Anik Chattopadhyay

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Education

University of Florida — Gainesville, FL
PhD Candidate in Computer Science, GPA: 3.97/4 — *July 2024*
Master of Science in Computer Science, GPA: 4/4 — *Dec 2019*

Indian Institute of Technology, Guwahati — Guwahati, Assam
Bachelor of Technology in Computer Science and Engineering, GPA: 8.44/10 — *May 2013*

Academic Experience

Research Assistant in Computational Neuroscience — Jan 2018 - Present
CISE dept., University of Florida — *Gainesville, FL*

- Developed a novel framework for coding/decoding of continuous-time signals using a biological **spiking neurons.**
- Derived the reconstruction bounds for the proposed framework applied to a generalized class of **FRI** signals.
- Validated the framework on about a thousand audio snippets from a large repository, showing an average SNR of **20 dB at 1/5** of the Nyquist rate, and demonstrating superior performance over state-of-the-art convolutional sparse coding techniques in the low spike rate regime, both in terms of accuracy and runtime.

Research Assistant in Machine Learning — Jan 2021 - Present
UF Genetics Institute — *Gainesville, FL*

- Developed a machine learning-guided pipeline for viral vector design, including classification and generative models for predicting rAAV assembly and creating a library of rAAV mutants.
- Trained a **Transformer**-based model on a dataset of approximately 21 million viral sequences, achieving $\approx 73\%$ accuracy in capsid assembly prediction, representing an $\approx 8\%$ **improvement** over the benchmark.

Teaching Assistant — Aug 2018 - Present
CISE dept., University of Florida — *Gainesville, FL*

- Teaching assistant for courses including Machine Learning Engineering (CAI4104/6108: Sp '24), Advanced Machine Learning (CAP6617: Sp '24), Machine Learning (CAP6610: Sp '23, Fa '20, Fa '18), Applied Machine Learning (CAP6617: Sp '22, Sp '21), Data Structures & Algorithms (COP3530: Su '22), Math for Intelligent Systems (COT5615: Fa '22, Sp '19, Fa '18), Programming Language Fundamentals (COP4020: Su '21), and Applied Discrete Structures (COT3100: Fa '23).

Professional Experience

Software Development Engineer, Intern — May 2017 – Dec 2017
Optym — *Gainesville, FL*

- Implemented optimized algorithms and data models, including a multi-dimensional range tree, for SkyWorks, an airline scheduling display developed for **Amadeus** (serving **1.7 billion** passengers annually), improving load times by $\approx$ **70**% and enhancing scalability. Contributed to two successful project phases.

Software Engineer — Aug 2013 – Aug 2016
EMC Corporation, Enterprise Content Division — *Bangalore, India*

- Built backend REST resources for Capital Project Thermal, a cloud-based document solution on Documentum, supporting projects for **hundreds** of clients in the oil, gas, and construction industries, improving document handling by $\approx$ **30**%.
- Refactored the monolithic REST solution into microservices, boosting scalability and cutting downtime by $\approx$ **40**%.

Software Development Engineer, Intern — May 2012 – July 2012
Amazon, Inc. — *Hyderabad, India*

- Migrated payment soft-decline email generation from Perl to a Java framework and improved the email content.

Technical Skills

Languages/Libraries: Java, Python, C/C++, C#, SQL, Matlab, JavaScript, NumPy, Pandas, Scikit-learn, NetworkX
Frameworks/Tools: Spring, JUnit, PyTorch, TensorFlow, Hadoop, Spark, Git, Docker, AWS, Anaconda, Jupyter

Select Graduate Courses

Advanced Machine Learning, Medical Image Analysis, Computer Vision, Machine Learning, Intro to Data Science, Distributed Operating System, Analysis 1, Modern Analysis 2

Publications & Patent

• *Chattopadhyay, A. and Banerjee, A. (2024). Robust Online Reconstruction of Continuous-Time Signals from a Lean Spike Train Ensemble Code. arXiv preprint arXiv:2408.05950. Currently under review with* ***IEEE Transactions on Signal Processing****.*
• *Chattopadhyay, A. and Banerjee, A., "Beyond Rate Coding: Signal Coding and Reconstruction Using Lean Spike Trains"* ***ICASSP****, Rhodes, Greece, 2023.*
• *Chattopadhyay, A. and Banerjee, A., "Efficient and Robust Spike Ensemble Coding of Signals" Accepted for presentation at the* ***NeurIPS*** *2024 Compression Workshop, December 2024.*
• *Chattopadhyay, A., and Banerjee, A. (2019). Signal Coding and Perfect Reconstruction using Spike Trains. arXiv preprint arXiv:1906.00092.*
• *A. Banerjee and A. Chattopadhyay, "Signal Encoding and Reconstruction via Spiking Neuron Modeling,"* ***U.S. Provisional Patent Application No. 63/502,735*** *filed May 17, 2023 (Patent pending)*

Collaborative Projects

Movie Search Engine | *Python, NetworkX* Aug 2019 – Dec 2019

- Implemented backend APIs for an **in-memory graph database** in a team project, enabling the development of a movie search engine, achieving around **90**% accuracy with less than 1s average response time.

IoT-based Temperature Indicator | *Java, Websocket* Oct 2016 – Dec 2016

- Led a 4-member team to build an IoT temperature indicator using a three-tier architecture with **BBB** devices, UDP to an edge server, and Java **Websocket** to a cloud server.

Invited Talks and Poster Presentations

- **Poster Presentation:** *"Efficient and Robust Spike Ensemble Coding of Signals"* at Compression Workshop, NeurIPS Conference (December 2024)
- **Poster Presentation:** *"Beyond Rate Coding: Signal Coding and Reconstruction Using Lean Spike Trains"* at Sigma Xi Conference, University of Florida (March 2024) and IEEE ICASSP Conference (July 2023)
- **Invited Talk:** *"Signal Coding and Perfect Reconstruction Using Spike Trains"* at Seminar at Dr. Joel Harley's Lab, ECE Department, University of Florida (November 2019)

Achievements and Involvements

- Gartner Group Graduate Fellowship (2023, 2019); Academic Achievement Award (2016); Travel Grants, UF CISE Department and Research Office for ICASSP (2023) and NeurIPS (2024), University of Florida
- Reviewer, ICASSP (2023, 2024); Member, IEEE, IEEE Young Professionals, IEEE Signal Processing Society
- EMC ECD Hackathon Winner (2016), EMC Excellence Silver Award (2014)
- 1st and 2nd prizes, Dimension '12 and '11 (Cryptography Contest), IIT Guwahati
- Ranked top 0.6% in IIT-JEE '09, top 0.05% in AIEEE '09, top 0.01% in WBJEE '09
- Chess Captain, Dihing Hostel ('11); Silver Medalist, Spardha '11, IIT Guwahati

References

- Aruanva Banerjee
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  CISE Dept.
  University of Florida
  arunava@ufl.edu
- Alireza Entezari
  Associate Professor
  CISE Dept.
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- Vincent Bindschaedler
  Assistant Professor
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