Vindula Jayawardana

vindula@mit.edu / vindulamj.github.io

Education

Massachusetts Institute of Technology

Ph.D. in Computer Science, minor in Robotics — GPA: **4.9/5.0** — *Expected May 2025*

M.S. in Electrical Engineering and Computer Science — GPA: **5.0/5.0** — *September 2022*

University of Moratuwa, Sri Lanka

B.S. in Computer Science and Engineering — GPA: **4.1/4.2** — *December 2017*

Selected Research (8 first-author publications + 3 under review + 2 work in progress)

MIT – *PhD Candidate, advised by **Prof. Cathy Wu*** *Sep 2019 – Present*

- ∴ Focus: Generalizing multi-agent coordinated control across problem variations with scenario modeling, control and simulations in **autonomous driving, traffic optimizations, and robotics.**
- ∴ Integrated **deep learning** and **reinforcement learning (Python, PyTorch)** to improve solution qualities and **generative modeling (Transformers, LLMs)** for problem variation modeling, especially in large-scale problems.

V Jayawardana, et al. IntersectionZoo: Eco-driving for Benchmarking Multi-Agent Contextual Reinforcement Learning. *In review.* IntersectionZoo

J. Cho**, V Jayawardana,** S Li, C Wu. Model-Based Transfer Learning for Contextual Reinforcement Learning. ***NeurIPS* 2024**. Accepted.

V Jayawardana, S Li, C Wu, Y Farid, K Oguchi. Generalizing Cooperative Eco-driving via Multi-residual Task Learning. ***ICRA* 2024**.

V Jayawardana, et al. Learning to Mitigate Metropolitan Carbon Emissions with Dynamic Eco-driving. ***ECC* 2022,** *In review.* NewScientist, MIT News Spotlight, TechCrunch, NPR

V Jayawardana, C Tang, S Li, D Suo, C Wu. The Impact of Task Underspecification in Evaluating Deep Reinforcement Learning. ***NeurIPS* 2022.**

V Jayawardana*, D Suo*, C Wu, Model-free Learning of Corridor Clearance: A Near-term Deployment Perspective, ***IEEE T-ITS 2023.***

Cornell University – *Visiting Research Scholar, advised by **Prof. Samitha Samaranayake*** *Feb 2019 – Sep 2019*

- ∴ Designed and developed a state-of-the-art ride-sharing simulator **(C++, threading)** and Integer programming models **(Gurobi, Mosek)** for ridesharing with meeting point problem. Improved service rate by 13.4%. OpenRidepoolSimulator
- ∴ Designed learning-guided ride-pooling algorithms with passenger choice modeling to improve total ride revenue by 22%.

Y Kim, **V Jayawardana**, S Samaranayake. Learning-Augmented Vehicle Dispatching with Slack Times for High-Capacity Ride-Pooling. ***TR-C.*** Conditional Acceptance**.**

University of Moratuwa– *Undergraduate Researcher, advised by **Dr. Shehan Perera*** *Jan 2017 – Dec 2017*

- ∴ Trained **deep learning** models for **language modeling, ontology modeling,** and **document retrieval**.

V Jayawardana, et al. Word Vector Embeddings and Domain Specific Semantic-based Semi-supervised Ontology Instance Population, ***ICTer* 2017**.

V Jayawardana, et al. Deriving a Representative Vector for Ontology Classes with Instance Word Vector Embeddings, ***INTECH* 2017.**

Work Experience *(5 total: 4 research + 1 engineering)*

NVIDIA – *Research Scientist Intern (Hosted by Sanja Fidler, Jonah Philion, and Jason Peng)* *June 2024 – Aug 2024*

- ∴ Trained **large transformers** for **multiagent autonomous driving (sim-agent)** as a **language modeling** task.
- ∴ Designed and developed a **reinforcement learning environment** to simulate Waymo Vehicle Motion data in closed loop and a **residual policy learning** approach for efficient and fast **closed-loop fine-tuning of large transformer models**.

Toyota North America – *Research Intern (Hosted by Kentato Oguchi and Yashar Farid)* *June 2023 – Aug 2023*

- ∴ Designed and implemented a **generalizable multi-agent reinforcement learning** algorithm to **optimize energy efficiency** in driving of hundreds of **coordinated autonomous vehicles** in the presence of human-driven vehicles.
- ∴ Demonstrate performance improvements over heuristically designed (up to 37%) and learning-based (up to 64%) baselines.

V Jayawardana, S Li, C Wu, Y Farid, K Oguchi. Generalizing Cooperative Eco-driving via Multi-residual Task Learning. ***ICRA* 2024**.

V Jayawardana, Y Farid, K Oguchi. Systems And Methods for Vehicles Navigating Roads Using a Control Model Trained with Residual Policies. ***U.S. Patent***. In review.

WSO2 – *Software Engineering Intern* *July 2016 – Dec 2016*

- ∴ Designed and developed the WSO2 SCIM 2.0 library Charon 2.0 for **cross-domain identity management** (**Java, microservices, unit testing, Git)** and integrated with the WSO2 Identity Server. Charon 2.0
- ∴ Designed and developed an open-source SCIM 2.0 compliance test suite. SCIM 2.0 Compliance Test

Others: Consultant Research Engineer at PickMe 2018-2019, Research Assistant at University of Moratuwa 2018-2019

Other Experience

- 2024 Co-organizer: Autonomous Vehicle Across Scales Workshop, RSS 2024 AVAS
- 2024 Rising Star in Cyber-Physical Systems Research, University of Virginia, NSF CPS Rising Stars
- 2024 IEEE ITSS WiE/YP Fellowship, IEEE Intelligent Transportation Systems Society
- Teaching: MIT 1.041/1.200 Transportation: Foundations and Methods, UoM CS4622 Machine Learning, UoM CS2022 Data Structure and Algorithms
  - 2022 Harold L. Hazen Award for Teaching Excellence, MIT EECS
- 2017 Finalist at NASA International Space Apps, NASA
- 2017 Gold Award at National Best Quality ICT Awards, Sri Lanka Sector of British Computer Society
- 2017 Google Summer of Code SCIM 2.0 Compliance Test

Technical Skills: **Python, PyTorch, Numpy, Pandas**, Matplotlib, **C++**, **Java, Git**, Gurobi, Mosek, SUMO, SQL, Javascript, Tensorflow, AWS