Ram Padmanabhan

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Education

University of Illinois Urbana-Champaign — Urbana, IL, USA
Ph.D. Electrical and Computer Engineering — *August 2023 — Present*
Advisor: Melkior Ornik
Thesis: *Resource-Aware System Design and Resilience Quantification*

University of Michigan — Ann Arbor, MI, USA
M.S. Electrical and Computer Engineering — *August 2021 — April 2023*
Advisor: Peter Seiler

PES University — Bengaluru, India
B. Tech Electronics and Communication Engineering — *August 2017 — June 2021*
Advisors: Rajini Makam and Koshy George
Capstone Project: *Adaptive Iterative Learning Control*

Publications

Preprints and Submitted Material:

[1] C. A. F. Persiani, **R. Padmanabhan**, M. Ornik, and M. H. Terra, "Control of Markov Jump Linear Systems with Uncertain Lumpable Cluster Observations," *arXiv:2610.02573* [math.OC], Oct. 2026.

[2] **R. Padmanabhan**, M. Fowler, K. Huff, M. Neubauer, and M. Ornik, "A Vision for STEM Higher Education in the Face of AI," *EdArXiv: Nzd53_v1*, May 2026.

[3] R. Das*, **R. Padmanabhan***, M. Ornik, and P. Jagtap, "Energetic Resilience under Temporal Logic Specifications," *arXiv:2604.14203* [eess.SY], Apr. 2026.

[4] **R. Padmanabhan** and M. Ornik, "Ignore Drift, Embrace Simplicity: Constrained Nonlinear Control through Driftless Approximation," *arXiv:2509.06188* [math.OC], Sep. 2025.

Journal Articles:

[5] **R. Padmanabhan** and M. Ornik, "Approximate Energetic Resilience of Nonlinear Systems under Partial Loss of Control Authority," *Automatica*, 187, May 2026.

[6] **R. Padmanabhan**, A. Aspeel, N. Ozay, and M. Ornik, "Mode-Prefix-Based Control of Switched Linear Systems with Applications to Fault Tolerance," *IEEE Control Systems Letters*, 9, pp. 1784–1789, Jul. 2025 (presented at *64th IEEE Conference on Decision and Control (CDC)*, Dec. 2025).

[7] **R. Padmanabhan** and P. Seiler, "Analysis of Gradient Descent with Varying Step Sizes using Integral Quadratic Constraints," *IEEE Transactions on Automatic Control*, 70(1), pp. 587–594, Jan. 2025.

[8] **R. Padmanabhan**, R. Makam, and K. George, "Multiple Estimation Models for Discrete-time Adaptive Iterative Learning Control," *International Journal of Systems Science*, 55(10), pp. 2154–2171, Apr. 2024.

[9] **R. Padmanabhan**, M. Shetty, and T. S. Chandar, "Discrete Robust Control of Robot Manipulators using an Uncertainty and Disturbance Estimator," *Journal of Dynamic Systems, Measurement and Control*, 145(5): 051022, May 2023.

[10] **R. Padmanabhan**, M. Shetty, and T. S. Chandar, "Discrete-Time Design and Applications of Uncertainty and Disturbance Estimator," *International Journal of Robust and Nonlinear Control*, 31(10), pp. 4994–5015, Jul. 2021.

Peer-Reviewed Conference Papers:

[11] **R. Padmanabhan** and M. Ornik, "Finite-time Reachability for Constrained, Partially Uncontrolled Nonlinear Systems," in *65th IEEE Conference on Decision and Control (CDC)*, Honolulu, HI, USA, Dec. 2026.

[12] G. Puthumanaillam*, **R. Padmanabhan***, J. Fuentes, N. Cruz, P. Padrao, R. Hernandez, H. Jiang, W. Schafer, L. Bobadilla, and M. Ornik, "Online Learning of Deceptive Policies under Intermittent Observation," in *2026 IEEE/RSJ International Conference on Intelligent Robots & Systems (IROS)*, Pittsburgh, PA, USA, Sep. 2026.

[13] S. A. Dinkar, **R. Padmanabhan**, A. Clarke, P.-O. Gutman, and M. Ornik, "Analysis of the Unscented Transform Controller for Systems with Bounded Nonlinearities," in *5th Modeling, Estimation and Control Conference (MECC)*, Pittsburgh, PA, USA, Oct. 2025.

[14] **R. Padmanabhan** and M. Ornik, "Energetic Resilience of Linear Driftless Systems," in *11th IFAC Symposium on Robust Control Design (ROCOND)*, Porto, Portugal, Jul. 2025.
(Selected as Finalist, IFAC Young Author Award.)

[15] **R. Padmanabhan**, C. Bakker, S. A. Dinkar, and M. Ornik, "How Much Reserve Fuel: Quantifying the Maximal Energy Cost of System Disturbances," in *63rd IEEE Conference on Decision and Control (CDC)*, Milan, Italy, Dec. 2024.

[16] **R. Padmanabhan**, M. Bhushan, K. K. Hebbar, R. Makam, and K. George, "Second-Level Adaptation and Optimization for Multiple Model Adaptive Iterative Learning Control," in *Seventh Indian Control Conference (ICC)*, Mumbai, India, Dec. 2021, pp. 289–294.

[17] S. Damodaran, **R. Padmanabhan**, R. Maahin, and S. Gurugopinath, "A Copula-Driven Unsupervised Learning Framework for Anomaly Detection with Multivariate Heterogeneous Data," in *IEEE 31st International Workshop on Machine Learning for Signal Processing (MLSP)*, Gold Coast, Queensland, Australia, Oct. 2021.

[18] **R. Padmanabhan**, M. Bhushan, K. K. Hebbar, R. Makam, and K. George, "A Novel Strategy with Multiple Models to Improve Performance of Adaptive Iterative Learning Control," in *IEEE International Conference on Electronics, Computing and Communication Technologies (CONECCT)*, Bengaluru, India, Jul. 2021.

[19] **R. Padmanabhan**, S. Damodaran, V. N. Batra, and S. Gurugopinath, "A Convolutional Neural Network Architecture for Camera Model Identification with Small Datasets," in *IEEE International Conference on Electronics, Computing and Communication Technologies (CONECCT)*, Bengaluru, India, Jul. 2020.

Awards and Fellowships

Joan and Lalit Bahl Fellowship	*August 2025 — May 2026*
Finalist, IFAC Young Author Award	*July 2025*
Graduate College Mentoring Certificate	*May 2025*
Joan and Lalit Bahl Fellowship	*August 2024 — May 2025*
Prof. CNR Rao Merit Scholarship	*August 2017 — May 2020*
Prof. MRD Merit Scholarship	*August 2017 — May 2020*

Invited Talks & Posters

Talks:

IEEE Control Systems Society
Hybrid Systems Technical Committee Forum [Online]
System Level Synthesis in Switched Systems: Convexity, Causality, and Scalability — *October 2026*

Indian Institute of Science — Bengaluru, India
CORAL Talk Series, Robert Bosch Centre for Cyber-Physical Systems
Resilient Nonlinear Control under Adversarial Effects — *June 2026*

University of California, Berkeley [Online]
Prof. Murat Arcak Research Group
Analysis of Gradient Descent with Varying Step Sizes using IQCs — *February 2023*

PES University Bengaluru, India
Research at ECE (R@ECE) Colloquium
Discrete-Time Design and Applications of Uncertainty and Disturbance Estimator *April 2021*

Posters:

12th Midwest Workshop on Control and Game Theory
Purdue University West Lafayette, IN, USA
Energetic Resilience under Temporal Logic Specifications *April 2026*

11th Midwest Workshop on Control and Game Theory
University of Illinois Urbana-Champaign Urbana, IL, USA
Mode-Prefix-Based Control of Switched Linear Systems with Applications to Fault Tolerance *April 2025*

10th Midwest Workshop on Control and Game Theory
Northwestern University Evanston, IL, USA
How Much Reserve Fuel: Quantifying the Maximal Energy Cost of System Disturbances *April 2024*

Mentoring

Undergraduate Research Apprenticeship Program (URAP) *August 2024 — May 2025*
Mentored an undergraduate student at UIUC on the use of the particle filter for three-dimensional robot localization, and received the Graduate College Mentoring Certificate.

Promoting Undergraduate Research in Engineering (PURE) *August — December 2023*
Mentored a group of three undergraduates at UIUC in investigating the performance of different nonlinear Kalman filters on the problem of battery state-of-charge estimation.
(One student subsequently joined our primary research group.)

Teaching

Graduate Teaching Assistant, University of Illinois Urbana-Champaign Urbana, IL, USA
AE 598 AAO — Autonomy Against the Odds *January — May 2027*

Graduate Teaching Assistant, University of Illinois Urbana-Champaign Urbana, IL, USA
ECE 517 — Nonlinear & Adaptive Control *August — December 2026*
Held office hours and graded homeworks.

Graduate Teaching Assistant, University of Illinois Urbana-Champaign Urbana, IL, USA
AE 498 ARO — Advanced Review of Basic Mathematics (Special "Online-only" Section) *January — May 2026*
Held office hours and constructed problems for homeworks and exams.

Graduate Student Instructor, University of Michigan Ann Arbor, MI, USA
EECS 460 — Control System Analysis and Design *January — April 2023*
Held two discussion sessions each week, with teaching evaluations among the University's highest.

Graduate Student Instructor, University of Michigan Ann Arbor, MI, USA
EECS 301 — Probabilistic Methods in Engineering *August — December 2022*
Held two discussion sessions each week, with teaching evaluations among the University's highest.

Service

Session Moderator
Coordinated Science Laboratory Student Panel Urbana, IL, USA
Graduate Research in the Age of AI *October 2026*

Session Chair
2026 Coordinated Science Laboratory Student Conference Urbana, IL, USA
Robotics and Control Session *February 2026*

Peer Reviewer

Journals: *Automatica; IEEE Control Systems Letters; IEEE Robotics and Automation Letters; IEEE Transactions on Automatic Control; IEEE Transactions on Control Systems Technology; IEEE Transactions on Industrial Electronics; IEEE Transactions on Systems, Man and Cybernetics; Journal of the Franklin Institute; Nonlinear Analysis: Hybrid Systems.*

Conferences: *American Control Conference* (2025, 2027), *IEEE Conference on Decision and Control* (2024, 2025, 2026), *IFAC Symposium on Robust Control Design* (2025), *Learning for Dynamics & Control Conference* (2026, 2027), *Modeling, Estimation and Control Conference* (2025).

Member

IEEE Control Systems Society Technical Committee on Hybrid Systems;
IEEE Control Systems Society Technical Committee on Robust and Complex Systems

Internships

Research Intern, Indian Institute of Technology, Bombay Mumbai, India
Systems and Control Engineering *December 2020 — May 2021*
Used feedback linearization to achieve an upwind climb in gliding unmanned aerial vehicles with various wind gradient models, avoiding heavy computations from optimal control formulations.

Research Intern, Indian Space Research Organization Bengaluru, India
Control and Digital Electronics Group *June — July 2019*
Studied the properties of the Linear and Ensemble Kalman Filter, applied to a one– and three-dimensional motion estimation problem.

Professional Memberships

Graduate Student Member: IEEE; IEEE Control Systems Society; IEEE Robotics and Automation Society; IEEE Signal Processing Society

Affiliate: International Federation of Automatic Control (IFAC)