBE)