Samuel Schmidgall

Robotic Learning @ GMU & NRL | sschmidg@gmu.edu | 🎓Google Scholar (click me)

🧠 Research Areas

Robotic Learning, Reinforcement Learning, Meta-learning, Online Learning, Neuromorphic Computing

📈 Professional Experience

Space Robotics Department @ Naval Research Laboratory **Washington, D.C.**
Computer Scientist since June 2021
- Granted funding through the Safe Lifelong Motor Learning (SLLML) initiative under the Office of the Under Secretary of Defense (OUSD) to pursue the development of robotic learning systems which can adapt to new challenges during their lifetime. Focus on robotic learning for quadrupedal locomotion using neuromorphic hardware in order to dramatically improve power-efficiency of deep learning based methods for robotic control.

Undergraduate Research Intern May 2019 – May 2021
- Developed online learning algorithms for neuromorphic controllers on robotic learning applications via meta-learning online fast- and slow-weight learning rules.

George Mason University **Fairfax, VA**
Graduate Research Assistant, Maryam Parsa since Aug 2022
- Research in brain-inspired artificial intelligence on neuromorphic systems for robotic learning applications.

Mason Experimental Geometry Laboratory **Fairfax, VA**
Undergraduate Research Assistant, Matthew Holzer January 2020 – May 2020
- Research in wave propagation dynamics for locked fronts in a discrete time discrete space population model

Undergraduate Research Assistant, Anton Lukyanenko & Damoon Soudbakhsh August 2018 – May 2019
- Research in robotic motion planning, finding optimal localized trajectories for the planning of multiple vehicles.

Gartner **Arlington, VA**
Data Science Intern May 2018 – March 2019
- Extracting and predicting performance based on resume features & language modelling for chat-bot automation.

Asymmetriq **Marshall, VA**
Software Engineering Intern May 2017 – May 2018
- Using computer vision learning models (via deep learning) for improving online license plate character recognition (i.e. optical character recognition).

📚 Education

George Mason University **Fairfax, VA**
PhD in Electrical and Computer Engineering since August 2022
- **Robotics&ML:** CS685 Autonomous Robotics, CS896 Research in Robotic Learning, ECE527 Learning from Data, ECE528 Introduction to Random Processes

Bachelor of Science in Computer Science August 2017- May 2021
- **Robotics&ML:** CS498 Research in Reinforcement Learning for Robotics I-II (*with Jana Kosecka*), MATH491 Research in Robotic Motion Planning, CS480 Artificial Intelligence, STAT472 Introduction to Statistical Learning, CS484 Data Mining
- **Computer Science:** CS483 Analysis of Algorithms, CS367 Systems Programming, CS330 Theoretical CS, CS310 Data Structures, CS471 Operating Systems, CS455 Comp Networking, CS499 Cryptography
- **Math&Physics:** Math315 Real Analysis, MATH322 Adv Linear Algebra, MATH452 Adv Mathematical Statistics, MATH213 Calculus I-III, PHYS261 Physics I-II

🧬 Publications

Under Review/In-Preparation
- **Schmidgall, S.**, Hays, J., (2023). Toward a Robotic Motor Cortex. *Frontiers in Neurorobotics (Under Review).*
- **Schmidgall, S.**, Dannenberg, H., Maryam, P., (2023). Brain-inspired learning in artificial neural networks. *Nature Machine Intelligence (Under Review).*

- **Schmidgall, S.**, Hays, J., (2023). A low-power solution for the control of legged robots. *Science Robotics (In Preparation, Expected February 2023).*
- **Schmidgall, S.**, Risi, S., (2023). A neural structure that supports rapid learning for embodied control. *The 2023 Genetic and Evolutionary Computation Conference (GECCO). (In Preparation, Expected January 2023).*

Journal

- **Schmidgall, S.**, Hays, J. (2022). Learning to Learn Online with Neuromodulated Synaptic Plasticity in Spiking Neural Networks. *Neural Networks. (Final stages of review).*
- Holzer, M., Richey, Z., Rush, W., **Schmidgall, S.**, (2022). Locked fronts in a discrete time discrete space population model. *Journal of Mathematical Biology.*
- **Schmidgall, S.**, Ashkanazy, J., Lawson, W., Hays, J, (2021). SpikePropamine: Differentiable Plasticity in Spiking Neural Networks. *Frontiers in Neurorobotics*.

Conference

- **Schmidgall, S.**, Parsa, M., (2022). Biological connectomes as a representation for the architecture of artificial neural networks. *International Conference on Learning Representations (ICLR). (Under Review).*
- **Schmidgall, S.**, Hays, J., (2022). Stable Lifelong Learning: Spiking neurons as a solution to instability in plastic neural networks. *Neuro-Inspired Computational Elements (NICE)*.
- Lukyanenko, A., Camphire, H., Austin, A., **Schmidgall, S.**, Soudbakhsh, D., (2021). Optimal Localized Trajectory Planning of Multiple Non-holonomic Vehicles. *5th Conference on Control Technology and Applications (CCTA).*
- **Schmidgall, S.** (2021). Self-constructing Neural Networks through Random Mutation. *International Conference on Learning Representations (ICLR).*
- **Schmidgall, S.**, (2020). Adaptive Reinforcement Learning through Evolving Self-Modifying Neural Networks. *The 2020 Genetic and Evolutionary Computation Conference (GECCO).*

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Activities and Awards

- **Security Clearance** granted security clearance through my work at the Naval Research Laboratory.
- **Edison Memorial Graduate Fellow** Full funding provided by the Naval Research Laboratory to pursue a graduate program in their field (2023-2024 with yearly renewal).
- **2022 Alan Berman Research Publication Award** for paper *SpikePropamine: Differentiable Plasticity in Spiking Neural Networks.*
- **Invited reviewer** at the *2022 NSF "Brain-Inspired Dynamics for Engineering Energy-Efficient Circuits and Artificial Intelligence"* Program.
- **Reviewer editor** for *Neural Networks* journal.
- **Invited speaker** at the *Intel Labs INRC Spring 2022 Continual Learning Workshop* [link].
- **Invited speaker** for ECE556 *Neuromorphic Computing* at George Mason University [link].
- **Invited speaker** at the *Spring 2022 Naval Applications of Machine Learning (NAML).*
- **Oral Presentation** at the *2022 Neuro-Inspired Computational Elements Workshop (NICE)* [link].
- **Oral Presentation** at the *2021 International Conference on Machine Learning "A Roadmap to Never-Ending Reinforcement Learning" (ICLR NERL) Workshop* [link].
- **Oral Presentation** at the *2020 Genetic and Evolutionary Computation Conference (GECCO)* [link].
- **Best Poster Award** MEGL Symposium Poster Presentation Spring 2020
- **Outstanding Poster Award** Joint Mathematics Meeting Conference Spring 2019