Varuna Jasodanand

varunaja@bu.edu

EDUCATION

Boston University 2022 – Current
PhD Student, Behavioral Neurosciences *4.0 GPA*

Post-Baccalaureate Courses 2021 – 2022
Calculus I, General Chemistry I & II, Organic Chemistry I & II *4.0 GPA*

Bryn Mawr College 2020
Bachelor of Arts in Psychology & Philosophy, Neuroscience Minor *3.76 GPA*

RESEARCH EXPERIENCE

Doctoral Researcher 2023 – Current
Boston University, Kolachalama Laboratory
PI: Dr. Vijaya Kolachalama

- Leveraging AI-based frameworks for diagnosis and staging of biological Alzheimer's disease.
- Developing computer vision models for clinically relevant neuroimaging data representation.
- Applying survival models to proteomics data to identify novel prognostic protein biomarkers.
- Implementing and evaluating large language models for neurology applications.

Data Science Intern 2025
Novartis Biomedical Research, Human Genetics & Targets
Co-mentors: Dr. Sarah Spencer, Dr. Andrea Byrnes, Dr. Victoria Eastham

- Developed a reusable, version-controlled pipeline integrating internal and external multi-omics data for systematic target identification and prioritization.
- Deployed a Dash-based web application with dynamic data tables enabling cross-functional teams to evaluate and prioritize therapeutic targets.

Neuroimaging Analyst 2020 – 2022
Vanderbilt University, Vanderbilt Memory and Alzheimer's Center
Co-PIs: Dr. Angela Jefferson, Dr. Timothy Hohman

- Examined the relationship between cardiovascular health and brain aging.
- Built preprocessing and analysis pipelines for multimodal neuroimaging and clinical data.

Thesis Research Student 2019 – 2020
Bryn Mawr College, Grafe Laboratory
PI : Dr. Laura Grafe

- Analyzed behavioral and EEG data to study sex differences in stress-induced sleep impairments in rats.
- Conducted behavioral tasks and used cryosectioning and immunohistochemistry to assess cognitive flexibility and stress resilience.

Undergraduate Research Fellow 2019 – 2020
University of Pennsylvania, Center for Neuromodulation in Depression and Stress
PI: Dr. Desmond Oathes

- Supported recruitment efforts, collection of psychophysiological data, neuroimaging data quality check and clinical data organization using UNIX shell scripting.
- Conducted statistical analyses on the effects of individualized transcranial magnetic stimulation on mood in major depressive disorder.

SKILLS

Machine Learning & Statistical Analysis

- Deep learning (CNNs, transformers) and traditional ML for predictive modeling in Python.
- LLM chain-of-thought prompt engineering, LLM inference and evaluation with vLLM.
- AI model deployment with Streamlit on HuggingFace.
- Statistical modeling in Python and R.

Neuroimaging Biomarkers

- Image processing: segmentation (FreeSurfer, FastSurfer, CAT12, SynthSeg, LST), registration (SPM, ANTs), skull-stripping (FSL, SynthStrip).
- Quantitative analysis: morphometrics, perfusion, white matter microstructure and lesion quantification, PET SUVR and centiloid pipelines.

Computational Biology & Biomarker Discovery

- Proteomics: differential abundance analysis, survival modeling.
- Transcriptomics: single-cell RNA-seq differential gene expression, gene-set enrichment.

Data Engineering & Infrastructure

- Production pipelines: version-controlled, reproducible workflows for multi-omics data.
- Database integration: SQL, REST/GraphQL APIs, enterprise data systems.

Programming & Development

- Python (proficient): PyTorch, numpy, scikit-learn, pandas, nibabel, MONAI, scanpy, AnnData.
- R (proficient): statistical modeling packages, tidyverse, ggplot2.
- Bash (proficient): scripting, file management, HPC job submission.
- GitHub, BitBucket (proficient): version control.

Laboratory & Clinical Research

- Immunofluorescence microscopy, cryosectioning, and behavioral neuroscience (attentional set shifting, stress paradigms in rodents).
- Multimodal 3T MRI acquisition; neuropsychological and psychophysiological assessments.

Collaborative Project Management

- Confluence, Jira, Miro, Asana, Notion.

PUBLICATIONS

Manuscript under review

- Jia, S., Bit S., **Jasodanand, V. H.**, Liu, Y., & Kolachalama, V.B. (2025). Agentic memory-augmented retrieval and evidence grounding for medical question-answering tasks. medRxiv. https://www.medrxiv.org/content/10.1101/2025.08.06.25333160v1

Published Works

- **Jasodanand, V. H.**, Bellitti, M., & Kolachalama, V. B. (2025). An AI-first framework for multimodal data in Alzheimer's disease and related dementias. Alzheimer's & dementia : the journal of the Alzheimer's Association, 21(9), e70719. https://doi.org/10.1002/alz.70719

- **Jasodanand, V. H.**, Kowshik, S. S., Puducheri, S., Romano, M. F., Xu, L., Au, R., & Kolachalama, V. B. (2025). AI-driven fusion of multimodal data for Alzheimer's disease biomarker assessment. Nature Communications, 16(1), 7407. https://doi.org/10.1038/s41467-025-62590-4

- Jia, S., Bit, S., Searls, E., Lauber, M.V., Fan, P., Wang, W.M., Claus, L.A., **Jasodanand, V.H.**, Veerapaneni, D., Au, R. and Kolachalama, V.B., 2025. PodGPT: An audio-augmented large language model for research and education. npj Biomedical Innovations, 2(1), p.26. https://doi.org/10.1038/s44385-025-00022-0

- Xue, C.*, Kowshik, S. S.*, Lteif, D., Puducheri, S., **Jasodanand, V. H.**, Zhou, O. T., Walia, A. S., Guney, O. B., Zhang, J. D., Pham, S. T., Kaliaev, A., Andreu-Arasa, V. C., Dwyer, B. C., Farris, C. W., Hao, H., Kedar, S., Mian, A. Z., Murman, D. L., O'Shea, S. A., … Kolachalama, V. B. (2024). AI-based differential diagnosis of dementia etiologies on multimodal data. *Nature Medicine*, *30*(10), 2977–2989. https://doi.org/10.1038/s41591-024-03118-z

- Lauber, M. V.*, Bellitti, M.*, Kapadia, K., **Jasodanand, V. H.**, Au, R., & Kolachalama, V. B. (2024). Global amyloid burden enhances network efficiency of tau propagation in the brain. Journal of Alzheimer's disease : JAD, 13872877241294084. Advance online publication. https://doi.org/10.1177/13872877241294084

- Ravaglia, I. C., **Jasodanand, V.**, Bhatnagar, S., & Grafe, L. A. (2024). Sex differences in body temperature and neural power spectra in response to repeated restraint stress. *Stress*, 27(1), 2320780. https://doi.org/10.1080/10253890.2024.2320780

- Archer, D. B., Schilling, K., Shashikumar, N., **Jasodanand, V.**, Moore, E. E., Pechman, K. R., Bilgel, M., Beason-Held, L. L., An, Y., Shafer, A., Ferrucci, L., Risacher, S. L., Gifford, K. A., Landman, B. A., Jefferson, A. L., Saykin, A. J., Resnick, S. M., Hohman, T. J., for the Alzheimer's Disease Neuroimaging Initiative. (2023). Leveraging longitudinal diffusion MRI data to quantify differences in white matter microstructural decline in normal and abnormal aging. *Alzheimer's & Dementia: Diagnosis, Assessment & Disease Monitoring*, 15(4), e12468. https://doi.org/10.1002/dad2.12468

- Yang, Y., Schilling, K., Shashikumar, N., **Jasodanand, V.**, Moore, E. E., Pechman, K. R., Bilgel, M., Beason-Held, L. L., An, Y., Shafer, A., Risacher, S. L., Landman, B. A., Jefferson, A. L., Saykin, A. J., Resnick, S. M., Hohman, T. J., & Archer, D. B. (2023). White matter microstructural metrics are sensitively associated with clinical staging in Alzheimer's disease. *Alzheimer's & Dementia: Diagnosis, Assessment & Disease Monitoring*, 15(2), e12425. https://doi.org/10.1002/dad2.12425

- Gargiulo, A. T., **Jasodanand, V.**, Luz, S., O'Mara, L., Kubin, L., Ross, R. J., Bhatnagar, S., & Grafe, L. A. (2021). Sex differences in stress-induced sleep deficits. *Stress*, 24(5), 541–550. https://doi.org/10.1080/10253890.2021.1879788

POSTERS

- **Jasodanand, V. H.**, Kowshik, S. S., Puducheri, S., Romano, M.F., Xu, L., Au, R., Kolachalama, V.B. (2025), Multimodal machine learning for assessment of amyloid-beta and tau PET positivity status. *Alzheimer's & Parkinson's Disease International Conference*.

- Archer, D. B., Shashikumar, N., **Jasodanand, V**., Moore, E. E., Pechman, K. R., Bilgel, M., Beason-Held, L. L., An, Y., Shafer, A. T., Risacher, S. L., Landman, B. A., Jefferson, A. L., Saykin, A. J., Resnick, S. M., Hohman, T. J., & Initiative, A. D. N. (2022). Sex differences in white matter microstructure in aging and Alzheimer's disease: A multi-site free-water imaging study. *Alzheimer's & Dementia*, *18*(S5), e066752. https://doi.org/10.1002/alz.066752

- Archer, D. B., Shashikumar, N., **Jasodanand, V.,** Moore, E. E., Murray, S., Pechman, K. R., Bilgel, M., Beason-Held, L. L., An, Y., Risacher, S. L., Landman, B. A., Jefferson, A. L., Saykin, A. J., Resnick, S. M., & Hohman, T. J. (2023). The association between 73 Alzheimer's disease risk variants and white matter microstructural decline in aging. *Alzheimer's & Dementia*, *19*(S16), e079087. https://doi.org/10.1002/alz.079087

HONORS AND AWARDS

Clinical & Translation Science Institute Poster Award, Boston University 2025
- Awarded first place for poster presentation at the 12th CTSI Symposium

Departmental Honors in Psychology and Philosophy, Bryn Mawr College 2020

Clinical & Translational Science Award, University of Pennsylvania 2019

Summer Science Research Fellowship, Bryn Mawr College 2018

TEACHING EXPERIENCE

Teaching Assistant 2017 – 2019

Bryn Mawr College, French and Francophone Studies
- Led independent teaching sessions and facilitated class discussion through creative teaching methods to accommodate diverse learning styles.

Guest Lecturer 2020

Rider University, Introduction to Psychology
- Lecture on the fundamentals of brain aging and Alzheimer's disease.

LEADERSHIP

Swim Team Captain 2013 – 2020
- Co-captain for 2019 and 2020 seasons on Bryn Mawr College Women's Varsity Swim Team.
- Mauritius national swim team captain at African Championships (2013, 2016).