

# Vindula Jayawardana

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

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**Massachusetts Institute of Technology**  
Department of Electrical Engineering and Computer Science  
Ph.D. Student  
Advisor: Cathy Wu

*September 2019 - Present*

**Massachusetts Institute of Technology**  
M.S. in Electrical Engineering and Computer Science  
Thesis: An Invisible Issue of Task Underspecification in Deep Reinforcement Learning Evaluations  
Advisor: Cathy Wu

*September 2019 - September 2022*  
GPA 4.9/5.0

**University of Moratuwa, Sri Lanka**  
B.Sc. in Computer Science and Engineering  
First Class Honors and Dean's Honors List

*2014 - 2018*  
GPA 4.08/4.2

## RESEARCH INTERESTS

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

## RESEARCH EXPERIENCE

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**Massachusetts Institute of Technology**  
*Laboratory for Information and Decision Systems*  
Advised by Cathy Wu

September 2019 - Present  
*Ph.D. Student*

Interested in advancing the understanding of learning for control in large-scale cyber-physical systems to enable advanced decision-making. Current research includes making reinforcement learning suitable for real-world problems by tackling the diversity, scale, and complexity of the real world. Applications include learning for connected autonomous vehicles and tackling climate change. Student lead of the project Greenwave ([link](#)). In collaborations with the Utah Department of Transportation, MIT-IBM Watson AI Lab, and National Center for High-Performance Computing (NCHC), Taiwan.

**University of Moratuwa, Sri Lanka**  
*Data Science, Engineering and Analytics Research Hub (DataSEARCH)*

January 2018 - July 2019  
*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 Sri Lankan mobility market. In collaboration with Digital Mobility Solutions Lanka Pvt Ltd.

**Cornell University, USA**  
*Mobility, Algorithms, and Society Lab (MAS Lab)*

June 2018 - August 2018  
*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**  
*Department of Computer Science and Engineering*

January 2017 - December 2017  
*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 with ontology content.

## WORK EXPERIENCE

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**Digital Mobility Solutions Lanka Pvt Ltd, Sri Lanka**  
*Engineering and Research Team*

January 2018 - July 2019  
*Consultant Research Engineer*

**Cornell University, USA**  
*Mobility, Algorithms, and Society Lab (MAS Lab)*

June 2018 - August 2018  
*Summer Intern*

**Trancite24 Pvt Ltd, Sri Lanka**  
*University of Moratuwa affiliated private company*

January 2016 - July 2019  
*Co-founder*

**WSO2 Lanka Pvt Ltd, Sri Lanka**  
*Identity Server Team*

July 2016 - December 2016  
*Software Engineering Intern*

## PUBLICATIONS

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- [1] **V. Jayawardana**, 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
- [2] **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**)
- [3] **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**)
- [4] **V. Jayawardana\***, D. Suo\*, and C. Wu, "Learning corridor clearance for emergency vehicles under mixed autonomy," in *IEEE Transactions on Intelligent Transportation Systems (T-ITS)*, 2022, In review
- [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, In review
- [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

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<b>NeurIPS 2022 Scholar Award</b> Neural Information Processing Systems (NeurIPS).	<i>2022</i>
<b>Harold L. Hazen Teaching Award</b> MIT Department of Electrical Engineering & Computer Science.	<i>2022</i>
<b>Migara Ranathunga Trust Award</b> Best industrial trainee in Computer Science and Engineering. Institution of Engineers, Sri Lanka	<i>2017/2018</i>
<b>Digital Mobility Solutions Lanka Fellowship</b> Awarded by Digital Mobility Solutions Lanka Pvt Ltd, Sri Lanka.	<i>2018</i>
<b>Gold Award</b> , National Best Quality ICT Awards Best student technology project of the year in Sri Lanka.	<i>2017</i>
<b>World Finalist</b> , NASA International Space Apps 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.	<i>2017</i>
<b>Academic Excellence Award</b> Department of Computer Science & Engineering, University of Moratuwa.	<i>2017</i>
<b>World Finalist</b> , Air Asia Airvolutaion, Malaysia Within top 20 technological products in the world.	<i>2017</i>
<b>University Award</b> Outstanding non-academic performance at University of Moratuwa.	<i>2017</i>
<b>Google Summer of Code</b> Selected participant	<i>2017</i>
<b>Academic Excellence Award</b> Department of Computer Science & Engineering, University of Moratuwa.	<i>2016</i>
<b>University Award</b> Outstanding non-academic performance at University of Moratuwa.	<i>2016</i>
<b>Winner</b> in Google, I/O Extended Sri Lanka	<i>2016</i>
<b>Silver Medal</b> , Junior Science Olympiad Competition, Sri Lanka.	<i>2010</i>

## INVITED TALKS & CONFERENCE PRESENTATIONS

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European Control Conference	<i>2022</i>
Robotics for Climate Change ( <b>Spotlight talk</b> )	<i>2022</i>
MIT CEE Annual Research Day	<i>2022</i>
University of Moratuwa	<i>2021</i>
MIT-IBM Watson AI Lab Open House	<i>2021</i>
Data Drives - Data science applications in technology based industries	<i>2019</i>
Innovative Computing Technology Conference	<i>2017</i>

## OPEN SOURCE SOFTWARE CONTRIBUTIONS

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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

## TEACHING

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### Instructor

CS2022 - Data Structures and Algorithms UoM Spring 2019

### Teaching Assistant

1.041/1.200 - Transportation: Foundations and Methods (**Teaching Excellence Award**) MIT Fall 2020/ 2021  
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

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**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

Jiaxin He (Vanderbilt University), Baptiste Freydt (ETH Zurich) and Sunera Chandrasiri (University of Moratuwa)

## SERVICES

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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

## OTHER ACTIVITIES

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**Sri Lankan Students' Association at MIT** October 2019 - Present

President 2019/2023

**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

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**Full Name:** Vindula Muthushan Jayawardana

**Citizenship:** Sri Lankan

**Languages:** English(proficient), Sinhala(native)