Sarasij Banerjee

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Education

Arizona State University Aug 2021 ∼ Dec 2025
Ph.D. in Chemical Engineering *GPA: 4/4*

Indian Institute of Technology Kanpur Jul 2017 – May 2021
Bachelor of Technology in Chemical Engineering *GPA: 3.26/4*

Technical Skills

Related Coursework: System Identification, Model Predictive Control, State Estimation, Digital Control, Linear Systems Theory, Stochastic and Convex Optimization, Maths for Machine Learning, Numerical Methods, Digital Signal Processing

Software and Programming: Matlab & Simulink, C++, Python, SQL, MongoDB

Library: Eigen, OSQP, Odeint, CPLEX, CasADi, NumPy, SciPy, PyTorch, Pandas

Work Experience

IFAPA Research Center, Andalusia, Spain Nov 2023 – Present

Control-Relevant Modeling and Model Predictive Control for Sustainable Microalgae Production (MATLAB)

- Developed novel **signal design** and **system identification** framework for a real-life industry-scale photobioreactor.
- Solved challenges in training data requirement by conceptualizing innovative multisine signals **(64% cost reduction)**.
- Improved control precision using a **multi-degree-of-freedom MPC**, resulting in a **34% reduction** in operational cost.

Control Systems Engineering Lab, ASU Jan 2022 – Present

Data-Driven Estimation And Control Of Highly Interacting Chemical Reactor System (C++, MATLAB)

- Innovated a combined **data-centric** estimation and **nonlinear control** approach for complex **multivariable** systems.
- Prototyped a **robust Kalman-Filter-based MPC**, significantly improving setpoint tracking and reducing the effect of disturbances to **50%** for a highly interacting and nonlinear reactor model, over conventional MPC.
- Coded the full identification and controller stack in C++ and MATLAB, ensuring minimal latency.

Modeling and Control Of Physical Activity For Human Behavior Improvement (C++, Python, MATLAB)

- Engineered systematic dynamic modeling and control of **real-time behavior** for improving daily physical activity.
- Reduced computational time from **7 hours to 8 minutes** for model estimation through **stochastic** search routines.
- Worked with multi-disciplinary teams to execute **MIQP-based Hybrid MPC** improving activity of **48 participants**.

Power Electronics and Control Engineering Lab, ASU May 2020 – Aug 2020

Neural-Network-based Direct Inverse Control of a Step-Down Power Converter (MATLAB)

- Developed a novel neural-network-based controller algorithm for a 48V-1V converter for **datacenter** applications.
- Validated (a) a well-regulated output voltage with **±1% ripple** and (b) undershoot/overshoot of the output voltage within a band of **±3%** subjected to 100% load transient as per the Point-of-Load application requirements.

Awards and Achievements

- Awarded membership to the nationally recognized Tau Beta Pi Engineering Honors Society.
- Outstanding Graduate Teaching Assistant. Awarded to only 3 graduate students across the school of engineering, ASU.
- INSPIRE scholarship, Ministry of Science & Technology, India. Awarded to top 1% students of each state of India.

Publications

S. Banerjee, O. Khan, M. El Mistiri, D.E. Rivera, "A Data-Driven Hybrid Model Predictive Control Framework for Managing Epidemics Using 3DoF-KF HMPC [In Press]" *American Control Conference*, 2025

S. Banerjee, 0. Khan, M. El Mistiri, N.N. Nandola, D.E. Rivera "Data-Driven Control of Highly Interactive Systems using 3DoF Model-On-Demand MPC: Application to a MIMO CSTR." *IFAC Symposium on System Identification*, 2024

S. Banerjee, P. Otálora, M. El Mistiri, J.L. Guzman, D.E. Rivera "Control-Relevant Input Signal Design For Integrating Processes: Application to a Microalgae Raceway Reactor." *IFAC Symposium on System Identification*, 2024

S. Banerjee, R.T. Kha, D.E. Rivera, E. Hekler, "Predicting Goal Attainment in Control-Oriented Behavioral Interventions Using a Data-Driven System Identification Approach." *IFAC Journal of Process Control*, 2023

Positions of Responsibility

- Conference Reviewer for IFAC World Congress 2023, ACC 2023, and IFAC Conference on Advances in PID Control 2024.
- Mentored an MS student for the academic year 2022-2023 for an applied project aimed at degree completion.
- Served as a Graduate Teaching Assistant of the senior-year undergraduate course on Process Dynamics and Control.