Shivang Rawat

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Education

Courant Institute of Mathematical Sciences, New York University — New York, NY
Ph.D. in Mathematics (GPA: 4.0/4.0); Advisor: Stefano Martiniani — *Jan. 2022 – July 2025*

- Thesis: Divisive Normalization as a Mechanism for Stable and Efficient Recurrent Neural Computation

University of Minnesota — Minneapolis, MN
Master of Science in Chemical Engineering — *Aug. 2019 – Dec. 2021*

Indian Institute of Technology (IIT) Roorkee — Roorkee, India
Bachelor of Technology in Chemical Engineering — *Aug. 2015 – May 2019*

Work Experience

The Sequel Institute (Telepath) — New York, NY
AI Research Scientist — *Aug. 2025 – present*

DLR (German Aerospace Center) — Lampoldshausen, Germany
Summer Internship — *May 2018 – July 2018*

- Developed a time-efficient ray tracing algorithm and spectral model for the creation of 2-D line-of-sight integrated images from CFD models of flames in rocket engines.

Awards/Scholarships

- Wilhelm T. Magnus Memorial Prize for significant contributions to mathematical sciences, 2025.
- APS DBIO Travel Award, 2024.
- MacCracken Fellowship to support Ph.D. at NYU, 2022.
- Arnie Fredrickson Fellowship to support Ph.D. at UMN, 2019.
- DAAD-WISE scholarship for undergraduate summer internship, 2018.
- KVPY (Kishore Vaigyanik Protsahan Yojana) Scholar, 2015.

Research Articles

- **Rawat, S.**, Morello, M., Morone, F., & Heeger, D. J. (2026). Prospective Coding Improves Learning in Deep Continuous-Time Recurrent Networks. *Advances in Neural Information Processing Systems (Spotlight).*
- Morone, F.*, **Rawat, S.***, Heeger, D. J., & Martiniani, S. (2026). Stabilization of recurrent neural networks through divisive normalization. *Proceedings of the National Academy of Sciences*, 123(30), e2601841123.
- Pal, A., **Rawat, S.**, Heeger, D. J., & Martiniani, S. (2026). Hierarchical Neural Circuit Theory of Normalization and Inter-areal Communication. *eLife*, 111297.1.
- **Rawat, S.**, Heeger, D., & Martiniani, S. (2024). Unconditional stability of a recurrent neural circuit implementing divisive normalization. *Advances in Neural Information Processing Systems*, 37, 14712-14750.
- **Rawat, S.**, & Martiniani, S. (2024). Element-wise and recursive solutions for the power spectral density of biological stochastic dynamical systems at fixed points. *Physical Review Research*, 6(4), 043179.

* equal contribution

Preprints

- McClain, K.*, **Rawat, S.***, Morrell, M., Martiniani, S., Heeger, D. J., & Morone, F. (2026). A minimal mechanism to generate long timescales without fine tuning. arXiv preprint arXiv:2608.21586.
- **Rawat, S.**, Morone, F., Heeger, D. J., & Martiniani, S. (2026). Exact Variance and Fano Factor for Arbitrary Level Crossings in Stationary Gaussian Processes. arXiv preprint arXiv:2605.25278.

Research Presentations

- Contributed talk at APS March Meeting, 2025, 'Unconditional stability of a recurrent neural circuit implementing divisive normalization.'
- Poster presentation at Neural Information Processing Systems (NeurIPS), 2024, 'Unconditional stability of a recurrent neural circuit implementing divisive normalization.'
- Poster presentation at From Neuroscience to Artificially Intelligent Systems (NAISys), 2024, 'Unconditional stability of a recurrent neural circuit implementing divisive normalization.'
- Poster presentation at Computational and Systems Neuroscience (COSYNE), 2024, 'A comprehensive large-scale model of primary visual cortex (V1).'
- Poster presentation at Cognitive Computational Neuroscience, 2024, 'A comprehensive large-scale model of primary visual cortex (V1).'
- Spotlight talk at Mathematics of Neuroscience and AI, 2023, 'Coherence influences the dimensionality of communication subspaces.'
- Poster presentation at COSYNE, 2023, 'Coherence influences the dimensionality of communication subspaces.'
- Contributed talk at APS March Meeting, 2023, 'Theory of communication for stochastic recurrent neural networks.'
- Contributed talks at APS March Meeting, 2021–2022: 'Generalized ORGaNICs: Towards a Unifying Framework for Neural Dynamics' (2021); 'A simple theory of stochastic dynamics near stable fixed points' (2022).
- Poster presentations at NAISys (2020, 2022) and Neuroscience (2021) on generalized ORGaNICs, resonance in stochastic models of cortical circuits, and spectral analysis of normalization circuits.

Teaching Experience

- TA for Intro. to Math Analysis, Graduate Course, Fall 2022, Courant NYU
- TA for Chemical Engineering Design, Undergraduate Course, Spring 2021, University of Minnesota

Professional Service

- Reviewer, Neural Information Processing Systems (NeurIPS), 2025, 2026
- Reviewer, International Conference on Learning Representations (ICLR), 2027

Technical Skills

Research Areas: Continual learning, recurrent neural networks and state space models, biologically plausible learning, dynamical systems and stability theory, stochastic processes and spectral analysis
Languages: Python, C/C++
Scientific Software: MATLAB, Mathematica, LaTeX, Illustrator
Developer Tools: Git, VS Code, PyCharm
Cloud & Compute: AWS, GPU training
Libraries: PyTorch, pandas, scikit-learn, NumPy, Matplotlib