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

February	**Workshop Travel Award**, UCLA's Intitute of Pure and Applied Mathematics	*$ 1,725*
February	**NetSI Spring Travel Award**, Network Science Institute	*$ 1,000*

2025

May	**NetSI Spring Travel Award**, Network Science Institute	*$ 1,000*

2026

March	**NetSI Spring Travel Award**, Network Science Institute	*$ 1,000*
May-July	**AccelNet-MultiNet Fellowship**, AccelNet-MultiNet program	*$ 8,350*

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	*Boston, MA*
'24-'25	**Network Science Institute's Graduate Student Association**, Events Coordinator	*Boston, MA*
'24-present	**Theoretical Neuroscience Reading Group**, Organizer	*remote*
Mar 2025	**Network Science Student Research Symposium**, Chair	*Boston, MA*
Sept 2025	**CCS 2025 Satellite: Complexity in the Brain**, Chair	*Siena, IT*
March 2026	**CoSyNe 2026 Workshop: Renormalization Principles in Neural Systems**, Chair	*Lisbon, PT*

Peer Review

Cerebral Cortex

Development

UCLA Institute of Pure and Applied Mathematics Workshop: Mathematical Approaches for Connectome Analysis, an interdisciplinary workshop to address the challenges of analyzing large-scale neural connectivity data.

Neuromatch Computational Neuroscience, a code-first computational neuroscience course, work presented 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 summer school focused on the problem of intelligence, work presented 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.

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.