

# Jesseba Fernando

PHD STUDENT · NETWORK SCIENCE INSTITUTE

Northeastern University, 360 Huntington Ave, Boston, MA 02115

✉ fernando.je@northeastern.edu | 🏠 jesseba.github.io | 🐦 @richlyn\_jesseba

## Education

### Northeastern University

PHD NETWORK SCIENCE

- Advisor: Dr. Samuel V. Scarpino

Boston, MA

Aug. 2023 - present

### University of Connecticut

BSc & MSc NEUROBIOLOGY

- Honors Thesis and MSc Advisor: Dr. Joseph LoTurco

Storrs, CT

Aug. 2012 - May 2018

## Research Experience

### Northeastern University - Network Science Institute

ADVISOR: DR. SAMUEL V. SCARPINO

Boston, MA

Aug. 2023 - Present

### Dana Farber Cancer Institute

SUPERVISOR: DR. WILLIAM LOTTER

- Paper: "Beyond Structured Attributes: Image-Based Predictive Trends for Chest X-Ray Classification"

Boston, MA

Jan. 2023 - Aug. 2023

### Harvard Medical School/Beth Israel Deaconess Medical Center

SUPERVISOR: DR. MARK ANDERMANN

- 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.

Boston, MA

2018 - 2022

### University of Connecticut - Dept of Physiology and Neurobiology

ADVISOR: DR. JOSEPH LOTURCO

- Honor's Thesis: "Time Course Synapse Development in Interneurons of the Disinhibitory Circuits of Somatosensory Cortex"

Storrs, CT

2013-2016

## Publications

*\* equally contributing authors*

### PUBLISHED

**Fernando, Jesseba**, Grigori Guitchoants. 2025. Transformer Dynamics: A neuroscientific approach to interpretability of large language models. arXiv preprint arXiv:2502.12131.

**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, Chinfai 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

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2024

2024 **Workshop Travel Award**, UCLA's Institute of Pure and Applied Mathematics

\$ 1,620

## Presentations

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<sup>†</sup> *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. *Transformer Dynamics: A neuroscientific approach to interpretability of large language models*. Spotlight Talk: Sixth International Conference on Mathematics of Neuroscience and AI, Split, Croatia.

### POSTERS

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

## Teaching Experience

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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

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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

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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

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### SERVICE AND OUTREACH

- '24-present **Students, Networks, And Collaborations (SNACs) Seminar**, Organizer
- '24-present **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

### 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 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**, an upcoming collaboration exploring complex systems where network structure and node-level dynamics mutually influence each other in order to better model real-world phenomena like disease spread through populations, infrastructure systems, and social dynamics where timescale interactions create complex feedback loops.