Bhathiya Rathnayake

Baltimore, MD   brathna1@jh.edu   +1 (518) 596 5193   Publications   in LinkedIn   My Website

EDUCATION

University of California San Diego   **Jul 2022 – Jun 2025**
PhD in Electrical Engineering (Intelligent Systems, Robotics, & Control), GPA: 3.85/4.0   *San Diego, CA*
Rensselaer Polytechnic Institute   **Jan 2020 – May 2022**
MS in Computer & Systems Engineering, GPA: 3.89/4.0   *Troy, NY*
University of Peradeniya   **Jan 2014 – Oct 2017**
BSc in Electrical & Electronic Engineering, GPA: 3.65/4.0   *Sri Lanka*

SKILLS

Control Systems: Non-linear Control, Hybrid Systems Control, Adaptive Control, Model Predictive Control
Electrical Engineering: Power Systems, Power Electronics, Analog Circuits
Robotics: Reinforcement Learning, Optimization, State Estimation, SLAM, Motion Planning
Data Science: Probabilistic Modeling, Statistical Methods
Scientific Machine Learning: TensorFlow, Keras, PyTorch, Scikit-learn
Coding Languages: Matlab/Simulink, Python, C++
Application Areas: Energy Systems, Traffic Flow, Water Systems, Natural Gas Systems

AWARDS

ROSEI Postdoctoral Fellowship 2025 - Ralph O'Connor Sustainable Energy Institute, Johns Hopkins University

PUBLICATIONS

Journals

(1) **B. Rathnayake** and M. Diagne, "Global exponential stabilization of 2x2 linear hyperbolic PDEs via dynamic event-triggered backstepping control," ***accepted*** for publication in Automatica

(2) E. Somathilake, **B. Rathnayake**, and M. Diagne, "Output feedback periodic event-triggered and self-triggered control of coupled 2x2 linear hyperbolic PDEs," Automatica, vol. 179, p. 112433, 2025

(3) P. Zhang⋆, **B. Rathnayake**⋆, M. Diagne, and M. Krstic, "Performance-barrier event-triggered PDE control of traffic flow," to appear in IEEE Transactions on Automatic Control, 2025 (⋆***equal contributions***)

(4) **B. Rathnayake**, M. Diagne, J. Cortes, and M. Krstic, "Performance-barrier event-triggered control of a class of reaction-diffusion PDEs," Automatica, vol. 174, p. 112181, 2025

(5) **B. Rathnayake** and M. Diagne, "Observer-based periodic event-triggered and self-triggered boundary Control of a class of parabolic PDEs," IEEE Transactions on Automatic Control, vol. 69, no. 12, pp. 8836 - 8843, 2024

(6) **B. Rathnayake** and M. Diagne, "Observer-based event-triggered boundary control of the one-phase Stefan problem," International Journal of Control, vol. 97, no. 12, pp. 2975-2986, 2024

(7) **B. Rathnayake**, M. Diagne, and I. Karafyllis, "Sampled-data and event-triggered boundary control of a class of reaction-diffusion PDEs with collocated sensing and actuation," Automatica, vol. 137, p. 110026, 2022

(8) **B. Rathnayake**, M. Diagne, N. Espitia, and I. Karafyllis, "Observer-based event-triggered boundary control of a class of reaction-diffusion PDEs," IEEE Transactions on Automatic Control, vol. 67, no. 6, pp. 2905 – 2917, 2022

(9) E. M. M. B. Ekanayake, H. M. H. K. Weerasooriya, D. Y. L. Ranasinghe, S. Herath, **B. Rathnayake**, G. M. R. I. Godaliyadda, M. P. B. Ekanayake, and H. M. V. R. Herath, "Constrained nonnegative matrix factorization for blind hyperspectral unmixing incorporating endmember independence," IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, vol. 14, pp. 11853 - 11869, 2021

(10) **B. Rathnayake**, E. M. M. B. Ekanayake, K. Weerakoon, G. M. R. I. Godaliyadda, M. P. B. Ekanayake, and H. M. V. R. Herath, "Graph-based blind hyperspectral unmixing via nonnegative matrix factorization," IEEE Transactions on Geoscience and Remote Sensing, vol. 58, no. 9, pp. 6391-6409, 2020

Conference Proceedings

(1) P. Zhang, **B. Rathnayake**, M. Diagne, and M. Krstic, "Performance-barrier periodic event-triggered PDE control of traffic flow," in 2024 IEEE Conference on Decision and Control, IEEE, 2024, pp. 4947–4954

(2) **B. Rathnayake**, M. Diagne, J. Cortes, and M. Krstic, "Performance-barrier-based event-triggered boundary control of a class of reaction-diffusion PDEs," in 2024 American Control Conference, IEEE, 2024, pp. 5313–5319

(3) P. Zhang, **B. Rathnayake**, M. Diagne, and M. Krstic, "Performance-barrier-based event-triggered boundary control of congested ARZ traffic PDEs," IFAC-PapersOnLine, vol. 58, no. 10, pp. 182–187, 2024

(4) **B. Rathnayake** and M. Diagne, "Self-triggered boundary control of a class of reaction-diffusion PDEs," in 2023 IEEE Conference on Decision and Control, IEEE, 2023, pp. 6887–6892

(5) **B. Rathnayake** and M. Diagne, "Periodic event-triggered boundary control of a class of reaction-diffusion PDEs," in 2023 American Control Conference, IEEE, 2023, pp. 1800–1806

(6) **B. Rathnayake** and M. Diagne, "Observer-based periodic event-triggered boundary control of the one-phase Stefan problem," IFAC-PapersOnLine, vol. 56, no. 2, pp. 11 415–11 422, 2023

(7) **B. Rathnayake** and M. Diagne, "Event-based boundary control of the stefan problem: A dynamic triggering approach," in 2022 IEEE Conference on Decision and Control, IEEE, 2022, pp. 415–420

(8) **B. Rathnayake** and M. Diagne, "Event-based boundary control of one-phase stefan problem: A static triggering approach," in 2022 American control conference, IEEE, 2022, pp. 2403–2408

(9) **B. Rathnayake**, M. Diagne, and I. Karafyllis, "Sampled-data boundary control of a class of reaction-diffusion PDEs with collocated sensing and actuation," in 2021 IEEE Conference on Decision and Control, IEEE, 2021, pp. 434–441

(10) **B. Rathnayake**, M. Diagne, N. Espitia, and I. Karafyllis, "Event-triggered output-feedback boundary control of a class of reaction-diffusion PDEs," in 2021 American Control Conference, IEEE, 2021, pp. 4069–4074

(11) E. Ekanayake, **B. Rathnayake**, E. Ekanayake, A. Rathnayake, H. Herath, G. Godaliyadda, and M. Ekanayake, "Enhanced hyperspectral unmixing via non-negative matrix factorization incorporating the end member independence," in 2019 IEEE International Geoscience and Remote Sensing Symposium, IEEE, 2019, pp. 2256–2259

(12) **B. Rathnayake**, K. Weerakoon, G. Godaliyadda, and M. Ekanayake, "Toward finding optimal source dictionaries for single channel music source separation using nonnegative matrix factorization," in 2018 IEEE Symposium Series on Computational Intelligence, IEEE, 2018, pp. 1493–1500

(13) **B. Rathnayake**, K. Weerakoon, G. Godaliyadda, and M. Ekanayake, "A robust control paradigm for path following of an underwater robotic vehicle," in 2018 International Conference on Computer Science & Education, IEEE, 2018, pp. 1–6.

RESEARCH EXPERIENCE

Johns Hopkins University   **Jul 2025 – Present**
ROSEI Postdoctoral Fellow — Focus: Power Systems, Inverter-based Resources, Safety-   *Baltimore, MD*
Critical Control

- Developing safety-critical control frameworks for inverter-dominated power systems to guarantee operational constraints on voltage, frequency, and current
- Designing decentralized and distributed controllers to ensure scalability and minimal communication among inverter-based resources
- Modeling and controlling power systems using hybrid systems formulations to incorporate both continuous dynamics and discrete events; integrating event-triggered control strategies to reduce communication overhead
- Investigating physics-informed AI techniques and data-driven approaches for black-box modeling and real-time safe control of renewable-rich grids

University of California San Diego   **Jul 2022 – Jun 2025**
Graduate Student Researcher — Focus: PDEs, Event-triggered Control, Traffic/Water   *San Diego, CA*
Systems

- Solved the global exponential stability problem for linear parabolic & hyperbolic PDEs under event-triggered control with dynamic triggering, addressing a problem that had **remained unsolved for 7 years**
- Developed the **first** periodic event-triggered and self-triggered control strategies for parabolic & hyperbolic PDEs with industrial applications in traffic control and water management in reservoirs
- Simulated traffic and water systems to validate the developed control algorithms
- Documented results in research articles published in IEEE Transactions on Automatic Control (IEEE TAC) & Automatica

Los Alamos National Laboratory   **Jul 2024 - Aug 2024**

Graduate Intern (remote) — Focus: Estimation and Control of Gas Flow in Pipeline   *Remote Internship*
Networks

- Developed observers and controllers for gas pipeline networks subject to uncertainties
- Simulated gas flow in pipelines to validate the developed control algorithms
- Documented results in a research paper published in the proceedings of the American Control Conference (ACC) 2025 [Available online: https://arxiv.org/abs/2409.17413]

Rensselaer Polytechnic Institute   **Apr 2020 - May 2022**

Graduate Research Student — Focus: PDEs, Event-triggered Control, 3D Printing   *Troy, NY*

- Developed event-triggered boundary control strategies for physics-based model of melting processes (Stefan problem) and reaction-diffusion processes with applications in 3D printing
- Documented results in research articles published in IEEE TAC, Automatica, & International Journal of Control

Sri Lanka Technological Campus   **Jan 2018 - Jul 2019**

Research Assistant — Focus: Hyperspectral Image Analysis   *Sri Lanka*

- Developed graph-based blind source separation algorithms for unmixing of hyperspectral images
- Documented results in a research article published in IEEE Transactions on Geoscience and Remote Sensing

University of Peradeniya   **Jan 2017 - Oct 2017**

Undergraduate Research Student — Focus: Robotics and Control   *Sri Lanka*

- Developed a **5-DOF underwater robotic vehicle (URV)** and performed system modeling and parameter identification
- Designed MIMO sliding mode controllers to address trajectory tracking and path following control of the URV
- Documented results in a research paper published in an IEEE conference

REVIEW SERVICES

- IEEE Transactions on Automatic Control
- Automatica
- IEEE Transactions on Cybernetics
- Systems & Control Letters
- International Journal of Control
- Conference on Decision and Control (CDC)- 2021, 2022, 2023, 2024
- American Control Conference (ACC)- 2025
- European Control Conference (ECC)- 2025