Cyrus Neary

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Education

The University of Texas at Austin May 2021 - May 2024 (Expected Graduation)
PhD in Computational Science, Engineering, and Mathematics *Austin, TX*
Advisor: Ufuk Topcu | Member of the Center for Autonomy and the Center for Scientific Machine Learning

The University of Texas at Austin September 2018 - May 2021
Master of Science in Computational Science, Engineering, and Mathematics *Austin, TX*
GPA Over 39 Credits – 4.00

The University of British Columbia September 2013 - May 2018
Bachelor of Applied Science in Engineering Physics, Minor in Honours Mathematics *Vancouver, BC*
GPA Over 177 Credits – 91.4% | Co-operative Education Program | Graduated with Distinction

Experience

The University of Texas at Austin – *Graduate Research Assistant* September 2018 - Present
◇ Developing methods to leverage prior knowledge in deep learning and reinforcement learning algorithms in order to improve their data efficiency and robustness, as well as to yield policies with verifiable properties.

MDA Systems Ltd. – *Mission Systems Engineering Co-op* May 2017 - August 2017
◇ Performed simulation and analysis of the control algorithms for the European Space Agency's (ESA) ExoMars 2022 rover. Communicated findings and recommendations to the ESA and other international Aerospace companies through a 100+ page technical engineering report.

MDA Systems Ltd. – *Research and Development Co-op* May 2016 - December 2016
◇ Developed, implemented, and validated an image processing algorithm to improve object characterization in the presence of artifacts within synthetic aperture radar images. The algorithm provided a marked performance improvement over the technique previously implemented in company software. Travelled to Ottawa to deliver a 45-minute presentation regarding the results of my work to Defence Research and Development Canada.

D-Wave Systems Inc. – *Processor Development Co-op* January 2015 - May 2015
◇ Designed and executed physics experiments to improve the magnetic shields for the company's quantum computer.
◇ Collaborated with several D-Wave physicists to increase the speed and reduce the error of magnetic field measurement techniques. Measurement standard error values were decreased by a factor of 10.

Publications

* Indicates equal contribution

Compositional Learning of Dynamical System Models Using Port-Hamiltonian Neural Networks 2023
Cyrus Neary, Ufuk Topcu
The Learning for Dynamics and Control Conference (L4DC) 2023

How to Learn and Generalize From Three Minutes of Data:
Physics-Constrained and Uncertainty-Aware Neural Stochastic Differential Equations 2023
Franck Djeumou*, **Cyrus Neary***, Ufuk Topcu
Selected for spotlight at *The Conference on Robot Learning (CORL) 2023*

A Multifidelity Sim-to-Real Pipeline for Verifiable and Compositional Reinforcement Learning 2023
Cyrus Neary, Christian Ellis, Aryaman Singh Samyal, Craig Lennon, Ufuk Topcu
Under submission to *The IEEE International Conference on Robotics and Automation (ICRA) 2024*

Verifiable Reinforcement Learning Systems via Compositionality 2023
Cyrus Neary, Aryaman Singh Samyal, Christos Verginis, Murat Cubuktepe, Ufuk Topcu
Under submission to *The Journal of Artificial Intelligence Research (JAIR)*

Designing Minimally-Dependent Multiagent Systems that are Robust to Communication Loss 2023
Mustafa O. Karabag*, **Cyrus Neary***, Ufuk Topcu
Under submission to *The Journal of Autonomous Agents and Multiagent Systems (JAAMAS)*

Multimodal Pretrained Models for Sequential Decision-Making: Synthesis, Verification, Grounding, and Perception 2023
Yunhao Yang, **Cyrus Neary**, Ufuk Topcu
Under submission to *The Artificial Intelligence Journal (AIJ)*

Automaton-Based Representations of Task Knowledge from Generative Language Models 2023
Yunhao Yang, Jean-Raphaël Gaglione, **Cyrus Neary**, Ufuk Topcu
Under submission to *The Journal of Artificial Intelligence Research (JAIR)*

Physics-Informed Kernel Embeddings: Integrating Prior System Knowledge with Data-Driven Control 2023
Adam J. Thorpe*, **Cyrus Neary***, Franck Djeumou*, Meeko M. K. Oishi, Ufuk Topcu
Under submission to *The American Control Conference (ACC) 2024*

Differential Privacy in Cooperative Multiagent Planning 2023
Bo Chen*, Calvin Hawkins*, Mustafa O. Karabag*, **Cyrus Neary***, Matthew Hale, Ufuk Topcu
The Conference on Uncertainty in Artificial Intelligence (UAI) 2023

Automatic Decomposition of Reward Machines for Decentralized Multiagent Reinforcement Learning 2023
Sophia Smith, **Cyrus Neary**, Ufuk Topcu
The IEEE Conference on Decision and Control (CDC) 2023

Verifiable and Compositional Reinforcement Learning Systems 2022
Cyrus Neary, Christos Verginis, Murat Cubuktepe, and Ufuk Topcu
The International Conference on Automated Planning and Scheduling (ICAPS) 2022

Neural Networks with Physics-Informed Architectures and Constraints for Dynamical Systems Modeling 2022
Franck Djeumou*, **Cyrus Neary***, Eric Goubault, Sylvie Putot, Ufuk Topcu
The Learning for Dynamics and Control Conference (L4DC) 2022

Planning Not to Talk: Multiagent Systems that are Robust to Communication Loss 2022
Mustafa O. Karabag*, **Cyrus Neary***, and Ufuk Topcu
The International Conference on Autonomous Agents and MultiAgent Systems (AAMAS) 2022

Taylor-Lagrange Neural Ordinary Differential Equations: Toward Fast Training and Evaluation of Neural ODEs 2022
Franck Djeumou*, **Cyrus Neary***, Eric Goubault, Sylvie Putot, Ufuk Topcu
The International Joint Conference on Artificial Intelligence (IJCAI) 2022

Multiscale Heterogeneous Optimal Lockdown Control for COVID-19 Using Geographic Information 2022
Cyrus Neary, Murat Cubuktepe, Niklas Lauffer, Xueting Jin, Alexander J. Phillips, Zhe Xu, Daoqin Tong, and Ufuk Topcu
Scientific Reports

Reward Machines for Cooperative Multiagent Reinforcement Learning 2021
Cyrus Neary, Zhe Xu, Bo Wu, and Ufuk Topcu
The International Conference on Autonomous Agents and MultiAgent Systems (AAMAS) 2021

Smooth Convex Optimization using Sub-Zeroth-Order Oracles 2021
Mustafa O. Karabag, **Cyrus Neary**, and Ufuk Topcu
The AAAI Conference on Artificial Intelligence (AAAI) 2021

Oral Presentations

How to Learn and Generalize From Three Minutes of Data November, 2023
The Conference on Robot Learning

Incorporating Physics Knowledge into Neural Differential Equations November, 2023
SIAM TX-LA Section Annual Meeting

Incorporating Physics Knowledge into Neural Differential Equations for the Control of Robotic Systems October, 2023
Texas Robotics Seminar

NeuroSPAR: Neuro Symbolic Perception, Action, and Reasoning October, 2023
DARPA Assured Neuro Symbolic Learning and Reasoning PI Meeting

Leveraging Physics Knowledge in Learned Dynamics Models for Reinforcement Learning and Control August, 2023
ONR Science of Autonomy Program Review

Multi-Modal, Pre-Trained Models in Verifiable Sequential Decision-Making June, 2023
Microsoft Applied Sciences Group Invited Talk

Incorporating Physics-Based Knowledge into Neural Ordinary Differential Equations May, 2023
ACC Workshop on Recent Developments in Data-Driven Methods for Dynamical Systems and Control

Leveraging Task Structure and A Priori Physics Knowledge in Reinforcement Learning March, 2023
University of Massachusetts Amherst, Autonomous Learning Lab Invited Talk

Neural ODEs with Physics-Informed Architectures and Constraints November, 2022
SIAM TX-LA Section Annual Meeting

Taylor-Lagrange Neural ODEs July, 2022
The International Joint Conference on Artificial Intelligence

Verifiable and Compositional Reinforcement Learning Systems — June, 2022
The International Conference on Automated Planning and Scheduling

Neural Networks with Physics-Informed Architectures and Constraints — April, 2022
SIAM Uncertainty Quantification

Planning not to Talk: Multiagent Systems that are Robust to Communication Loss — April, 2022
AFOSR Center of Excellence in Assured Autonomy in Contested Environments Program Review

How to Learn to Reach, Walk, Swim and Fly in One Trial — October, 2021
DARPA Invited Talk

How to Learn to Reach, Walk, Swim and Fly in One Trial — October, 2021
Texas Robotics Research Symposium

Reward Machines for Cooperative Multiagent Reinforcement Learning — May, 2021
The International Conference on Autonomous Agents and Multiagent Systems

Poster Presentations

Compositional Learning of Dynamical System Models Using Port-Hamiltonian Neural Networks — June, 2023
The Learning for Dynamics and Control Conference

Taylor-Lagrange Neural ODEs — July, 2022
The International Joint Conference on Artificial Intelligence

Verifiable and Compositional Reinforcement Learning Systems — June, 2022
The International Conference on Automated Planning and Scheduling

Neural Networks with Physics-Informed Architectures and Constraints — June, 2022
The Learning for Dynamics and Control Conference

Service

The Oden Institute Committee for Diversity, Equity, Inclusion, and Outreach — September 2022 - August 2023

◇ Served as the committee's graduate student representative. Contributed to a report that analyzed the results of an Oden Institute-wide climate survey and provided recommendations to the institute's leadership. Organized outreach information sessions to connect graduate student at the Oden Institute with local STEM outreach organizations.

Babuška Forum Seminar Series, Organizer — September 2022 - May 2023

◇ Hosted a biweekly seminar series to expose PhD students to topics in computational science, engineering, and math.

Code2College Python Instructor — September 2022 - Present

◇ Teaching Python courses to highschool students through Code2College, an organization whose mission is to dramatically increase the number of underrepresented students who excel in STEM undergraduate majors and careers.

Reviewer

◇ The American Control Conference — 2023
◇ IEEE International Conference on Robotics and Automation — 2023
◇ IEEE Transactions on Automatic Control — 2023
◇ IEEE Conference on Decision and Control — 2023
◇ The Learning for Dynamics and Control Conference — 2023
◇ The International Conference on Automated Planning and Scheduling — 2023
◇ IEEE Control Systems Letters — 2022
◇ IEEE Conference on Computers, Software & Applications in an Uncertain World — 2022
◇ ACM/IEEE International Conference on Cyber-Physical Systems — 2021

Other Volunteering

◇ Student volunteer, The International Conference on Autonomous Agents and Multiagent Systems — 2021

Fellowships, Honors, and Awards

Student Scholarship – International Conference on Automated Planning and Scheduling — 2022
Student Scholarship – International Conference on Autonomous Agents and Multiagent Systems — 2022, 2021
National Initiative for Modeling and Simulation Graduate Research Fellowship — 2019
The University of Texas at Austin Graduate Recruitment Fellowship — 2018
Carl and Elsie Halterman Scholarship — 2018
The University of British Columbia Dean's Honor List — 2018, 2017, 2016, 2014

The University of British Columbia Trek Excellence Scholarship	2017, 2016, 2014
Captain C.Y. Wu Scholarship	2017, 2016
MDA Co-op Scholarship	2016
NSERC Industrial Undergraduate Student Research Award	2016, 2015
The University of British Columbia Chancellor's Scholar	2013

Other Technical Projects

Ocular Torsion Quantification – *UBC Kinesiology* September 2017 - May 2018

◇ Worked with two other UBC Engineering Physics students to develop a computer algorithm to measure eye torsion from video recordings. This algorithm is of specific interest to researchers in UBC's Sensorimotor Physiology Laboratory.

UAS Flight Navigation and Collision Avoidance – *Aeriosense Technologies* September 2016 - May 2017

◇ Developed an autonomous unmanned aircraft system (UAS) with two other UBC Engineering Physics Students. The system used stereo cameras and onboard processing to navigate and avoid collisions with obstacles.

Electrical Engineering Team Leader – *Formula UBC Engineering Design Team* September 2013 - September 2017

◇ Responsible for the design and fabrication of power distribution, data acquisition, and electronic actuation systems onboard the racecar. The team creates a new car annually to compete in the international Formula SAE competition.

Autonomous Robot Competition – *UBC Engineering Physics* May 2015 - August 2015

◇ Worked with three other UBC Engineering Physics students to design, prototype, and test a fully autonomous robot that competed in the 2015 UBC Engineering Physics robot competition.