# Udari Madhushani

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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, 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

**Assistant in Teaching** (Princeton University)

- MAE 542 Advanced Dynamics                                 Fall 2020
- MAE 502/APC 506 Mathematical Methods of Engineering Analysis    Spring 2020
- MAE 345/MAE 549 Introduction to Robotics                  Fall 2019

**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

## Outreach

**Leadership Training**

Future Digileaders (Stockholm, Sweden)                      November 2019

**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**

Automatica, IEEE Transactions on Automatic Control, IEEE Control Systems Letters, Conference on Decision and Control, American Control Conference, European Control Conference, Journal of Field Robotics, IEEE Transactions on Communications

# 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 |

**Awards**

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

# Publications

**Journal Papers**

- Decentralized Stochastic Bandits with Probabilistic Communications
  **Udari Madhushani**, Naomi Leonard
  (In Preparation).

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

- Heterogeneous Explore-Exploit Strategies on Multi-Star Networks
  **Udari Madhushani**, Naomi Leonard
  IEEE Control Systems Letters, (under review).

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

**Conference Papers**

- Broadcast when Exploring: Cost-effective Communication in Distributed Stochastic Bandits
  **Udari Madhushani**, Naomi Leonard
  (In Preparation).

- Hamiltonian $Q$-learning: Data Efficient RL Using Importance-sampling
  **Udari Madhushani**, Biswadip Dey, Naomi Leonard, Amit Chakraborty
  International Conference on Learning Representations, **(ICLR)** 2021 (Under Review).

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

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

- 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.

- 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.

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

- 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.

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

**Workshop Papers**

- 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. (Under Review)

- 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 (Mother Tounge), English (Fluent)