Udari Madhushani

Ph.D. Candidate

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Research Interest

Deep reinforcement learning, Multi-agent reinforcement learning, Sequential decision making, Multi-robot coverage problem, Collective dynamics, Geometric controls for path planning.

Education

Program	Institution	Years
Ph.D., Mechanical Engineering	Princeton University NJ, USA	2017 - Present
M.A., Mechanical Engineering	Princeton University NJ, USA	2017 - 2019
B.Sc. Eng (Hons), Electronic Engineering	University of Peradeniya Kandy, Sri Lanka	2011 - 2015

Experience

Assistant in Research

- Princeton University   September 2017 - Present
- Sri Lanka Technological Campus (SLTC), Sri Lanka   January 2016 - August 2017

Research Internships

- Siemens, Princeton, USA   May 2020 - August 2020
- Atrenta Lanka (Pvt.) Ltd., Sri Lanka   October 2014 - January 2015
- Division of Biomedical Engineering Services, Sri Lanka   October 2013 - January 2014

Assistant in Teaching

- MAE 542 Advanced Dynamics (Princeton University)   Fall 2020
- MAE 502/APC 506 Mathematical Methods of Engineering Analysis (Princeton University)   Spring 2020
- MAE 345/MAE 549 Introduction to Robotics (Princeton University)   Fall 2019
- EE 554 Microwave Techniques (Peradeniya University)   October 2015 - December 2015

Outreach

Mentoring

Princeton University

- Sarah Dillender (B.S.E. Mechanical Engineering)   2020-21
- Jacob Walrath (B.S.E. Mechanical Engineering)   2020-21
- Samarie Wilson (B.S.E. Mechanical Engineering)   2020-21
- Gargi Sadalgekar (B.S.E. Mechanical Engineering)   2020-21

Peradeniya University, Sri Lanka

- Lasitha Weerakon (Post graduate, Mechanical Engineering)   2016-17
  Published in American Control Conference (**ACC**), 2018.
- Isuru Basnayake (Post graduate, Mechanical Engineering)   2016-17
  Published in International Conference of Industrial and Information Systems, (**ICIIS**), 2017.
- Kusal Tennakoon (Post graduate, Mechanical Engineering)   2016-17
  Published in International Conference of Industrial and Information Systems, (**ICIIS**), 2017.

Leadership Roles

- Committee member of Women in STEM Leadership Council (Princeton University) 2020-Present
- Committee member of Graduate Women in Science & Engineering (Princeton University) 2020-Present
- Future Digileaders Training (Stockholm, Sweden) November 2019
- Founder of EE Instructors Scholarship (Peradeniya University, Sri Lanka) 2016

Volunteer for

- World Maker Faire September 2018
- American Control Conference June 2018

Academic Service

Student Member of

IEEE (Institute of Electrical and Electronics Engineers), IEEE Young Professionals, IEEE Women in Engineering, APS (American Physical Society)

Reviewer for

Journal: Automatica, IEEE Transactions on Automatic Control, IEEE Control Systems Letters, ournal of Field Robotics, IEEE Transactions on Communications

Conference: IEEE Conference on Decision and Control, American Control Conference, European Control Conference, International Conference of Industrial and Information Systems

Honors

Graduate Honors (Princeton University)

- Britt and Eli Harari Fellowship 2020-21
- Larisse Rosentweig Klein Memorial Award Fall 2019
- Martin Summerfield Graduate Fellowship 2018-19
- Athena-Feron Prize for Mathematical Excellence Fall 2018
- Elliotte Robinson Little '25 Student Aid Fund Fellowship 2017-18

Travel Grants

- WiML travel grant (full registration fee), NeurIPS 2020
- Student travel grant (full registration fee), ICLR 2020
- Graduate student travel grant, MAE Princeton University 2018, 2019
- Graduate student travel grant, SEAS Princeton University 2019
- Research assistant travel grant, SLTC, Sri Lanka 2016, 2017, 2018

Awards

- Presidential Award for Scientific Research (Sri Lanka) 2019
- Best Undergraduate Project Award (IEEE Sri Lanka Section) December 2015

Publications

Journal Papers

[J4] Cooperative Bandits: A Class of Communication Protocols with Logarithmic Communication Cost
Udari Madhushani, Naomi Leonard
(In Preparation).

[J3] Decentralized Stochastic Bandits with Probabilistic Communications
Udari Madhushani, Anusha Lalitha, Andrea Goldsmith, Naomi Leonard
(In Preparation).

[J2] Heterogeneous Explore-Exploit Strategies on Multi-Star Networks
Udari Madhushani, Naomi Leonard
IEEE Control Systems Letters, 2020.

[J1] Semi-globally Exponential Trajectory Tracking for a Class of Spherical Robots
Udari Madhushani, Sanjeeva Maithripala, Janaka Wijayakulasooriya, Jordan Berg
Automatica, 2017.

Conference Papers

[C10] When to Call Your Neighbor? Cost-effective Communication in Cooperative Stochastic Bandits
Udari Madhushani, Naomi Leonard
International Conference on Machine Learning, **(ICML)** 2021 (Under Review).

[C9] On Using Hamiltonian Monte Carlo Sampling for Reinforcement Learning Problems in High-dimension
Udari Madhushani, Biswadip Dey, Naomi Leonard, Amit Chakraborty
International Conference on Machine Learning, **(ICML)** 2021 (Under Review).

[C8] Distributed Bandits: Probabilistic Communication on d-regular Graphs
Udari Madhushani, Naomi Leonard
European Control Conference, **(ECC)** 2021 (Under Review).

[C7] A Dynamic Observation Strategy for Multi-agent Multi-armed Bandit Problem
Udari Madhushani, Naomi Leonard
European Control Conference, **(ECC)** 2020.

[C6] Heterogeneous Stochastic Interactions for Multiple Agents in a Multi-armed Bandit Problem
Udari Madhushani, Naomi Leonard
European Control Conference, **(ECC)** 2019. **(Invited Paper)**

[C5] Feedback Regularization and Geometric PID Control for Robust Stabilization of a Planar Three-link Hybrid Bipedal Walking Model
Lasitha Weerakon, **Udari Madhushani**, Sanjeeva Mathripala, Jordan Berg
American Control Conference, **(ACC)** 2018.

[C4] Multi-armed Bandit Based Approach for Performance Enhancement of Window Intensity Test (WIT) Detector
Kusal Tennakoon, **Udari Madhushani**, Sanjeeva Mathripala
International Conference of Industrial and Information Systems, **(ICIIS)** 2017.

[C3] Intrinsic PID Controller for a Segway Type Mobile Robot
Isuru Basnayake, **Udari Madhushani**, Sanjeeva Mathripala
International Conference of Industrial and Information Systems, **(ICIIS)** 2017.

[C2] Feedback Regularization and Geometric PID Control for Trajectory Tracking of Mechanical Systems: Hoop Robots on an Inclined Plane
Udari Madhushani, Sanjeeva Mathripala, Jordan Berg
American Control Conference, **(ACC)** 2017.

[C1] WIT: Window Intensity Test Detector and Descriptor
Udari Madhushani, Sanjeeva Mathripala, Janaka Wijayakulasooriya
International Conference of Industrial and Information Systems, **(ICIIS)** 2016.

Workshop Papers

[W2] It Doesn't Get Better and Here's Why: A Fundamental Drawback in Natural Extensions of UCB to Multi-agent Bandits
Udari Madhushani, Naomi Leonard
I can't Believe It's Not Better! Workshop **(ICBINB)**, Conference on Neural Information Processing Systems, **(NeurIPS)** 2020. **(Spotlight)**

[W1] Distributed Learning: Sequential Decision Making in Resource-Constrained Environments
Udari Madhushani, Naomi Leonard
Practical ML for Developing Countries Workshop **(PML4DC)**, International Conference on Learning Representations, **(ICLR)** 2020. **(Oral)**

SKILLS

Computer Skills: Python, PyTorch, Matlab, LaTeX
Language Skills: Sinhala (Native), English (Fluent)