Nicholas E. Corrado

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Education

Present **University of Wisconsin – Madison**, Madison, WI
Doctoral Student, Advisor: *Josiah Hanna*
Interests: reinforcement learning, robotics, data augmentation, representation learning

2019 **University of Pittsburgh**, Pittsburgh, PA
BPhil in Physics, BS in Mathematics, Advisor: *Vladimir Savinov*
Thesis: A Search for W_{bJ} in Decays of $\Upsilon(5S)$: An Analysis Design Study [thesis]

Experience

Jan 2021 – Present **University of Wisconsin – Madison**, *Research Assistant*, Madison, WI.
Advisor: Josiah P. Hanna

- My research focuses on improving the data efficiency of reinforcement learning (RL) by controlling the distribution of data from which an RL agent learns.
- Identified aspects of data augmentation that improve the data efficiency of RL and successfully applied these insights to a **real-world robotics task.**
- Demonstrated that on-policy policy gradient algorithms are more data efficient with **adaptive, off-policy sampling** than on-policy sampling.

May 2021 – Nov 2023 **Sandia National Laboratories**, *Research Intern*, Albuquerque, NM.
Advisor: Drew Levin

- Deep reinforcement learning for power systems management.
- From May 2022 - Nov 2023, I served as a consultant for reinforcement learning projects.

Sept 2019 – Sept 2020 **University of Wisconsin – Madison**, *Research Assistant*, Madison, WI.
Advisor: Jignesh Patel

- Built the query execution and storage engines of Hustle, a scalable data platform built on top of Apache Arrow.
- Designed a variant of the Lookahead Information Passing (LIP) query execution strategy with improved robustness in dynamic data environments. for Hustle. [github]

Oct 2016 – Aug 2019 **University of Pittsburgh**, *Research Assistant*, Pittsburgh, PA.
Advisor: Vladimir Savinov

- Designed and optimized the first search for new hadronic W_{bJ} states in data collected by the Belle experiment. [thesis]
- Created tools to monitor TOP Level-1 trigger performance for the Belle-II experiment.

Submitted Manuscripts

Nicholas E. Corrado & Josiah P. Hanna. On-policy policy gradient learning without on-policy sampling. Under Review, 2023.

Nicholas E. Corrado & Josiah P. Hanna. Understanding when dynamics-invariant data augmentations benefit model-free reinforcement learning updates. Under Review, 2023. [preprint] [video]

Nicholas E. Corrado, Yuxiao Qu, John U. Balis, Adam Labiosa, & Josiah P. Hanna. Guided data augmentation for offline reinforcement learning and imitation learning. Under Review, 2023. [preprint]

Nicholas E. Corrado, Michael Livesay, Tyson Bailey, & Drew Levin. Reinforcement learning for automatic generation control using a Kuramoto-like model. Under Review, 2023.

Publications

IEEE SmartGridComm 2023 — **Nicholas E. Corrado**, Michael Livesay, Jay Johnson, & Drew Levin. Deep reinforcement learning for distribution power system cyber-resilience via distributed energy resource control. To appear in IEEE International Conference on Communications, Control, and Computing Technologies for Smart Grids (IEEE SmartGridComm), 2023.

CoLLAs 2022 — **Nicholas Corrado**, Yuxiao Qu, Josiah P. Hanna. Simulation-acquired latent action spaces for dynamics generalization. In Proceedings of the 1st Conference on Lifelong Learning Agents (CoLLAs), 2022. [paper] [website] [video]

Abstracts

MMLS 2023 — **Nicholas E. Corrado** & Josiah P. Hanna. On-policy policy gradient learning without on-policy sampling. In Midwest Machine Learning Symposium (MMLS), 2023. (Poster)

MMLS 2023 — **Nicholas E. Corrado**, Yuxiao Qu, John U. Balis, Adam Labiosa, & Josiah P. Hanna. Guided data augmentation for offline reinforcement learning and imitation learning. In Midwest Machine Learning Symposium (MMLS), 2023. (Poster)

APS Meeting 2018 — **Nicholas Corrado** & Vladimir Savinov. Search for $\Upsilon(5S) \to \gamma W_{bJ}$. American Physical Society (APS) Meeting, 2018. Oral. [abstract & slides]

Technical Reports

Belle Collaboration — **Nicholas Corrado** & Vladimir Savinov. Search for $\Upsilon(5S) \to \gamma W_{bJ}$. Belle Collaboration. Belle Note 1522, 2019. [paper]

Honors & Awards

2023 **Sandia Employee Recognition Award. Awarded to $<$ 10% of the Sandia workforce**

2019 **UW-Madison CS Department Scholarship ($3000). Awarded to top graduate applicants.**

John O. Blumberg Memorial Scholarship ($1000). Awarded to the top math major.

Pennsylvania Space Grant Consortium Scholarship (third time, $1500). Research funding.

2018 Emil Sanielevici Scholarship ($4000). Research funding.

Pennsylvania Space Grant Consortium Scholarship (second time, $1500). Research funding.

APS DPF Travel Award ($200)

J&M Bigos Memorial Scholarship ($10,000). Awarded for academic excellence.

Sigma Pi Sigma Physics Honor Society

2017 **Peter F.M. Koehler Award ($500). Awarded to the top physics major.**

Brackenridge Summer Research Fellowship ($3500). Research funding.

Rebecca Dytman Scholarship ($10,000). Awarded for academic excellence in physics and astronomy.

Pennsylvania Space Grant Consortium Scholarship (first time, $1500). Research funding.

Advising

Yuxiao Qu (Undergraduate, University of Wisconsin-Madison, 2021-2023); **Currently at Carnegie Mellon University.**

Talks

2023 On-Policy Policy Gradient Reinforcement Learning Without On-Policy Sampling (University of Edinburgh RL Reading Group)

Teaching Experience

Fall 2023 Completed Research Mentor Program
(University of Wisconsin – Madison, Delta Program)

Fall 2021 Teaching Assistant for *Mathematical Foundations of Machine Learning*
(University of Wisconsin – Madison, CS 761)

Fall 2021 Head Teaching Assistant for *Intro to Computer Systems*
(University of Wisconsin – Madison, CS 354)

Spring 2021 Teaching Assistant for *Problem Solving for Engineers*
(University of Wisconsin – Madison, CS 310)

Fall 2020	Teaching Assistant for *Discrete Mathematics* (University of Wisconsin – Madison, CS 240)
Fall 2018	Teaching Assistant for *Quantum Mechanics* (University of Pittsburgh, PHYS 1370)

Service

Reviewer	2024: ICML, NeurIPS, AAAI, ICLR
Program Committee	2024: ICRA
Workshops	2022: Sandia Machine Learning and Deep Learning (MLDL) Workshop. Designed and organized a reinforcement learning competition.

Technical Skills

Languages	Python, C++, C, familiar with Matlab, Java, Verilog
Other	PyTorch, Apache Arrow, ROOT