Vindula Jayawardana

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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: **4.9/5.0** — *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 + 2 under review + 1 work in progress)

MIT – *PhD Candidate, advised by **Prof. Cathy Wu*** *Sep 2019 – May 2025 (Expected)*

- ∴ Focus: **Reinforcement learning** and **generative modeling** for **multi-agent autonomous driving** that **generalize.**
- ∴ Integrated **machine learning** and **reinforcement learning (Python, PyTorch)** to control multiple traffic agents in **real-world conditions** and **generative modeling (LLMs)** to model traffic scenarios and human driving behaviors at scale.

V Jayawardana, et al. IntersectionZoo: Eco-driving for Benchmarking Multi-Agent Contextual Reinforcement Learning. ***ICLR 2025.*** GitHub
J. Cho**, V Jayawardana,** S Li, C Wu. Model-Based Transfer Learning for Contextual Reinforcement Learning. ***NeurIPS* 2024**.
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 at Scale. ***ECC* 2022** and ***TR-C***. *Webpage*
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*** *June 2018 – Aug 2018*

- ∴ Designed and developed a **real-world data-driven** ride-sharing simulator **(C++, threading)** and Integer programming models **(C++, Gurobi, Mosek)** for ridesharing. Improved ride service rate by 13.4%. GitHub
- ∴ Designed a learning-guided ride-pooling algorithm with passenger choice modeling. Improved ride revenue by 22%.

Y Kim, **V Jayawardana**, S Samaranayake. Learning-Augmented Vehicle Dispatching with Slack Times for High-Capacity Ride-Pooling. ***TR-C 2025.*** Conditional Acceptance**.**

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

- ∴ Trained **machine 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: 3 research + 1 engineering + 1 data science)*

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

- ∴ Built tokenized driving datasets and designed **GPT-style token-prediction models** and task-specialized loss functions to model **multi-agent autonomous driving (sim-agent)** as a **language modeling** task – to be submitted for publication.
- ∴ Designed and developed a **residual reinforcement learning** method and a **gym** environment to efficiently **fine-tune** a **pre-trained large transformer** vehicle control model with Waymo vehicle motion data in **closed-loop (alignment)**.

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

- ∴ Designed and implemented a **multi-agent reinforcement learning** algorithm that **generalize** across traffic scenarios for coordinated **planning** of hundreds of **autonomous vehicles** to **optimize energy efficiency** in driving.
- ∴ Demonstrated improved performance over heuristically designed (37%) and learning-based (64%) baselines. Results were published in ICRA 2024, and a patent was filed for the invention.

PickMe – *Research Engineer (Colombo, Sri Lanka)* *Jan 2018 – June 2019*

- ∴ Designed and developed driver-passenger matching algorithms for mobility-on-demand systems (**Integer programs**).
- ∴ Designed and developed a state-of-the-art ride-sharing simulator to simulate New York Yellow taxi data **(C++, Gurobi, Mosek)**.

Others: Software Engineering Intern at WSO2 2016, Research Assistant at University of Moratuwa 2018-2019

Other

- 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
- Teaching: MIT 1.200 Transportation: Foundations and Methods, UoM CS4622 Machine Learning
  - 2022 Harold L. Hazen Award for Teaching Excellence, MIT EECS
- 2017 Gold Award at National Best Quality ICT Awards, Sri Lanka Sector of British Computer Society
- 2017 Google Summer of Code GitHub

Expert skills: **Python, PyTorch, Numpy, Pandas**, Matplotlib, **C++**, **Java, Git**, SUMO
Proficient skills: AWS, Tensorflow, scikit-learn, Jax, Linux, SQL, Javascript, Gurobi, Mosek, C#, Slurm, Docker, CARLA, HTML, CSS