

Bhathiya Rathnayake

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EDUCATION

University of California San Diego

PhD in Intelligent Systems, Robotics, & Control, GPA: 3.85/4.0

Rensselaer Polytechnic Institute

MS in Computer & Systems Engineering, GPA: 3.89/4.0

University of Peradeniya

BSc in Electrical & Electronic Engineering, GPA: 3.65/4.0

Jul 2022 – Jun 2025

San Diego, CA

Jan 2020 – May 2022

Troy, NY

Jan 2014 – Oct 2017

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

PUBLICATIONS

Under Review

- (1) E. Somathilake, **B. Rathnayake**, and M. Diagne, “Output feedback periodic-event and self-triggered control of coupled 2x2 linear hyperbolic PDEs,” Under review in *Automatica* (***second round***)
- (2) **B. Rathnayake** and M. Diagne, “Global exponential stabilization of 2x2 linear hyperbolic PDEs via dynamic event-triggered backstepping control,” ***provisionally accepted*** for publication in *Automatica*

Journals

- (1) 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***)
- (2) **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
- (3) **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
- (4) **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
- (5) **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
- (6) **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
- (7) 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
- (8) **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

University of California San Diego

Jul 2022 – Present

Graduate Student Researcher — Focus: PDEs, Event-triggered Control, Traffic/Water Systems

San Diego, CA

- 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 Networks

Remote Internship

- 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 submitted to 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

- 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