Shourya Bose

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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. As a part of ∼1-year internship at Argonne National Laboratory, I was involved in **pre-training** and **fine-tuning** of foundation models with contemporary architectures on **multi-GPU clusters**, including adapter design for **language, time-series, and vision** transformers. My programming language of choice is **Python**.

I can start roles from **August 2025** or later. I can start with **OPT** but will require **H1B/O1** sponsorship in the future.

ACADEMICS AND SKILLS

1. ***Programming languages***   Python (with PyTorch (distributed), JAX, Mpi4py), C, Matlab (and Simulink), AMPL
2. ***Artificial Intelligence***   Foundation Models, Transformer (Vision/LLM/Time-Series) Pretraining & Finetuning, Reinforcement Learning, Federated Learning
3. ***Graduate Courses***   Machine (Deep) Learning, Numerical & Convex Optimization, Control Theory & Optimal Control, Analysis of Algorithms, Optimization & Economics of Power Systems
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 - August 2025 (expected)**

   University of California Santa Cruz, California, USA
   - Part of Energy, Optimization & Data Analytics Lab with PI Prof. 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.
   - Collaborating with Prof. Shaowei Chen on catalyst discovery using large-scale **graph neural-network foundation models**.

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 10+ Nvidia A100 GPUs nodes. Results published in NeurIPS '24.
   - Continuing work under a UCSC-Argonne collaboration on **multimodal foundation models** for weather-cognizant load forecasting.

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.

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. "Physics-Informed Gradient Estimation for Accelerating Deep Learning-Based AC-OPF", K. Chen, **S. Bose**, and Y. Zhang, *IEEE Transactions on Industrial Informatics*, 2025, Link.
3. "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.
4. "Event-Triggered Second-Moment Stabilisation under Action-Dependent Markov Packet Drops", **S. Bose** and P. Tallapragada, *IET Control Theory & Applications*, 2019, Link.

PUBLICATIONS - CONFERENCES

1. "From RNNs to Foundation Models: An Empirical Study on Commercial Building Energy Consumption", **S. Bose**, Y. Li, A.V. Sant, 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, *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. "Unsupervised Deep Learning for AC Optimal Power Flow via Lagrangian Duality", K. Chen, **S. Bose**, and Y. Zhang, *IEEE GLOBECOM 2022*, Link.
6. "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.
7. "Differentially Private Load Restoration for Microgrids with Distributed Energy Storage", **S. Bose** and Y. Zhang, *IEEE ISGT 2022 NA*, Link.
8. "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. "Error analysis of a Haar wavelets-based numerical method with its application to a nonlinear fractional dengue model", B. Prakash, A. Setia, and **S. Bose**, *International Journal of Computer Mathematics*, Link.
2. "Federated Short-Term Load Forecasting with Personalization Layers for Heterogeneous Clients", **S. Bose** and K. Kim, arXiv 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.