Dee Velazquez

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EDUCATION

Johns Hopkins University — Baltimore, MD
B.S. in Computer Science and Chemical & Biomolecular Engineering — 2019 – 2024

RESEARCH EXPERIENCE

Johns Hopkins University - JEFworks Lab — Baltimore, MD
Undergraduate Researcher & Post-bacc Researcher — August 2023 – present
Advisor: Jean Fan, Ph.D.

- Developing STARIT, a novel tensor-based rasterization framework to visualize subcellular transcriptomic heterogeneity from molecular-resolution spatial data
- Engineered an interactive web browser to explore spatiotemporal changes in cold ischemia kidney datasets across timepoints and tissue compartments
- Designed *scatterbar*, a CRAN R package for visualizing spatial cell-type proportions with improved clarity and interpretability over traditional scatterpie plots; wrote and published a peer-reviewed first-author manuscript describing the method

Universidad Carlos III de Madrid - EVANNI Lab — Madrid, Spain
Visiting Undergraduate Researcher — May 2023 – July 2023
Advisors: Pedro Isasi, Ph.D., Yago Saez, Ph.D., & Emilio Martin Gallardo, Ph.D.

- Designed a genetic algorithm in PyTorch to identify sparse supermasks in CNNs based on the Lottery Ticket Hypothesis, improving MNIST classification accuracy by 8.5% over random baselines
- Gained hands-on experience with convolutional neural networks, unit testing, and evolutionary computation while conducting research in a bilingual, international lab setting
- Delivered weekly progress presentations and iteratively refined model performance through advisor feedback and in-depth literature review

Johns Hopkins University - Bukowski Lab — Baltimore, MD
Undergraduate Researcher — January 2023 – May 2023
Advisor: Brandon Bukowski, Ph.D.

- Modeled lithium polysulfide interactions with metal-organic frameworks using ORCA and Python, contributing to Li–S battery catalyst optimization efforts
- Applied scikit-learn for machine learning-based prediction of molecular properties, building foundational experience in DFT (Density Functional Theory)
- Collaborated with graduate researchers and participated in computational chemistry seminars and lab meetings to deepen theoretical and practical knowledge

Johns Hopkins School of Medicine - Andrew Lab — Baltimore, MD
Undergraduate Researcher & Lab Assistant — October 2019 – March 2020
Advisor: Deborah Andrew, Ph.D.

- Supported molecular biology experiments investigating the *Malvolio* transcription factor in *Drosophila melanogaster*
- Performed PCR, gel electrophoresis, chemical stocking, DNA extraction, pipetting, and fly handling, maintaining laboratory inventory and cleanliness

PUBLICATIONS

Peer-Reviewed Papers:

- **D. Velazquez**, and J. Fan. "scatterbar: an R package for visualizing proportional data across spatially resolved coordinates". *Bioinformatics*, **41**(2), 2025. https://doi.org/10.1093/bioinformatics/btaf047

Papers Under Review/Pre-print:

- S. Singh, S. Kumar Patel, R. Matsuura, **D. Velazquez**, Z. Sun, S. Noel, H. Rabb, & J. Fan. "Spatiotemporal transcriptomic analysis of the murine kidney reveals compartment-specific changes during cold ischemic injury". *bioRxiv,* 2025. https://www.biorxiv.org/content/10.1101/2025.05.25.654911v1

TALKS & PRESENTATIONS

- **D. Velazquez**, and J. Fan. "scatterbar: an R Package for Visualizing Proportional Spatial Data". JHU Biomedical Engineering Guest Lecture, Baltimore, MD. March 3, 2025.
- **D. Velazquez**, and J. Fan. "Visualizing proportional data across spatially resolved coordinates". JHU Genomics Collective Joint Lab Meeting. Baltimore, MD. December 4, 2024
- **D. Velazquez**, C. Hallinan, and J. Fan. "Integrating Subcellular Molecular Heterogeneity through Rasterization for Enhanced Identification of Cellular Subtypes with STARIT". Biomedical Engineering Society Annual Meeting (BMES), Baltimore, MD. October 26, 2024.
- **D. Velazquez***, R. Talwar*, H. Sharma*, and U. Pradeep*. "OncoBot: Empathetic Cancer Information Through A.I.". Johns Hopkins University Design Day 2024, Baltimore, MD. May 1, 2024.

TEACHING EXPERIENCES

Guest Lecturer, Genomic Data Visualization (EN.580.428) — March 3, 2025
Course Assistant, Introduction to Human Computer-Interaction (EN.601.490/690) — January 2024 – May 2024
Course Assistant, Gateway Computing: Python (EN.500.113) — August 2024 – December 2024
Course Assistant, Mergers & Acquisitions (BU.231.740) — August 2022 – November 2022

SKILLS

Proficient in: Python, R, Java, C++, TensorFlow, PyTorch, BASH, Word, Excel, PowerPoint
Experience with: Git, MATLAB, HTML, CSS, C, JavaScript, React, Machine Learning, Deep Learning, Computer Vision, Software Engineering, R Package Development, Statistical Analysis, Cell Biology, Spatial Omics Analysis, Explainable AI

PROFESSIONAL SERVICE & ACTIVITIES

- Biomedical Engineering Society member — July 2024 – present
- Johns Hopkins oSTEM Chapter, Financial Director and Co-Head — July 2023 - May 2024
- Alpha Phi Omega (ΑΦΩ) — September 2022 - May 2024
- Hop-In/First Generation Low-Income (FLI) Network — June 2019 -May 2024
- SciComm — August 2019 – May 2021

SERVICE & OUTREACH

- Johns Hopkins First Generation Low-Income (FLI) Advisory Board — May 2023 – May 2024
- Out in STEM (oSTEM), Johns Hopkins Chapter — May 2023 – May 2024
- Alpha Phi Omega (ΑΦΩ) — September 2022 – May 2024
- Macksey Research Symposium Moderator — March 2021 – April 2021
- College Key Foundation Mentor — July 2020 – January 2021