Andrew Balch

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EDUCATION

University of Michigan, Ann Arbor, MI Fall 2025
Ph.D., Information
Relevant Graduate Courses: *Qualitative Methodologies*

University of Virginia, Charlottesville, VA Spring 2025
Bachelor of Science, Computer Science with Highest Honors 3.92 GPA
Relevant Graduate Courses: *Human-Computer Interaction, Machine Learning*
Relevant Undergraduate Courses: *Ethnography (STS Research Methods), Advanced Algorithms and Implementations, Mathematical Statistics, Data to Knowledge, Systems of Inequality*

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

HONORS & AWARDS

Graduate Research Fellowship – Honorable Mention April 2025
US National Science Foundation
Outstanding Undergraduate Researcher – Finalist December 2024
Computing Research Association
Student Research Competition – 3rd Place, Undergraduate Category November 2024
ACM Conference on Mobile Computing and Networking
Dean's Undergraduate Research Fellowship Summer 2023 & 2024
UVA School of Engineering and Applied Science
Outstanding Undergraduate Research April 2023
UVA Computer Science Department
Outstanding Undergraduate Research – Honorable Mention April 2024
UVA Computer Science Department
Computer Science Graduate School Application Fund Scholarship November 2024
UVA School of Engineering and Applied Science
Dean's List Fall 2021 – Present
Highest Honors in Research Methodology and Ethics Spring 2021
Governor's School for Science and Technology

RESEARCH EXPERIENCE

Union Bargaining Capacity, *class project (Qualitative Methodologies)* Aug. 2025– Present

- Facilitated a focus group discussion with 8 participants from a local labor union
- Employed qualitative coding, thematic analysis to compare opinions of "bargaining capacity"

Undergraduate Researcher, *UVA Human-AI Technology Lab* May 2022– May 2025

- Awarded $9,600 in funding through two UVA Dean's Research Fellowships (2023, 2024)
- Collaborated with PhD students on 3 diverse research projects aimed at applying computer science tools to address social issues, as both a project leader and a contributor

- Onboarded and managed 62 participants for a semester-long Human-Computer Interaction study on communicating wellness information through music
- Served as a peer reviewer for ACM Transactions on Computing for Healthcare and ACM CHI (alt.CHI track)

Micronutrient Status Assessment, *advised by Prof. Afsaneh Doryab* May 2022 – May 2025

- Lead a team of 3 PhD and undergrad students on a multi-year, interdisciplinary project leveraging ubiquitous devices and machine learning to gain insights into micronutrient status
- Prioritized accessible design to lower barriers to assessment in underserved communities
- Analyzed the state-of-the-art literature in the field and consulted with domain experts to write a comprehensive survey paper, published in
- Coordinated an inter-lab, inter-departmental collaboration to explore the potential of smartphone-based spectrophotometry for micronutrient quantification
- Prototyped a 3D-printed smartphone attachment to measure the concentration of a key micronutrient from an image with an accuracy of 91.3%
- Demonstrated the prototype at the *ACM Conference on Mobile Computing and Networking*
- Mentored a high school student as they contributed to a signal analysis pipeline

B.S.C.S. Thesis STS Research Paper, *advised by Prof. MC Forelle* Jan. 2025 – May 2025

- Applied feature analysis to understand the mechanisms and conditions through which the features of top-grossing mobile health (mHealth) applications afford actions to their users
- Qualitatively coded app store descriptions to argue that app features required habitual self-tracking, which was motivated by appeals to affect, resulting in disparate end-user impacts

Ethics and Politics in HCI Research, *class project (Ethnography)* Jan. 2025 – May 2025

- Conducted 2 semi-structured interviews with Computer Science PhD researchers
- Direct observation of multiple events in a multi-disciplinary HCI research laboratory
- Wrote an ethnographic paper based on thematic analysis of interview and observational data

Cultural Privacy Needs in Mobile Applications, *class project (HCI)* Aug. 2024 – Dec. 2024

- Designed a Qualtrics survey to collect demographic data and app permissions granted in a variety of descriptive scenarios
- Analyzed results with statistical testing to understand the needs of diverse groups

Small Language Model Unlearning, *class project (Machine Learning)* Aug. 2024 – Dec. 2024

- Fine-tuned small language models locally on a harmful dataset (hateful tweets)
- Evaluated the real-world effectiveness of unlearning methods for ameliorating harms induced by training data

B.S.C.S. Thesis Capstone Research, *advised by Prof. Afsaneh Doryab* Dec. 2023 – Apr. 2024

- Collaborated with the Chief of Colorectal Surgery at Emory University Healthcare and Winship Cancer Center, using detailed patient treatment data from 6 cancer hospitals
- Integrated machine learning and statistical analysis into a Sankey diagram to give surgeons and clinicians more valuable and actionable information about rectal cancer treatment
- Leveraged ensemble ML techniques and feature selection to identify and model critical treatment pathways associated with specific clinical outcomes

- Proposed a novel feature selection technique for identifying meaningful features across an event-sequence, without being biased towards earlier events
- Presented a poster at the *UVA Engineering Research Expo*
- Wrote a research-focused technical report, to be included in my undergraduate thesis

Reinforcement Learning, *advised by Prof. Afsaneh Doryab* May 2023 – Dec. 2023

- Researched knowledge transfer between RL policies in safety-constrained environments
- Implemented and evaluated state-of-the-art and novel approaches using PyTorch, including Model-Agnostic Meta Learning, Policy Distillation, and Successor Features-based techniques

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

PAPERS

Balch, Andrew, Cardei, Maria A., Kranz, Sibylle, Doryab, Afsaneh. (2025). "Towards an Accessible, Noninvasive Micronutrient Status Assessment Method: A Comprehensive Review of Existing Techniques." ACM Trans. Comput. Healthcare. https://doi.org/10.1145/3743690.

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

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

ACCEPTED POSTERS & DEMOS

Balch, Andrew, Cardei, Maria A., Doryab, Afsaneh. (Oct. 2025). "Exploring Smartphone-based Spectrophotometry for Vitamin B12 Quantification." *Abstract and poster presentation at ACM international joint conference on Pervasive and Ubiquitous Computing (UbiComp).*

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

Balch, Andrew, Doryab, Afsaneh. (Nov. 2024). "Towards Smartphone-Based Monitoring of Micronutrient Status." A*bstract and poster at ACM International Conference on Bioinformatics, Computational Biology and Health Informatics.*

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

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

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

PROFESSIONAL SERVICE

Reviewer, *ACM Transactions on Computing for Healthcare* Sep. 2024
Reviewer, *ACM CHI Conference on Human Factors in Computing Systems, Alt.CHI track* Dec. 2024

SKILLS

Qualitative Research: Interviewing, participant observation, focus group facilitation, reflexive memoing

Quantitative Research: Exploratory data analysis, visualization, regression analysis, statistical testing

Programming Languages: Python, Java, C, C++, Lua, Prolog, OCaml, R, SAS

Software Development: Git, Django, SQL, Heroku, Google Cloud, AWS, Kubernetes

Data Analysis: Pandas, TensorFlow, PyTorch, Sci-Kit Learn, Pandas, MatPlotLib, Plot.ly, SciPy

Prototyping: Autodesk Inventor, SolidWorks, 3D printing, Arduino, Raspberry Pi

Languages: Spanish at an intermediate level