

Pranay Vure

Duke University
Department of Biomedical Engineering
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Education

Duke University

BS, Biomedical Engineering, expected graduation May 2025.
Minor in Computational Biology
Core Areas: Molecular Engineering, Cellular Engineering
• GPA: 3.823 out of 4.0

Research

Programmable Biology Group, Duke University

Advisor: Dr. Pranam Chatterjee

June 2023 - Present

- Integrated deep learning/generative AI with protein design to develop programmable platforms for proteome engineering.

Duke Human Vaccine Institute, Duke University

Advisor: Dr. Mihai Azoitei

August 2021 - May 2023

- Experimentally produced, purified, and characterized protein products for downstream analysis of various epitope-scaffold designs.

Volgenau School of Engineering, George Mason University

Advisor: Dr. Caroline Hoemann

September 2020 - August 2021

- Conducted data mining and analysis of RNA sequencing data for differential splicing events.

Papers and Presentations

Vure, P., Pulugurta, R., Chen, T., Chatterjee, P. *IDR-pLM: IDR Ensemble Property Prediction via Protein Language Models*. Platform Presentation at BMES 2024 Conference.

Wang, L.[†], Pulugurta, R.[†], **Vure, P.[†]**, Pal, A., Zhang, Y., Chatterjee, P. ([†]equal contribution) *PepDoRA: A Unified Peptide Language Model via Weight-Decomposed Low-Rank Adaptation*. Poster Presentation at Neurips AIDrugsX 2024. Paper in review, Nature Methods.
doi: <https://doi.org/10.48550/arXiv.2410.20667>

Vincoff, S., Kholina, K., Goel, S., Pulugurta, R., **Vure, P.**, Chatterjee, P. *FusOn-pLM: A Fusion Oncoprotein-Specific Language Model via Focused Probabilistic Masking*. Nat Commun 16, 1436 (2025). doi: <https://doi.org/10.1038/s41467-025-56745-6>

Chen, T., Pertsemlidis, S., Watson, R., Kavirayuni, V.S, Hsu, A., **Vure, P.**, Pulugurta, R., Vincoff, S., Hong, L., Wang, T., Yudistyra, V., Haarer, E., Zhao, L., Chatterjee, P. *PepMLM: Target Sequence-Conditioned Generation of Therapeutic Peptide Binders via Span Masked Language Modeling*. Paper in review, Nature Biotechnology.
doi: <https://doi.org/10.48550/arXiv.2310.03842>

Bhat, S. et al., **Vure, P.**, Chatterjee, P. *De novo design of peptide binders to conformationally diverse targets with contrastive language modeling*. Sci. Adv. 11, eadr8638 (2025). doi: <https://doi.org/10.1126/sciadv.adr8638>

Kapingidza, B. et al., **Vure, P.**, Azoitei, M.L. *Engineered immunogens to elicit antibodies against conserved coronavirus epitopes*. Nature Communications 14, 7897 (2023). doi: <https://doi.org/10.1038/s41467-023-43638-9>

Chen, T., **Vure, P.**, Pulugurta, R., Chatterjee, P. *AMP-Diffusion: Integrating Latent Diffusion with Protein Language Models for Antimicrobial Peptide Generation*. Presented as poster at NeurIPS 2023 GenBio Workshop. Journal paper in preparation. doi: [www.https://doi.org/10.1101/2024.03.03.583201](https://doi.org/10.1101/2024.03.03.583201)

Chen, T., **Vure, P.**, Pulugurta, R., Chatterjee, P. *DPAC: Prediction and Design of Protein-DNA Interactions via Sequence-Based Contrastive Learning*. Poster Presentation at MOML @ MIT, 2024.

Projects

Vure, P., Chen, R., , Koneru, H., Lashkari, V., Tran, M., Gatongi, M., Kim, C. *Transient Delivery of ALDH2 via Adeno-Associated Virus to Mitigate Alcohol-Induced Toxicity*. (2024).

Kavirayuni, V.S., **Vure, P.**, Yerrabelli, R., Goodingham, E.P., Hong, L., Tran, M., Gatongi, M., Chatterjee, P. *Design of NCAM1 Specific Binders Towards Neuroendocrine Prostate Cancer Therapy*. (2024).

Vure, P., Hsu, A., Pulugurta, R., et al., Chatterjee, P. *DISTCLIP: Advancing Protein-Protein Interaction Predictions Through Contrastive Learning of Distograms*. (2024).

Vure, P. et al., Chatterjee, P. *Anti-CRISPR Tune: Fine-Tuning ProtGPT2 and ESM-2 for the Generative Design of Anti-CRISPR Proteins*. (2024).

D'Cunha, R., **Vure, P.**, Docters, S., Baldwin, B., Le, P. *Modeling Effects of Humalog and Ozempic on Glucose and Insulin Dynamics in Healthy & Type 2 Diabetes Patients*. (2023).

Teaching

Department of Biomedical Engineering, Duke University

Teaching Assistant, BME 221: Biomaterials, S2024, Summer2024

Department of Innovation & Entrepreneurship, Duke University

Course Instructor, HOUSECS 59: Venture Launchpad: From Idea to Impact, S2024

Department of Computer Science, Duke University

Teaching Assistant, CS240: Race, Gender, Class, & Computing, F2022, S2023, F2023

Activities and Leadership

The Cube

President, 2023-2024

- President of the largest entrepreneurship community at Duke, overseeing 50+ members.
- Held events connecting students with successful entrepreneurs, venture capitalists, and founders who provided mentorship and insights into the startup world.

Duke Biomedical Engineering Society (BMES)

VP of Alumni Relations and Professional Development, 2024

- Facilitated communication and interaction with Duke biomedical engineering alumni.
- Organized alumni and industry panels and career-planning events for entirety of the biomedical engineering student body.

Duke Theta Tau

VP of Service, 2022-2023 / Board Member, 2023-2024

- Executive board member of the largest engineering community at Duke.
- Organized and held community service events for members with local partner organizations. Built a network of organizations spanning from a housing center for Duke Cancer Institute outpatients to Habitat for Humanity.

Professional Experience

Data Science/R&D Intern, Medtronic

Summer 2024

- Quantified sympathetic control of the renal vasculature via time-series analysis of arterial temperature, impedance, and pressure blood flow signals.
- Developed an indicator to predict the efficacy/success of renal denervation treatments.

Founding Engineer, Valinor Discovery

Summer 2024 - Present

- Worked closely with the CEO to build an ML platform to identify and validate drug targets for systemic organ aging.
- Company secured several hundred thousand dollars in angel investments to validate the platform and allow for the development of a perturbation model for aging-related disease pathways.

Awards and Fellowships

Medtronic Campus Ambassador (2023-present)

1st Place Award - Health & Wellness Track, HackDuke 2022

- Developed a low-cost, efficient, at-home spirometry test: [Link to project](#)

Award Winner, Pratt School of Engineering Student Design Fair 2022

- Developed a floating barge capable of holding 500+ lbs. of trash, which was designed for the Ellerbe Creek Watershed Association.

Award Winner, Rice University RespiraCon II 2022

- Developed a device aiming to adjust the humidity for continuous positive airway pressure (CPAP) machines.

Booz Allen Hamilton Vision Scholar (2021-present)

Governor's School for Medicine and Health Science (2020)

Skills & Other Info

Programming: Python, Java, R

Computational Skills: ML, Deep Learning, Generative AI, NLP, Statistics

Computational Tools: PyTorch, TensorFlow, HuggingFace, ESM-2, AlphaFold2, Rosetta Software Suite

Lab: Bacterial transformation, Mammalian transfection, Bacterial/Mammalian Cell Culture, Endotoxin Assay, Protein Purification, ELISA Assay, Western Blot, Flow Cytometry, PCR, qRT-PCR, SDS-PAGE, SPR

Interests: Volleyball, Gardening, Traveling, Learning new skills (currently: bonsai)