

# Sarasij Banerjee

+16232730782 | sarasij.banerjee@asu.edu | linkedin.com/in/sarasij | https://github.com/bsarasij  
1655 E University Dr, Apt 2047, Tempe AZ, 85288

## EDUCATION

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**Arizona State University**  
*Ph.D. in Chemical Engineering*

Aug 2021 ~ Dec 2025  
GPA: 4/4

**Indian Institute of Technology Kanpur**  
*Bachelor of Technology in Chemical Engineering*

Jul 2017 – May 2021  
GPA: 3.26/4

## TECHNICAL SKILLS

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**Related Coursework:** System Identification, Model Predictive Control, State Estimation, Digital Control, Robust Control, Linear Systems Theory, Stochastic and Convex Optimization, Maths for Machine Learning

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

**Library:** Eigen, CPLEX, CasADi, NumPy, SciPy, PyTorch, Pandas

## WORK EXPERIENCE

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**IFAPA Research Center, Andalusia, Spain**

Nov 2023 – Present

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

- 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 MIMO Chemical Reactor System**

- 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.

**Predictive Modeling and Control Of Physical Activity For Human Behavioral Intervention**

- 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**

- 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

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- 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

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**S. Banerjee**, O. 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

O. Khan, M. El Mistiri, **S. Banerjee**, D.E. Rivera, E. Hekler “Hybrid Model Predictive Control of Mixed Logical Dynamical Systems Subject to Measured and Unmeasured Disturbances, and Applications” *IFAC Control Engineering Practice*, 2023

## POSITIONS OF RESPONSIBILITY

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- 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 Graduated Teaching Assistant of the senior-year undergraduate course on Process Dynamics and Control.