Jesseba **Fernando**

PhD Student · Network Science Institute

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Education

Northeastern University — *Boston, MA*
PhD Network Science — *Aug. 2023 - present*
- Advisor: Dr. Samuel V. Scarpino

University of Connecticut — *Storrs, CT*
BSc & MSc Neurobiology — *Aug. 2012 - May 2018*
- Honors Thesis and MSc Advisor: Dr. Joseph LoTurco

Research Experience

Northeastern University - Network Science Institute — *Boston, MA*
Advisor: Dr. Samuel V. Scarpino — *Aug. 2023 - Present*

Dana Farber Cancer Institute — *Boston, MA*
Supervisor: Dr. William Lotter — *Jan. 2023 - Aug. 2023*
- Paper: "Beyond Structured Attributes: Image-Based Predictive Trends for Chest X-Ray Classification"

Harvard Medical School/Beth Israel Deaconness Medical Center — *Boston, MA*
Supervisor: Dr. Mark Andermann — *2018 - 2022*
- Projects: Imaging cortical neurons over weeks across initial learning and reversal to better understand encoding strategies of cues and outcomes in postrhinal cortex; Exploring the role of serotonin on retinal information flow to thalamus; Study role of offline cortical reactivations in memory consolidation for both stimulus response and prediction.

University of Connecticut - Dept of Physiology and Neurobiology — *Storrs, CT*
Advisor: Dr. Joseph LoTurco — *2013-2016*
- Honor's Thesis: "Time Course Synapse Development in Interneurons of the Disinhibitory Circuits of Somatosensory Cortex"

Publications

** equally contributing authors*

Published

Marco Nurisso, **Jesseba Fernando**, Raj Deshpande, Alan Perotti, Raja Marjieh, Steven M. Frankland, and Richard L. Lewis, Taylor W. Webb, Declan Campbell, Francesco Vaccarino, Jonathan D. Cohen, Giovanni Petri. 2025. Bound by semanticity: universal laws governing the generalization-identification tradeoff. ICLR 2026 preprint arXiv:2502.12131.

Fernando, Jesseba, Grigori Guitchounts. 2025. Transformer Dynamics: A neuroscientific approach to interpretability of large language models. arXiv preprint arXiv:2506.14797.

Fernando, Jesseba*, Katharina V. Hoebel*, William Lotter. 2024. Beyond Structured Attributes: Image-Based Predictive Trends for Chest X-Ray Classification. Machine Learning for Biomedical Imaging, PMLR 250:610-640, 2024.

Nguyen, Nghia D., Andrew Lutas, Oren Amsalem, **Jesseba Fernando**, Andy Young-Ahn, Richard Hakim, Josselyn Vergara, Justin McMahon, Jordane Dimidschstein, Bernardo L Sabatini, Mark L Andermann. 2024. Cortical reactivations predict future sensory responses. Nature, 625 (7993), 110-118.

Reggiani, Jasmine DS, Qiufen Jiang, Melanie Barbini, Andrew Lutas, Liang Liang, **Jesseba Fernando**, Fei Deng, Jinxia Wan, Yulong Li, Chinfei Chen, Mark L Andermann. 2023. Brainstem serotonin neurons selectively gate retinal information flow to thalamus. Neuron, 111 (5), 711-726. e11.

McGuire, Kelly L., Oren Amsalem, Arthur U Sugden, Rohan N Ramesh, **Jesseba Fernando**, Christian R Burgess, Mark L Andermann. 2022. Visual association cortex links cues with conjunctions of reward and locomotor contexts. Current Biology, 32 (7), 1563-1576. e8.

Awards, Fellowships, & Grants

2024

2024	**Workshop Travel Award**, UCLA's Intitute of Pure and Applied Mathematics
2025; 2026	**NetSI Spring Travel Award**, Network Science Institute
Summer '26	**AccelNet-MultiNet Fellowship**, AccelNet-MultiNet program

Presentations

*† presenting author; * equally contributing authors*

Talks

Jan 2025. *From Neurons to Networks: Unraveling Adaptive Learning Mechanisms in Mice and Machines*. Contributory talk: NetSciX, Indore, India.

May 2025. *From Neurons to Networks: Unraveling Adaptive Learning Mechanisms in Mice and Machines*. Invited Participant at the Working Group for Foundations of Adaptive Networks, Santa Fe Institute, Santa Fe, NM.

May 2025. *Transformer Dynamics: A neuroscientific approach to interpretability of large language models*. Spotlight Talk: Sixth International Conference on Mathematics of Neuroscience and AI, Split, Croatia.

September 2025. *From Neurons to Networks: Unraveling Adaptive Learning Mechanisms in Mice and Machines*. Contributory Talk: Conference on Complex Systems, Siena, Italy.

Posters

Fernando, Jesseba*†, Katharina V. Hoebel*, William Lotter. 2024. Beyond Structured Attributes: Image-Based Predictive Trends for Chest X-Ray Classification. Poster: Medical Imaging with Deep Learning, Paris, France.

Fernando, Jesseba†, Marilyn Gatica, Giovanni Petri, Samuel V. Scarpino. 2024. Multi-scale Analysis of Learning Dynamics in Biological and Artificial Neural Systems. Poster: IPAM Naturalistic Approaches to Intelligence Workshop, Los Angeles, CA.

Fernando, Jesseba†, Marilyn Gatica, Giovanni Petri, Samuel V. Scarpino. 2025. Unraveling Adaptive Learning Mechanisms in Mice and Machines. Poster: NetSI Student Research Symposium, Boston, MA.

Fernando, Jesseba, Grigori Guitchounts. 2025. Transformer Dynamics: A Neuroscientific Approach to Interpretability of Large Language Models. Poster: Conference on Cognitive Computational Neuroscience, Amsterdam, NL

Teaching Experience

2017-2018	**PNB 2275: Physiology and Neurobiology II**, Teaching Assistant	*UConn*
2016-2017	**PNB 2274: Physiology and Neurobiology I**, Teaching Assistant	*UConn*
2017	**Integrative Neurobiological Imaging**, Teaching Assistant	*UConn*

Mentoring

2020-2021	**Praveena Prasad**, Research Technician, Harvard Medical School	*HMS/BIDMC*
2019-2020	**Lilly Rupert**, Undergraduate Co-Op, Northeastern University	*HMS/BIDMC*
2019-2020	**Hannah Lauterwasser**, Undergraduate Co-Op, Northeastern University	*HMS/BIDMC*
2019-2020	**Amanda Hasbrouck**, Undergraduate Co-Op, Northeastern University	*HMS/BIDMC*
2018-2020	**Inga Shurnayte**, Undergraduate Co-Op; Research Technician, Northeastern University	*HMS/BIDMC*
2018-2019	**Chayanne Gumbs**, Undergraduate Co-Op, Northeastern University	*HMS/BIDMC*

Professional Experience

2023	**Research Assistant**, Dana Farber Cancer Institute - Data Science Department
2022-2023	**Consultant**, E11 Bio
2018-2023	**Senior Research Associate**, Harvard Medical School
2016-2018	**Graduate Teaching Assistant**, Physiology and Neurobiology, University of Connecticut
2013-2016	**Undergraduate Research Assistant**, Physiology and Neurobiology, University of Connecticut

Outreach & Professional Development

Service and Outreach

'24-'25	**Students, Networks, And Collaborations (SNACs) Seminar**, Organizer
'24-'25	**Network Science Institute's Graduate Student Association**, Events Coordinator
'24-present	**Theoretical Neuroscience Reading Group**, Organizer
Mar 2025	**Network Science Student Research Symposium**, Chair
Sept 2025	**CCS 2025 Satellite: Complexity in the Brain**, Chair
March 2026	**CoSyNe 2026 Workshop: Renormalization Principles in Neural Systems**, Chair

Development

UCLA Institute of Pure and Applied Mathematics Workshop: Mathematical Approaches for Connectome Analysis, an interdisciplinary workshop brought together neuroscientists and mathematicians to address the challenges of analyzing large-scale neural connectivity data ("connectomes").

Neuromatch Computational Neuroscience, a code-first computational neuroscience course where my group presented our work on "Adaptive Decision-Making in Mice: Behavioral Strategies under Symmetric and Asymmetric Visual Stimuli Probabilities".

MIT CBMM Summer School: Brains, Minds, Machines Summer School, an intensive summer school focused on the problem of intelligence from neuroscience, cognitive science, and artificial intelligence perspectives. I presented my work on "Adaptive Reinforcement Learning Models for Mouse Decision-Making in Visual Discrimination Tasks" at the culmination of the school.

UCLA Institute of Pure and Applied Mathematics Workshop: Naturalistic Approaches to Intelligence Workshop, an interdisciplinary workshop exploring biologically-inspired AI paradigms beyond traditional neural networks. I presented my work and engaged with researchers developing novel algorithms aiming to establish rigorous mathematical foundations for these naturalistic AI approaches.

Santa Fe Institute Working Group on Foundations of Adaptive Networks, a collaboration exploring complex systems where network structure and node-level dynamics mutually influence each other in order to better model real-world phenomena. I presented my work and engaged with other researchers outlining a perspective piece to come out of the workshop.