Vindula Jayawardana

Laboratory for Information and Decision Systems (LIDS)
Massachusetts Institute of Technology
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EDUCATION

Massachusetts Institute of Technology *September 2019 - Present*
Department of Electrical Engineering and Computer Science GPA 4.9/5.0
Ph.D. Student
Advisor: Cathy Wu

Massachusetts Institute of Technology *September 2019 - September 2022*
M.S. in Electrical Engineering and Computer Science GPA 4.9/5.0
Thesis: An Invisible Issue of Task Underspecification in Deep Reinforcement Learning Evaluations
Advisor: Cathy Wu

University of Moratuwa, Sri Lanka *2014 - 2018*
B.Sc. in Computer Science and Engineering GPA 4.08/4.2
First Class Honors and Dean's Honors List

Chartered Institute of Management Accountants (CIMA), United Kingdom *2013 - 2014*
CIMA Dip. MA

RESEARCH INTERESTS

Multi-agent Reinforcement Learning, Responsible Reinforcement Learning, Autonomous Vehicles, Climate Change

RESEARCH EXPERIENCE

Massachusetts Institute of Technology September 2019 - Present
Laboratory for Information and Decision Systems *Ph.D. Student*

Advised by Cathy Wu

Interested in advancing the understanding of learning for control in large-scale cyber-physical systems to enable societal benefits such as mitigating climate change. Current research includes making reinforcement learning suitable for real-world problems with applications including learning for energy-efficient driving for connected autonomous vehicles in tackling climate change. Student lead of the project *Greenwave* (link) in leveraging learning for tackling transportation-related climate change. In collaborations with the Utah Department of Transportation, MIT-IBM Watson AI Lab, and the National Center for High-Performance Computing (NCHC), Taiwan.

University of Moratuwa, Sri Lanka January 2018 - July 2019
Data Science, Engineering and Analytics Research Hub (DataSEARCH) *Research Assistant*

Advised by Samitha Samaranayake, Shehan Perera and Uthayasanker Thayasivam

Designed and developed a state-of-the-art ride-sharing simulator in C++ and underlying matching algorithms based on integer programming. Conducted experiments to evaluate the impact and effectiveness of on-demand high-capacity ride-sharing in the context of the Sri Lankan mobility market. In collaboration with Digital Mobility Solutions Lanka Pvt Ltd.

Cornell University, USA June 2018 - August 2018
Mobility, Algorithms, and Society Lab (MAS Lab) *Summer Intern*

Advised by Samitha Samaranayake

Developed an integer programming-based algorithm for ride-pooling with meeting points problem. Quantified the optimality gap of the state-of-the-art heuristic algorithms by simulating ride pooling in the scale of Manhattan Island.

University of Moratuwa, Sri Lanka January 2017 - December 2017
Department of Computer Science and Engineering *Undergraduate*

Advised by Shehan Perera and Nisansa de Silva

Developed an ontology-based information extraction framework for legal professionals. Scraped websites for legal case details and built an ontology with the help of legal professionals. Designed a natural language processing pipeline to process user inputs and schematically match them with ontology content.

WORK EXPERIENCE

Toyota Motor North America June 2023 - August 2023
Toyota InfoTech Labs *Research Scientist Intern*

Digital Mobility Solutions Lanka Pvt Ltd, Sri Lanka January 2018 - July 2019
Engineering and Research Team *Consultant Research Engineer*

Cornell University, USA June 2018 - August 2018
Mobility, Algorithms, and Society Lab (MAS Lab) *Summer Intern*

Trancite24 Pvt Ltd, Sri Lanka January 2016 - July 2019
University of Moratuwa affiliated private company *Co-founder*

WSO2 Lanka Pvt Ltd, Sri Lanka July 2016 - December 2016
Identity Server Team *Software Engineering Intern*

WORK IN REVIEW/PREPARATION

[W1] **V. Jayawardana**, B. Freydt, A. Qu, C. Hickert, E. Sanchez, C. Tang, S. Chandrasiri, A. Valiveru, J. He, D. Suo, B. Leonard, and C. Wu, "Assessing no-stop intersections for low-carbon transportation," *In Preparation (Nature)*, 2023

[W2] D. Suo*, **V. Jayawardana***, and C. Wu, "Learning corridor clearance for emergency vehicles under mixed autonomy," in *In review (Transactions on Intelligent Transportation Systems (T-ITS))*, 2022

[W3] Y. Kim, **Vindula Jayawardana**, and S. Samaranayake, "Request-vehicle matching with traveler choice modeling in high-capacity ride-pooling," *In preparation (Transportation Research Part C)*, 2023

PUBLICATIONS

[1] S. Jayawardana, **V. Jayawardana**, K. Vidanage, and C. Wu, "Multi-behavior learning for socially compatible autonomous driving," *International Conference on Intelligent Transportation Systems (ITSC)*, 2023, **Equal supervision**

[2] **V. Jayawaradana**, C. Tang, S. Li, D. Suo, and C. Wu, "The impact of task underspecification in evaluating deep reinforcement learning," *Advances in Neural Information Processing Systems (NeurIPS)*, 2022

[3] **V. Jayawardana** and C. Wu, "Learning eco-driving strategies at signalized intersections," in *2022 European Control Conference (ECC)*, 2022, pp. 383–390 **(Spotlight in MIT News, covered by NPR and Tech Crunch)**

[4] **V. Jayawardana** and C. Wu, "Reinforcement learning for eco-lagrangian control at intersections," in *Robotics for Climate Change Workshop at International Conference on Robotics and Automation (ICRA)*, 2022 **(Spotlight Presentation)**

[5] E. Sanchez, C. Tang, **V. Jayawardana**, and C. Wu, "Learning surrogates for diverse emission models," in *Tackling Climate Change with Machine Learning Workshop at NeurIPS*, 2022

[6] D. Zhuang, Y. Huang, **V. Jayawardana**, J. Zhao, D. Suo, and C. Wu, "Mitigating the braess's paradox in a closed system using reinforcement learning," in *Transportation Research Board (TRB)*, 2022,

[7] D. Zhuang, Y. Huang, **V. Jayawardana**, J. Zhao, D. Suo, and C. Wu, "The braess paradox in dynamic traffic," in *2022 IEEE International Intelligent Transportation Systems Conference (ITSC)*, 2022

[8] A. Qu, A. Valiveru, C. Tang, **V. Jayawardana**, B. Freydt, and C. Wu, "What is a typical signalized intersection in a city?" In *Transportation Research Board (TRB)*, 2022,

[9] **V. Jayawardana**, A. Landler, and C. Wu, "Mixed autonomous supervision in traffic signal control," in *2021 IEEE International Intelligent Transportation Systems Conference (ITSC)*, 2021, pp. 1767–1773

[10] M. Mounesan, **V. Jayawardana**, Y. Wu, S. Samaranayake, and H. T. Vo, *Fleet management for ride-pooling with meeting points at scale: A case study in the five boroughs of new york city*, 2021

[11] K. Sugathadasa, B. Ayesha, N. de Silva, A. S. Perera, **V. Jayawardana**, D. Lakmal, and M. Perera, "Legal document retrieval using document vector embeddings and deep learning," in *Proceedings of the 2018 Computing Conference*, vol. 2, 2019, pp. 160–175

[12] **V. Jayawardana**, D. Lakmal, N. de Silva, A. S. Perera, K. Sugathadasa, B. Ayesha, and M. Perera, "Word vector embeddings and domain specific semantic based semi-supervised ontology instance population," *The International Journal on Advances in ICT for Emerging Regions (ICTer)*, vol. 11, no. 1, 2018

[13] **V. Jayawardana**, D. Lakmal, N. de Silva, A. S. Perera, K. Sugathadasa, B. Ayesha, and M. Perera, "Semi-supervised instance population of an ontology using word vector embedding," in *2017 Seventeenth International Conference on Advances in ICT for Emerging Regions (ICTer)*, Sep. 2017, pp. 1–7

[14] **V. Jayawardana**, D. Lakmal, N. de Silva, A. S. Perera, K. Sugathadasa, and B. Ayesha, "Deriving a representative vector for ontology classes with instance word vector embeddings," in *2017 Seventh International Conference on Innovative Computing Technology (INTECH)*, Aug. 2017, pp. 79–84

[15] K. Sugathadasa, B. Ayesha, N. de Silva, A. S. Perera, **V. Jayawardana**, D. Lakmal, and M. Perera, "Synergistic union of word2vec and lexicon for domain specific semantic similarity," in *2017 IEEE International Conference on Industrial and Information Systems (ICIIS)*, Dec. 2017, pp. 1–6

*: Equal contributions

AWARDS & HONORS

NeurIPS 2022 Scholar Award *2022*
Neural Information Processing Systems (NeurIPS).

Harold L. Hazen Teaching Award *2022*
MIT Department of Electrical Engineering & Computer Science.

Migara Ranathunga Trust Award *2017/2018*
Best industrial trainee in Computer Science and Engineering.
Institution of Engineers, Sri Lanka

Digital Mobility Solutions Lanka Fellowship *2018*
Awarded by Digital Mobility Solutions Lanka Pvt Ltd, Sri Lanka.

Gold Award, National Best Quality ICT Awards *2017*
Best student technology project of the year in Sri Lanka.

World Finalist, NASA International Space Apps *2017*
Within the best five technology products in the world with the most potential to improve life on earth or in the universe out of 25,140 participants in 69 countries.

Academic Excellence Award *2017*
Department of Computer Science & Engineering, University of Moratuwa.

World Finalist, Air Asia Airvolutaion, Malaysia *2017*
Within the top 20 technological products in the world.

University Award *2017*
Outstanding non-academic performance at the University of Moratuwa.

Google Summer of Code *2017*
Selected participant

Academic Excellence Award *2016*
Department of Computer Science & Engineering, University of Moratuwa.

University Award *2016*
Outstanding non-academic performance at the University of Moratuwa.

Winner in Google, I/O Extended Sri Lanka *2016*

Silver Medal, Junior Science Olympiad Competition, Sri Lanka. *2010*

TEACHING

Instructor
CS2022 - Data Structures and Algorithms *UoM Spring 2019*

Teaching Assistant
1.041/1.200 - Transportation: Foundations and Methods **(MIT EECS Teaching Excellence Award)** *MIT Fall 2021*
1.041/1.200 - Transportation: Foundations and Methods *MIT Fall 2020*
1.041/1.200 - Transportation: Foundations and Methods *MIT Fall 2019*
CS4622 - Machine Learning *UoM Fall 2018*
CS3042 - Database Systems *UoM Fall 2018*
CS2052 - Computer Architecture *UoM Spring 2018*
CS2062 - Object Oriented Software Development *UoM Spring 2018*
CS3962 - Research and Report Writing *UoM Fall 2017*
CS2963 - Presentation Skills *UoM Fall 2017*

MENTORSHIP

MIT Advanced Undergraduate Research Opportunities Program (SuperUROP) *2021*
Anna Landler: Co-authored paper on autonomous traffic signal supervision [9]

MIT Undergraduate Research Opportunities Program (UROP) *2021, 2022*
Catherine Tang: Co-authored papers on task underspecification in deep reinforcement learning [1] and learning surrogate emission models [5]
Anirudh Valiveru: Co-authored paper on data processing pipeline for open street maps [8]
Ammar Fayad

Wu Lab Visiting Students *2022, 2023*
Jiaxin He (Vanderbilt University), Baptiste Freydt (ETH Zurich), and Sunera Chandrasiri (University of Moratuwa): Co-authoring a paper on large-scale eco-driving using deep reinforcement learning [W1]
Sanjula Jayawardana (University of Westminster and Informatics Institute of Technology): Co-authoring a paper on socially compatible autonomous driving [4]

Old Royalists Engineering Professionals' Association Student Chapter *2015*
Mentoring program project chairperson and mentor

INVITED TALKS & CONFERENCE PRESENTATIONS

Toyota Research and Development in Mountain View *2023*
MIT CEE Annual Research Day *2023*
Neural Information Processing Systems Conference *2022*
European Control Conference *2022*
Robotics for Climate Change (**Spotlight talk**) *2022*
MIT CEE Annual Research Day *2022*
University of Moratuwa *2021*
MIT-IBM Watson AI Lab Open House *2021*
Data Drives - Data science applications in technology based industries *2019*
Innovative Computing Technology Conference *2017*

SERVICES

Transactions on Robotics (T-RO) - Reviewer *2023*
Neural Information Processing Systems Conference (NeurIPS) - Reviewer *2023*
Physica A: Statistical Mechanics and its Applications (Physica A) - Reviewer *2023*
International Conference on Robotics and Automation (ICRA) - Reviewer *2020, 2022*
Transactions on Intelligent Systems and Technology (T-IST) - Reviewer *2022*
When Machine Learning meets Dynamical Systems: Theory and Applications at AAAI - Program Committee *2022*
Representation Learning for Responsible Human-Centric AI at AAAI - Area Chair (**Top Area Chair**) *2022*
Transportation Research Board (TRB) - Reviewer *2022*
Moratuwa Engineering Research Conference (MERCon) - Reviewer *2020, 2021*

OPEN SOURCE SOFTWARE CONTRIBUTIONS

Open Ridepool Simulator (link) - Developed during the summer internship at Cornell University *2019*
SCIM 2.0 Compliance Test Suite (link) - Developed as the Google Summer of Code 2017 project with WSO2 *2017*
Charon: SCIM 2.0 Open Source Implementation (link) - Developed as the internship project at WSO2 *2016*

OTHER ACTIVITIES

Sri Lankan Students' Association at MIT *September 2019 - Present*
President 2019/2024

Rotaract Club of Alumni of University of Moratuwa *March 2017 - July 2019*
Director Professional Development 2018/2019
Director Information Technology 2017/2018

Old Royalists Engineering Professionals' Association Student Chapter *April 2015 - April 2018*
Assistant Secretary 2017/2018
Director School Projects 2016/2017
Mentoring Program 2015 - Project Chairperson

Rotaract Club of University of Moratuwa *March 2014 - December 2016*
Project Chairperson and Event Coordinator

PERSONAL INFORMATION

Full Name: Vindula Muthushan Jayawardana
Citizenship: Sri Lankan
Languages: English(proficient), Sinhala(native)