Arthea Valderrama

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Education

University of Massachusetts Lowell — Lowell, MA

Honors College B.S, magna cum laude, Computer Science, Minor in Mathematics — *September 2021 - August 2025*

- GPA: 3.72/4.0
- Honors thesis: "Adversarial Machine Learning." Committee: Yimin Chen, Sirong Lin
- Relevant Coursework: Probability and Statistics, Applied Statistics, Linear Algebra, Analysis of Algorithms, Computing I-IV, Calculus I-II, Software Project I-II

Experience

Cybersecurity Firmware Developer Co-Op — September 2025 – Present

Schneider Electric — *Andover, MA*

- Rehired to develop a C/C++ security library leveraging TPM2.0 to enhance device verification for automation
- Collaborating in an Agile team to track and resolve defects, ensuring products adhere to cybersecurity standards

NIH HuBMAP Research Intern — June 2025 - Present

Department of Biomedical Informatics, Harvard Medical School — *Boston, MA*

- Published and collaborated on a 1.02 million+ dataset and pipeline of natural language queries, in accordance with Gosling JSON specifications to support finetuning an LLM model with genomics interfaces on HuggingFace
- Engineered review software application in Vue and Typescript, implementing SQL retrieval of large dataset into genomics visualization API, ensuring alignment of dataset with research goals

Honors Research Fellow — September 2024 - Present

Department of Physics, University of Massachusetts Lowell — *Lowell, MA*

- Employing generative language models to improve protein design, reducing RMSD by more than 30%
- Validate protein stability with coarse-grained molecular dynamics simulations over 200ns
- Performed time-series analysis and visualizations of 200+ residue trajectories to enhance structural predictions

AI Cybersecurity Research Assistant — September 2024 - May 2025

Schneider Electric- Senior Capstone Project — *Lowell, MA*

- Investigated vulnerabilities within AI predictions, deploying algorithms dropping prediction accuracy below 10%
- Created anomaly detection model for facial recognition, achieving 97% accuracy in detecting adversarial attacks
- Launched a full-stack React.js application with integrated chatbot API on Vercel, improving LLM response time

Machine Learning Research Intern — June 2024 –August 2024

Harvard & Smithsonian Center for Astrophysics — *Cambridge, MA*

- Achieved 0.05 validation loss by building an autoencoder model using 5,000 atomic energy samples with PyTorch
- Reduced spectral computation time from 2 weeks to 2 hours by leveraging ML methods to enhance data models

Software Engineer Research Intern — June 2023 – August 2023

Harvard & Smithsonian Center for Astrophysics — *Cambridge, MA*

- Developed a C++-Python interface for spectroscopy software XSPEC, improving legacy code compatibility
- Improved spectral model accessibility for astronomers, leading to an AAS conference poster presentation

Web Developer, Research Assistant — May 2022 – June 2023

Engaging Computing Lab, University of Massachusetts Lowell — *Lowell, MA*

- Maintained and updated data visualization website with REST architecture using HTML, CSS, JavaScript, and Ruby on Rails to resolve bugs and server issues to ensure the site remains user-friendly
- Collaborated in running an after-school program to study the effects of AI, machine learning, and data science
- Led discussions and curated data on perceptions of AI in education among middle school aged participants

Publications

S. S. Walters*, **A. Valderrama***, et al., "GQVis: A Dataset of Genomics Data Questions and Visualizations for Generative AI," *IEEE VIS, Austria, 2025.* https://doi.org/10.48550/arXiv.2510.13816.

*These authors contributed equally to this work (co–first authors).

Leadership Experience

Computer Science Student Ambassador October 2024 – May 2025
University of Massachusetts Lowell *Lowell, MA*

- Lead guided tours during open house events for engaging prospective students
- Assisted staff in organizing student engagement events to maximize outreach
- Maintained and updated department website, boosting student engagement online

CREATE Peer Mentor June 2024 – August 2024
Harvard & Smithsonian Center for Astrophysics *Cambridge, MA*

- Promoted to serve as mentor for a cohort of students in science, enhancing team dynamics and collaboration
- Coordinated meetings and social events between interns and CREATE faculty, promoting an inclusive culture

Student Team Leader September 2022 – June 2023
Engaging Computing Lab *Lowell, MA*

- Managed colleagues' development environment and provided tailored resources to ensure seamless workflows and improve project efficiency on iSENSE application
- Led fellow team members to stay on track with production goals by conducting regular status updates

Honors and Awards

Honors College Fellowship September 2024

- $3,000 research grant given to a Commonwealth Honors student for pre-approved scholarly engagement with a reading component, concluding with a 15-minute presentation

Grace Hopper Scholar August 2024

- Selected as one of 9 participants to receive full sponsorship for the Grace Hopper Celebration by the Miner School of Computer and Information Sciences

National Scholar May 2020

- $20,000 highly selective, renewable scholarship awarded to an undergraduate first-year at UMass Lowell in recognition of outstanding academic achievements and potential

Technical Skills

Programming Languages: C++, Python, C, HTML, CSS, SQL, JavaScript, Ruby on Rails, R
Frameworks: React.js, Node.js, Vue, Flask, Scikit-learn, AWS CDK
Developer Tools: Git, Docker, AWS, VS Code, Visual Studio, Valgrind, Tableau, Jupyter Notebook
Libraries: PyTorch, Transformers, Pandas, NumPy, Matplotlib

Presentations

[1] Valderrama, A.L. Exploring Protein Knots with Artificial Amino Acids: Insights from AlphaFold-Driven Molecular Simulations. Poster presentation delivered at the 2025 APS New England Section (NES). November 2025.

[2] Valderrama, A.L. Machine Learning and Molecular Dynamics for Protein Topology. Poster presentation delivered at the 28th annual University of Massachusetts Lowell Student Research and Community Engagement Symposium. April 2025.

[3] Valderrama, A.L. Synthesizing Atomic Data Using Machine Learning. American Astronomical Society Meeting Abstracts. 245. Poster presentation delivered at the American Astronomical Society meeting, Washington, D.C., January 2025.

[4] Valderrama, A.L. Mending the Language Barrier: A C++ Wrapper for XSPEC's Python Module. American Astronomical Society Meeting Abstracts. 243. Poster presentation delivered at the American Astronomical Society meeting, New Orleans, LA, January 2024.