Neda Sardaripour

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Summary

A Ph.D. candidate in Biomedical Engineering with expertise in developing and applying computational models to decode complex biological systems from multiscale, multimodal data. My experience spans from building statistical and machine learning models to formulating quantitative, mechanistic frameworks, enabling novel insights from diverse multiomics datasets including genomics, neuroimaging, EHR and biosignals. I am seeking a Research position dedicated to advancing foundational research and improving human health through data-driven discovery.

Education

Vanderbilt University Nashville, TN
Ph.D. Candidate in Biomedical Engineering *Jan 2021 – Fall 2025 (expected)*

Research: Advanced Signal Processing and Machine Learning for Physiological and Neuroimaging Data

K. N. Toosi University of Technology Tehran, Iran
M.Sc. in Biomedical Engineering, Bioelectrics *Aug 2016 - Dec 2020*

Thesis: Investigating the visual system function and improving the evaluation of LGN Region in MS patients using fMRI

Research Experience

Transcriptomic and Cellular Basis of Large-Scale Brain Network Individuality *Ongoing*

- Refined and optimized a multimodal data pipeline to integrate large-scale neuroimaging, transcriptomics, and human brain cell-type data, ensuring data integrity and accuracy.
- Developed an iterative multiview learning pipeline that improved feature selection efficiency, enabling more precise decoding of molecular drivers of brain networks.

GeneExpression, Neuroimaging and Clinical Data Integration *2021 - 2024*

- Designed, implemented, and validated a novel framework to harmonize imputed gene expression, neuroimaging, and clinical data.
- Leveraged advanced statistical and machine learning methodologies to boost region-specific prediction accuracy, identifying significant genes across 8 brain regions critical for clinical insight.

Visual System Dysfunction in Multiple Sclerosis(MS) Patients *2018 - 2020*

- Engineered optimized fMRI protocols and visual stimulation paradigms to acquire high-fidelity time-series data from 38 subjects, ensuring maximum signal quality from the physiological source.
- Applied spectral analysis to 260 fMRI volumes per subject, identifying a significant reduction in BOLD signal that localized functional impairments in the lateral geniculate nucleus.

AI-Based ECG Signal Processing for Abnormality Detection *2018 - 2021*

- Developed a piecewise linear segmentation algorithm for ECG waveform feature extraction, achieving 97.2% sensitivity and 96.1% positive predictive value on large-scale clinical datasets.
- Implemented advanced preprocessing and feature engineering pipelines that enhanced the classification of cardiovascular diseases, reducing misclassification error by 15% on the HCM dataset.

Technical Skills

Programming Languages: Python, Matlab, Linux/Bash Scripting
Tools: Git, Jupyter, Visual Studio, PyCharm, Freesurfer, FSL, Genomics Toolbox:GCTA

Publications

- **N. Sardaripour**, et al. *"Multiview Integration of Brain Morphometry, Connectivity, and Transcriptomics Reveals Shared Gene-Regional-Network Pathways"*. **Under Preparation**.
- N. Hoang, **N. Sardaripour**, et al. *"Integration of estimated regional gene expression with neuroimaging and clinical phenotypes at biobank scale"*. **PLOS Biology**, **2024**.
- K. Nezamabadi, **N. Sardaripour**, et al. *"Unsupervised ECG Analysis: A Review*. **IEEE Reviews in Biomedical Engineering"**, **2022**.
- K. Nezamabadi, S.Sivalokanathan, J.Lee, T.Tanriverdi, M.Chen, D.Lu, **N. Sardaripour**, et al. *"Explainable Artificial Intelligence Identifies and Localizes Left Ventricular Scar in Hypertrophic Cardiomyopathy Using 12-Lead Electrocardiogram"*. medRxiv preprint, 2024. **Recently Accepted in Scientific Reports**.
- **N. Sardaripour**, et al. *"Functional Impairment of the Lateral Geniculate Nucleus in Multiple Sclerosis"*. **bioRxiv preprint**, **2022**.
- **N. Sardaripour**, et al. *"Assessment of Functional Disorders of Magno, Parvo, and Konio-Cellular Pathways in MS Patients Using fMRI"*. **Iranian Journal of Biomedical Engineering**, **2019**.

Professional Service

Peer-Review: Served as a reviewer for the following Journals (+20 reviews) *2020 – present*

- *Signal, Image and Video Processing*
- *IEEE Access*
- *Journal of Medical Internet Research (JMIR) Cardio*

Steering Committee: Women of VISE – Served on the executive board of the Vanderbilt Institute for Surgery and Engineering (VISE) *2022 – 2023*

Teaching

2024	**Teaching Assistant**,*Biomedical Engineering Lab*	*Vanderbilt University*
2021	**Teaching Assistant**, *Intro to Engineering: Microfluidics in BME*	*Vanderbilt University*
2021	**Teaching Assistant**, *Biomedical Devices and Systems' Design*	*Vanderbilt University*
2019	**Teaching Assistant**, *Statistical Pattern Recognition*	*K.N.Toosi University*
2019	**Teaching Assistant**, *Digital Image Processing*	*K.N.Toosi University*
2019	**Teaching Assistant**, *Functional Brain Imaging System*	*K.N.Toosi University*
2018	**Workshop**, *Preprocessing and Analysis of fMRI Data*	*K.N.Toosi University*

Selected Talks & Poster Presentations

2025	*Society for Neuroscience (SfN) conference* - Poster presentation	*San Diego, CA*
2024	*19th VUIIS annual retreat* - Oral presentation	*Nashville, TN*
2024	*10th Annual BRAIN Initiative conference* - Poster presentation	*Bethesda, MD*
2023	*SfN conference* - Oral presentation in Nanosymposium	*Washington DC*
2023	*American Society of Human Genetics (ASHG) conference* - Poster presentation	*Washington DC*
2022	*SfN conference* - Poster presentation	*San Diego, CA*
2022	*Vanderbilt University Institute for Imaging Science annual retreat* - Oral presentation	*Nashville, TN*

Academic Achievements & Recognitions

2025	Society for Neuroscience (SfN) Trainee Professional Development Award	*San Diego, CA*
2025	Allen Brain Institute Travel Award, "Describe Your Neurons Like the Allen Institute"	*Allen Institute, Seattle*
2023	Vanderbilt Award for Doctoral Discovery	*Vanderbilt University*
2021	Biomedical Engineering Doctoral fellowship	*Vanderbilt University*
2020	Graduated in the top 5% of the class, ranked 2nd	*K.N.Toosi University*