Shourya Bose
Phone - (+1) 831-239-7205
Email - shbose@ucsc.edu
Github - Link, Google Scholar - Link, LinkedIn - Link

ABOUT ME

I am a fifth-year Ph.D. candidate with the ECE Department at UC Santa Cruz. My research covers **federated learning**, **foundation models**, **convex optimization**, and **reinforcement learning** applied for tasks in electric power systems. I also have experience with **fine-tuning** of **large language models (LLMs)**. Having a strong mathematical background, I excel at creating mathematical AI/ML (and other) models and converting them into efficient code.

ACADEMICS AND SKILLS

1. ***Programming languages*** Python (with PyTorch, JAX), C, Matlab (and Simulink), SQL, LaTeX
2. ***Graduate Courses*** Machine (Deep) Learning, Numerical & Convex Optimization, Control Theory & Optimal Control, Analysis of Algorithms, Optimization & Economics of Power Systems
3. ***Undergraduate Courses*** Various abstract math & numerical computation courses, Various control, power electronics & systems courses, Electrodynamics
4. ***Teaching*** TA for CSE20 (Python programming), ECE30 (Engineering principles of electronics), ECE13 (Computer Systems and C Programming), Mentor for SIP 2021 & 2022

EDUCATION

1. **Ph.D. Electrical and Computer Engineering** **Sep 2020 - June 2025 (expected)**
   University of California Santa Cruz, California, USA
   - Part of Energy, Optimization & Data Analytics Lab with PI Dr. Yu Zhang.
   - Recipient of Chancellor's and Dissertation-year Fellowship. Completed my master's coursework with a 3.96 GPA and now focusing on research.
   - Studying the intersection of machine learning, optimization, and control theory for applications in electric power systems.
2. **B.E. Electrical and Electronics Engineering & M.Sc. Mathematics** **2014-2019**
   BITS Pilani Goa Campus, Goa, India
   - Graduated with a dual degree, B.E. in Electrical and Electronics Engineering and an M.Sc in Mathematics.
   - Spent last year of studies at Department of Electrical Engineering, Indian Institute of Science (IISc) for thesis.

WORK EXPERIENCE

1. **Research Aide Technical, Ph.D.** **Jun 2024 - Dec 2024**
   Argonne National Laboratory, Illinois, USA
   - Researching foundation models for time-series forecasting, and federated finetuning thereof with Dr. Kibaek Kim.
   - Worked on finetuning base models and foundation models on 40+ Nvidia A100 GPUs. Results published in NeurIPS Workshop "Time Series in the Age of Large Models".
   - Working further on implementing federated model finetuning with APPFL.
2. **Givens Associate** **Jun 2023 - Sep 2023**
   Argonne National Laboratory, Illinois, USA
   - Researching privacy-preserving federated learning of load forecasting data with Dr. Kibaek Kim.
   - Working with PyTorch APPFL package.
   - Working remotely as visiting student after end of on-site duration in September.
3. **Project Associate** **Mar 2020 - Aug 2020**
   Indian Institute of Science, Bengaluru, India
   - Worked on event-triggered control with the same group as the previous internship.
   - Theoretical research led to publication of first-author article in IET Control Theory and Applications.
4. **Research Intern** **Jan 2019 - Feb 2020**
   Indian Institute of Science, Bengaluru, India
   - Worked as a part of the Control & Network Systems Group.
   - Researched multi-scale search algorithms for a UAV with downward pointing sensor with implementation in MATLAB.
5. **Research Intern** **Jan 2019 - Dec 2019**
   Pixxel, Bengaluru, India
   - Volunteered to do orbital simulations to calculate number of satellites needed in constellation for target parameters like coverage, revisit time, etc.
   - Used AGI STK and NASA GMAT software, along with some post-processing in MATLAB.

FIRST-AUTHOR PUBLICATIONS - JOURNALS

1. "A Mixture-of-Gradient-Experts Framework for Accelerating AC Optimal Power Flow", **S. Bose**, K. Chen, Y. Zhang, Under Review at a double-blind journal.
2. "Load Restoration in Islanded Microgrids: Formulation and Solution Strategies", **S. Bose** and Y. Zhang, *IEEE Transactions on Control of Network Systems*, 2023, Link.
   - **Award:** INFORMS Energy, Natural Resources and the Environment (ENRE) 2021 early-career best paper award.
3. "Event-Triggered Second-Moment Stabilisation under Action-Dependent Markov Packet Drops", **S. Bose** and P. Tallapragada, *IET Control Theory & Applications*, 2019, Link.

FIRST-AUTHOR PUBLICATIONS - CONFERENCES

1. "From RNNs to Foundation Models: An Empirical Study on Commercial Building Energy Consumption", **S. Bose**, Y. Li, Y. Zhang, and K. Kim, *NeurIPS Workshop on Time Series in the Age of Large Models, 2024*, Link.
2. "Addressing Heterogeneity in Federated Load Forecasting with Personalization Layers", **S. Bose** and K. Kim, 2023, *IISE Conference and Expo, 2024*, arXiv Link.
3. "Privacy-Preserving Load Forecasting for Personalized Model Obfuscation", **S. Bose**, Y. Zhang and K. Kim, *IEEE PES-GM 2024*, Link.
4. "On LinDistFlow Model Congestion Pricing: Bounding the Changes in Power Tariffs", **S. Bose**, K. Chen and Y. Zhang, *IEEE ISGT 2023*, Link.
   - **Award:** IEEE Student and Young Professional (SYPA) Travel Grant, UCSC Dean's Travel Grant
5. "Co-optimization of Battery Routing and Load Restoration for Microgrids with Mobile Energy Storage Systems", **S. Bose** and Y. Zhang, *IEEE PES-GM 2022*, Link.
6. "Differentially Private Load Restoration for Microgrids with Distributed Energy Storage", **S. Bose** and Y. Zhang, *IEEE ISGT 2022 NA*, Link.
7. "Event-Triggered Second Moment Stabilization under Markov Packet Drops", **S. Bose** and P. Tallapragada, *Fifth Indian Control Conference, 2019*, Link.

OTHER PUBLICATIONS AND REPORTS

1. "Federated Short-Term Load Forecasting with Personalization Layers for Heterogeneous Clients", **S. Bose** and K. Kim, arXiv Link.
2. "Unsupervised Deep Learning for AC Optimal Power Flow via Lagrangian Duality", K. Chen, **S. Bose** and Y. Zhang, *IEEE GLOBECOM 2022*, Link.
3. "Numerical Solution for a System of Fractional Differential Equations with Applications in Fluid Dynamics and Chemical Engineering", B. Prakash, A. Setia and **S. Bose**, *International Journal of Chemical Reactor Engineering*, 2017, Link.

AWARDS AND HONORS

These are excluding the awards for specific conferences or papers.

1. **Dissertation Year Fellowship, UCSC:** Highly competitive scholarship to cover funding for final year of Ph.D.
2. **Learning to Run a Power Network (L2RPN, 2023) by TU Delft:** Competition to use RL and RL-adjacent techniques to ensure reliable operation of power grids. Our team (myself, Q. Yang, Y. Zhang) placed **first** among 30+ teams and won 1500 euros.
3. **Chancellor's Fellowship, UCSC:** Highly competitive scholarship to financially cover first year of PhD studies.
4. **Hult Prize Regionals, 2016:** Social entrepreneurship competition organized by Hult Institute. Our team placed first.