Andrew Balch

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EDUCATION

University of Virginia, Charlottesville, VA — Spring 2025
Bachelor of Science, Computer Science, 3.92 GPA
Relevant course work: *Human-Computer Interaction, Machine Learning, Artificial Intelligence, Systems of Inequality, Politics of Modernity, Mathematical Statistics, Data to Knowledge*

Universitat Politécnica de Valéncia, Valéncia, Spain — Fall 2022
Engineering study abroad program

Governor's School for Science and Technology | York High School, Yorktown, VA — Spring 2021
Advanced Diploma, Dual-enrolled, 4.75 GPA

RESEARCH EXPERIENCE

Undergraduate Researcher, *UVA Human-AI Technology Lab* — May 2022 - Present
- Worked alongside PhD students as an active lab member
- Lead a multi-year-long, interdisciplinary project leveraging ubiquitous devices to gain insights into micronutrient status
- Spearheaded inter-lab, inter-departmental collaboration for micronutrient spectroscopy
- Designed and built a smartphone attachment to quantify Vitamin B12 in a solution
- Collaborated with a PhD student to implement state-of-the-art Constrained Reinforcement Learning approaches for real-world safety
- Helped run human-subjects study for communicating wellness through music

Capstone Research, *advised by Professor Afsaneh Doryab* — Dec. 2023 – Apr. 2024
- Continued previous cancer treatment modeling project as my B.S.C.S capstone
- Developed a novel, data-driven visualization approach that integrates feature selection
- Demonstrated the system to the Chief of Colorectal Surgery at Emory Cancer Center

Research Mentorship, *The MITRE Corporation* — Sep. 2020 – Apr. 2021
- Mentored under a software engineer and cybersecurity expert at The MITRE Corporation
- Analyzed behavior of 17,000 Android malware samples scraped from database
- Presented a novel, deep learning-based behavior forecasting solution in TensorFlow to industry professionals

Cancer Treatment Modeling, *Emory Cancer Center* — Apr. 2020 – Sep. 2020
- Cleaned and analyzed treatment data set with Excel, Pandas, Sci-Kit Learn, MatPlotLib
- Aimed to understand prognoses and infer optimal treatment plans for over 1,800 patients

International Science and Engineering Fair Project — Aug. 2019 – Feb. 2020
- Designed, developed, and tested an autonomous robotics system powered by induction
- Proved wireless power would cut cycle time by > 50%, built system infrastructure on AWS

PUBLICATIONS

Balch, Andrew, Cardei, Maria A., Doryab, Afsaneh. (2024). "Exploring Smartphone-based Spectrophotometry for Nutrient Identification and Quantification." *arXiv preprint arXiv:2410.11027*.

Under review at IEEE International Conference on Pervasive Computing and Communications.

Balch, Andrew, Cardei, Maria A., Kranz, Sibylle, Doryab, Afsaneh. (2024). "Towards an Accessible, Noninvasive Micronutrient Status Assessment Method: A Comprehensive Review of Existing Techniques." *arXiv preprint arXiv:2408.11877*.

Under review at ACM Transactions on Computing for Healthcare.

Balch, Andrew. (2024). "Why Algorithms Remain Unjust: Power Structures Surrounding Algorithmic Inequality." *arXiv preprint arXiv:2405.18461*.

Pending submission to ACM Conference on Human Factors in Computing Systems.

PRESENTATIONS & DEMOS

Balch, Andrew, Doryab, Afsaneh. (Nov. 2024). "Feasibility of Smartphones for Accessible, Noninvasive Micronutrient Assessment." *Upcoming abstract and demo at ACM International Conference on Mobile Computing and Networking.*

Balch, Andrew, Doryab, Afsaneh. (Oct. 2024). "Data-Driven Event Sequence Visualization of Rectal Cancer Outcomes" *Poster session upcoming at UVA Engineering Research Expo, Charlottesville, VA*.

Balch, Andrew, Doryab, Afsaneh. (Apr. 2024). "Using Smartphones to Hack Human Micronutrition." *Poster session at Commonwealth Cyber Initiative Symposium, Richmond, VA*.

Balch, Andrew, Doryab, Afsaneh. (Oct. 2023). "Smartphone-Based Spectrophotometer for Vitamin B12 Quantification" *Poster session at UVA Engineering Research Expo, Charlottesville, VA*.

HONORS & AWARDS

Outstanding Undergraduate Researcher – Nominee October 2024
Computing Research Association

Dean's Undergraduate Research Fellowship Summer 2024

Outstanding Undergraduate Research - Honorable Mention April 2024
Computer Science Department

Dean's List Spring 2024

Dean's Undergraduate Research Fellowship Summer 2023

Outstanding Undergraduate Research April 2023
UVA Computer Science Department

Dean's List Fall 2023

Dean's List Spring 2023

Dean's List Spring 2022

Dean's List Fall 2021

Highest Honors in Research Methodology and Ethics Spring 2021
Governor's School for Science and Technology

First Place at Tidewater Science and Engineering Fair March 2020

SKILLS

Research: **Experienced taking an interdisciplinary, critical approach to addressing social problems**

Programming: **Adept in Python, R, Java, and C/C++ as well as Git, AWS, and Kubernetes**

Analysis Tools: **Developed projects with TensorFlow and PyTorch, proficient in MatLab, SAS, Excel, and SQL**

Data Science: **Applied exploratory data analysis, regression analysis, data embedding, etc. in professional contexts**

Prototyping: **Hands-on experience building devices with 3D printing, microcontrollers, sensors, IoT**

Languages: **Spanish at an intermediate level**