

Nicholas Waytowich

Curriculum Vitae

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Professional Experience

- 2022–Present **Senior Machine Learning Research Scientist**, *Humans and Complex Systems Division, U.S. Army Research Laboratory, Maryland.*
Developing human-guided AI/ML algorithms and LLMs to improve human-autonomy teaming
- 2017–2022 **Machine Learning Research Scientist**, *Human Research and Engineering Directorate (HRED), U.S. Army Research Laboratory, Maryland.*
Researching machine learning, human-agent teaming, multi-agent systems and deep-reinforcement learning.
- 2019–2020 **CEO and Co-Founder**, *AIMS-Technologies, LLC.*
CEO and co-founder of a start-up company (Aerial Interception of Multirotor Systems (AIMS) Technologies) to research and develop new capabilities to detect and counter non-cooperative, small unmanned aerial systems (sUAS)
- 2017–2020 **Adjunct Associate Research Scientist**, *Columbia University, New York.*
Researching novel AI/ML methods for Brain-Computer Interfaces
- 2015–2017 **Postdoctoral Research Fellow**, *Laboratory for Intelligent Imaging and Neural Computing (LIINC), Columbia University, New York.*
Researched the neural correlates of adaptation during longitudinal feedback from brain-computer interfaces and designing novel transfer learning algorithms for real-world neuro-imaging paradigms.
- 2015–2017 **Postdoctoral Research Fellow**, *Human Research and Engineering Directorate (HRED), U.S. Army Research Laboratory, Maryland.*
Focused on the design and implementation of heterogeneous, multi-agent systems of human and computer agents for collaborative machine learning.
- 2010–2015 **Graduate Research Assistant**, *Advanced Signal Processing in Engineering and Neuroscience Lab - ODU, Norfolk.*
Developed novel signal processing and machine learning algorithms for non-invasive and visual based brain-computer interfaces to aid individuals with severe neuromuscular disorders.
- 2008–2010 **Research Assistant**, *Brain-Computer Interface Lab, University of North Florida, Jacksonville.*
Developed novel brain-computer interface applications to control anthropomorphic manipulator arms for neuroprosthetic control.

Teaching and Mentoring Experience

- 2024–Present **Adjunct Professor**, *University of Maryland Baltimore County (UMBC), Maryland.*
Teaching CMSC-478 Introduction to Machine Learning
- 2023–Present **Adjunct Professor**, *Anne Arundel Community College (AACC), Maryland.*
Teaching EGR-120 (Intro to Engineering) and EGR-250 (Intermediate Programming) courses
- 2018–Present **ORAU Student Mentor/Advisor**, *Army Research Laboratory.*
Currently mentor several undergraduate, and graduate students each year through OakRidge Associated Universities (ORAU) on various projects related to machine learning, reinforcement learning, robotics and human-in-the-loop AI

2008–2010 **Laboratory Instructor**, *Robotics Laboratory, University of North Florida*.
Managed UNF's Robotics and Manufacturing laboratory and taught the Robotics lab for the Introduction to Robotics course at UNF. Responsibilities included the development, preparation and teaching of weekly lectures and laboratory exercises

Education

2013–2015 **Ph.D. Biomedical Engineering**, *Old Dominion University, Norfolk VA*.
Specialization in Brain-Computer Interfaces and Machine Learning

2011–2013 **Masters in Electrical and Computer Engineering**, *Old Dominion University, VA*.
Specialization in Signal Processing and Machine Learning

2006–2010 **B.S. Mechanical Engineering**, *University of North Florida, Jacksonville FL*.
Specialization in Robotics

Research and Teaching Interests

- Human-Guided Machine Learning
- Human-in-the-loop Reinforcement Learning
- Brain-Computer Interfaces
- Human-Agent Teaming
- Machine Learning & Artificial Intelligence
- Large-Language Models
- Robotics
- Reinforcement Learning

Publications

- 2025 Vinicius Goecks and **Nicholas R Waytowich** and Ryan Bookman and Christian Kenny *COA-GPT 2.0: An Agentic AI Planning Tool for Accelerating the Military Decision-Making Process*, Under Review, 2025
- Mingyang Mao and Mariela M Perez-Cabarcas and Utteja Kallakuri and **Nicholas R Waytowich** and Xiaomin Lin and Tinoosh Mohsenin. *Multi-RAG: A Multimodal Retrieval-Augmented Generation System for Adaptive Video Understanding*. In: *arXiv preprint arXiv:2505.23990*. 2025
- Jonathan Hyun and **Nicholas R Waytowich** and Boyuan Chen. *CREW-Wildfire: Benchmarking agentic multi-agent collaborations at scale*. In: *arXiv preprint arXiv:2507.05178*. 2025
- Mingkang Wu and Devin White and Vernon Lawhern and **Nicholas R Waytowich** and Yongcan Cao. *Rbrl2. 0: Integrated reward and policy learning for rating-based reinforcement learning*. In: *arXiv preprint arXiv:2501.07502*. 2025
- Mikolaj Walczak and Romina Aalishah and Wyatt Mackey and Brittany Story and David L Boothe Jr and **Nicholas Waytowich** and Xiaomin Lin and Tinoosh Mohsenin. *EDEN: Entorhinal Driven Egocentric Navigation Toward Robotic Deployment*. In: *arXiv preprint arXiv:2506.03046*. 2025
- Evelyn Rose and Devin White and Mingkang Wu and Vernon Lawhern and **Nicholas R Waytowich** and Yongcan Cao. *Performance optimization of ratings-based reinforcement learning*. In: *arXiv preprint arXiv:2501.07755*. 2025
- Connor Mattson and Varun Raveendra and Ellen Novoseller and **Nicholas Waytowich** and Vernon J Lawhern and Daniel S Brown. *R2BC: Multi-Agent Imitation Learning from Single-Agent Demonstrations*. In: *arXiv preprint arXiv:2510.18085*. 2025
- Indrajeet Ghosh and Kasthuri Jayarajah and **Nicholas Waytowich** and Nirmalya Roy. *Augmenting Personalized Memory via Practical Multimodal Wearable Sensing in Visual Search and Wayfinding Navigation*. In: *Proceedings of the 33rd ACM Conference on User Modeling*. 2025

Mingkang Wu and Devin White and Evelyn Rose and Vernon Lawhern and **Nicholas R Waytowich** and Yongcan Cao. *Multi-Task Reward Learning from Human Ratings*. In: *arXiv preprint arXiv:2506.09183*. 2025

Indrajeet Ghosh and Kasthuri Jayarajah and **Nicholas Waytowich** and Nirmalya Roy. *Memento: Augmenting Personalized Memory via Practical Multimodal Wearable Sensing in Visual Search and Wayfinding Navigation*. In: *arXiv preprint arXiv:2504.19772*. 2025

Anna Madison and Kaleb McDowell and Vinicius G Goecks and Jeff Hansberger and Ceili M Olney and Claire Ahern and Amar Marathe and **Nicholas Waytowich** and Christian Kenney and Christopher Kelshaw. " *New* " *Challenges for Future C2: Commanding Soldier-Machine Partnerships*. In: *arXiv preprint arXiv:2503.08844*. 2025

2024 Vinicius G Goecks and **Nicholas Waytowich**. *Coa-gpt: Generative pre-trained transformers for accelerated course of action development in military operations*. In: *2024 International Conference on Military Communication and Information Systems*. 2024

Devin White and Mingkang Wu and Ellen Novoseller and Vernon J Lawhern and **Nicholas Waytowich** and Yongcan Cao. *Rating-based reinforcement learning*. In: *Proceedings of the AAAI Conference on Artificial Intelligence*. 2024

Lingyu Zhang and Zhengran Ji and **Nicholas Waytowich** and Boyuan Chen. *GUIDE: Real-time human-shaped agents*. In: *Advances in Neural Information Processing Systems*. 2024

Nicholas R Waytowich and Devin White and MD Sunbeam and Vinicius G Goecks. *Atari-gpt: Investigating the capabilities of multimodal large language models as low-level policies for atari games*. In: *arXiv e-prints*. 2024

Anna Madison and Ellen Novoseller and Vinicius G Goecks and Benjamin T Files and **Nicholas Waytowich** and Alfred Yu and Vernon J Lawhern and Steven Thurman and Christopher Kelshaw and Kaleb McDowell. *Scalable interactive machine learning for future command and control*. In: *2024 International Conference on Military Communication and Information Systems (ICMCIS)*. 2024

Utteja Kallakuri and Bharat Prakash and Arnab Neelim Mazumder and Hasib-Al Rashid and **Nicholas R Waytowich** and Tinoosh Mohsenin. *Atlas: Adaptive landmark acquisition using llm-guided navigation*. In: *First Vision and Language for Autonomous Driving and Robotics Workshop*. 2024

Ahaan Dabholkar and James Z Hare and Mark Mittrick and John Richardson and **Nicholas Waytowich** and Priya Narayanan and Saurabh Bagchi. *Adversarial attacks on reinforcement learning agents for command and control*. In: *The Journal of Defense Modeling and Simulation*. 2024

Nicholas R Waytowich and Devin White and MD Sunbeam and Vinicius G Goecks. *Atari-GPT: Benchmarking Multimodal Large Language Models as Low-Level Policies in Atari Games*. In: *arXiv preprint arXiv:2408.15950*. 2024

Mark Mittrick and John Richardson and Vinicius G Goecks and James Zachary Hare and **Nicholas Waytowich**. *Investigating the mission impact of non-kinetic variables in the operational environment*. In: *Artificial Intelligence and Machine Learning for Multi-Domain Operations Applications VI*. 2024

- 2023 Vinicius G Goecks and **Nicholas R Waytowich**. *Disasterresponsegpt: Large language models for accelerated plan of action development in disaster response scenarios*. In: *arXiv preprint arXiv:2306.17271*. 2023
- Vinicius G Goecks and **Nicholas Waytowich** and Derrik E Asher and Song Jun Park and Mark Mittrick and John Richardson and Manuel Vindiola and Anne Logie and Mark Dennison and Theron Trout and Priya Narayanan and Alexander Kott. *On games and simulators as a platform for development of artificial intelligence for command and control*. In: *The Journal of Defense Modeling and Simulation*. 2023
- Stephanie Milani and Anssi Kanervisto and Karolis Ramanauskas and Sander Schulhoff and Brandon Houghton and Sharada Mohanty and Byron Galbraith and Ke Chen and Yan Song and Tianze Zhou and Bingquan Yu and He Liu and Kai Guan and Yujing Hu and Tangjie Lv and Federico Malato and Florian Leopold and Amogh Raut and Ville Hautamäki and Andrew Melnik and Shu Ishida and João F Henriques and Robert Klassert and Walter Laurito and Ellen Novoseller and Vinicius G Goecks and **Nicholas Waytowich** and David Watkins and Josh Miller and Rohin Shah. *Towards solving fuzzy tasks with human feedback: A retrospective of the minerl basalt 2022 competition*. In: *arXiv preprint arXiv:2303.13512*. 2023
- Sean Kulinski and **Nicholas R Waytowich** and James Z Hare and David I Inouye. *Starcraftimage: A dataset for prototyping spatial reasoning methods for multi-agent environments*. In: *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*. 2023
- Ellen Novoseller and Vinicius G Goecks and David Watkins and Josh Miller and **Nicholas Waytowich**. *DIP-RL: Demonstration-Inferred Preference Learning in Minecraft*. In: *arXiv preprint arXiv:2307.12158*. 2023
- Prashant Ganesh and J Humberto Ramos and Vinicius G Goecks and Jared Paquet and Matthew Longmire and **Nicholas R Waytowich** and Kevin Brink. *Learning Flight Control Systems from Human Demonstrations and Real-Time Uncertainty-Informed Interventions*. In: *IFAC-PapersOnLine*. 2023
- 2022 Mozhgan Navardi and Aidin Shiri and Edward Humes and **Nicholas R Waytowich** and Tinoosh Mohsenin. *An optimization framework for efficient vision-based autonomous drone navigation*. In: *2022 IEEE 4th International Conference on Artificial Intelligence Circuits and Systems (AICAS)*. 2022
- Mozhgan Navardi and Prakhar Dixit and Tejaswini Manjunath and **Nicholas R Waytowich** and Tinoosh Mohsenin and Tim Oates. *Toward real-world implementation of deep reinforcement learning for vision-based autonomous drone navigation with mission*. In: *UMBC Student Collection*. 2022
- Rohin Shah and Steven H Wang and Cody Wild and Stephanie Milani and Anssi Kanervisto and Vinicius G Goecks and **Nicholas Waytowich** and David Watkins-Valls and Bharat Prakash and Edmund Mills and Divyansh Garg and Alexander Fries and Alexandra Souly and Jun Shern Chan and Daniel del Castillo and Tom Lieberum. *Retrospective on the 2021 minerl BASALT competition on learning from human feedback*. In: *NeurIPS 2021 Competitions and Demonstrations Track*. 2022
- Brian C sar-Tondreau and Garrett Warnell and Kevin Kochersberger and **Nicholas R Waytowich**. *Towards fully autonomous negative obstacle traversal via imitation learning based control*. In: *Robotics*. 2022

David Watkins-Valls and Peter K Allen and Henrique Maia and Madhavan Seshadri and Jonathan Sanabria and **Nicholas Waytowich** and Jacob Varley. *Mobile manipulation leveraging multiple views*. In: *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. 2022

Aidin Shiri and Mozghan Navardi and Tejaswini Manjunath and **Nicholas R Waytowich** and Tinoosh Mohsenin. *Efficient language-guided reinforcement learning for resource-constrained autonomous systems*. In: *IEEE Micro*. 2022

Aidin Shiri and Uttej Kallakuri and Hasib-Al Rashid and Bharat Prakash and **Nicholas R Waytowich** and Tim Oates and Tinoosh Mohsenin. *E2hrl: An energy-efficient hardware accelerator for hierarchical deep reinforcement learning*. In: *ACM Transactions on Design Automation of Electronic Systems (TODAES)*. 2022

Anjon Basak and Erin G Zaroukian and Kevin Corder and Rolando Fernandez and Christopher D Hsu and Piyush K Sharma and **Nicholas R Waytowich** and Derrik E Asher. *Utility of doctrine with multi-agent RL for military engagements*. In: *Artificial intelligence and machine learning for multi-domain operations applications IV*. 2022

Bharat Prakash and **Nicholas Waytowich** and Tim Oates and Tinoosh Mohsenin. *Towards an interpretable hierarchical agent framework using semantic goals*. In: *arXiv preprint arXiv:2210.08412*. 2022

Indrajeet Ghosh and Avijoy Chakma and Sreenivasan Ramasamy Ramamurthy and Nirmalya Roy and **Nicholas Waytowich**. *Permtl: A multi-task learning framework for skilled human performance assessment*. In: *2022 21st IEEE International Conference on Machine Learning and Applications (ICMLA)*. 2022

Rohin Shah and Steven H Wang and Cody Wild and Stephanie Milani and Anssi Kanervisto and Vinicius G Goecks and **Nicholas Waytowich** and David Watkins-Valls and Bharat Prakash and Edmund Mills and Divyansh Garg and Alexander Fries and Alexandra Souly and Chan Jun Shern and Daniel del Castillo and Tom Lieberum. *Retrospective on the 2021 BASALT competition on learning from human feedback*. In: *arXiv preprint arXiv:2204.07123*. 2022

Nicholas Waytowich and James Hare and Vinicius G Goecks and Mark Mittrick and John Richardson and Anjon Basak and Derrik E Asher. *Learning to guide multiple heterogeneous actors from a single human demonstration via automatic curriculum learning in StarCraft II*. In: *Artificial intelligence and machine learning for multi-domain operations applications IV*. 2022

Bharat Prakash and **Nicholas R Waytowich** and Tim Oates and Tinoosh Mohsenin. *Hierarchical Agents by Combining Language Generation and Semantic Goal Directed RL*. In: *Second Workshop on Language and Reinforcement Learning*. 2022

David Watkins and Peter Allen and Krzysztof Choromanski and Jacob Varley and **Nicholas Waytowich**. *Multiple View Performers for Shape Completion*. In: *arXiv preprint arXiv:2209.06291*. 2022

Mohit Khatwani and Hasib-Al Rashid and Hirenkumar Paneliya and Mark Horton and Houman Homayoun and **Nicholas Waytowich** and W David Hairston and Tinoosh Mohsenin. *A flexible software-hardware framework for brain eeg multiple artifact identification*. In: *Handbook of Biochips: Integrated Circuits and Systems for Biology and* . 2022

Kasthuri Jayarajah and Aryya Gangopadhyay and **Nicholas Waytowich**. *TagTeam Towards wearable-assisted, implicit guidance for human-drone teams*. In: *Proceedings of the 1st ACM Workshop on Smart Wearable Systems and Applications*. 2022

Nicholas R Waytowich and Tim Oates and Tinoosh Mohsenin. *E2HRL: An Energy-Efficient Hardware Accelerator for Hierarchical Deep Reinforcement Learning*. 2022

- 2021 Mohit Khatwani and Hasib-Al Rashid and Hirenkumar Paneliya and Mark Horton and **Nicholas Waytowich** and W David Hairston and Tinoosh Mohsenin. *A flexible multichannel EEG artifact identification processor using depthwise-separable convolutional neural networks*. In: *ACM Journal on Emerging Technologies in Computing Systems (JETC)*. 2021

Brian C  sar-Tondreau and Garrett Warnell and Ethan Stump and Kevin Kochersberger and **Nicholas R Waytowich**. *Improving autonomous robotic navigation using imitation learning*. In: *Frontiers in Robotics and AI*. 2021

Nitheesh Kumar Manjunath and Aidin Shiri and Morteza Hosseini and Bharat Prakash and **Nicholas R Waytowich** and Tinoosh Mohsenin. *An energy efficient edgeai autoencoder accelerator for reinforcement learning*. In: *IEEE Open Journal of Circuits and Systems*. 2021

Kristin E Schaefer and Brandon Perelman and Joe Rexwinkle and Jonroy Canady and Catherine Neubauer and **Nicholas Waytowich** and Gabriella Larkin and Katherine Cox and Michael Geuss and Gregory Gremillion and Jason S Metcalfe and Arwen DeCostanza and Amar Marathe. *Human-autonomy teaming for the tactical edge: The importance of humans in artificial intelligence research and development*. In: *Systems engineering and artificial intelligence*. 2021

Vinicius G Goecks and **Nicholas Waytowich** and David Watkins-Valls and Bharat Prakash. *Combining learning from human feedback and knowledge engineering to solve hierarchical tasks in minecraft*. In: *arXiv preprint arXiv:2112.03482*. 2021

Bharat Prakash and **Nicholas Waytowich** and Tim Oates and Tinoosh Mohsenin. *Interactive hierarchical guidance using language*. In: *arXiv preprint arXiv:2110.04649*. 2021

Aidin Shiri and Arnab Neelim Mazumder and Bharat Prakash and Houman Homayoun and **Nicholas R Waytowich** and Tinoosh Mohsenin. *A hardware accelerator for language-guided reinforcement learning*. In: *IEEE Design & Test*. 2021

Aidin Shiri and Bharat Prakash and Arnab Neelim Mazumder and **Nicholas R Waytowich** and Tim Oates and Tinoosh Mohsenin. *An energy-efficient hardware accelerator for hierarchical deep reinforcement learning*. In: *2021 IEEE 3rd International Conference on Artificial Intelligence Circuits and Systems (AICAS)*. 2021

Ravi Kumar Thakur and MD Sunbeam and Vinicius G Goecks and Ellen Novoseller and Ritwik Bera and Vernon J Lawhern and Gregory M Gremillion and John Valasek and **Nicholas R Waytowich**. *Imitation learning with human eye gaze via multi-objective prediction*. In: *arXiv preprint arXiv:2102.13008*. 2021

Ritwik Bera and Vinicius G Goecks and Gregory M Gremillion and Vernon J Lawhern and John Valasek and **Nicholas R Waytowich**. *Gaze-Informed Multi-Objective Imitation Learning from Human Demonstrations*. In: *arXiv preprint arXiv:2102.13008*. 2021

Bharat Prakash and **Nicholas Waytowich** and Tinoosh Mohsenin and Tim Oates. *Automatic goal generation using dynamical distance learning*. In: *arXiv preprint arXiv:2111.04120*. 2021

- 2020 Bharat Prakash and **Nicholas R Waytowich** and Ashwinkumar Ganesan and Tim Oates and Tinoosh Mohsenin. *Guiding Safe Reinforcement Learning Policies Using Structured Language Constraints.* In: *SafeAI@ AAAI*. 2020
- David Watkins-Valls and Jingxi Xu and **Nicholas Waytowich** and Peter Allen. *Learning your way without map or compass: Panoramic target driven visual navigation.* In: *2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. 2020
- Aidin Shiri and Arnab Neelim Mazumder and Bharat Prakash and Nitheesh Kumar Manjunath and Houman Homayoun and Avesta Sasan and **Nicholas R Waytowich** and Tinoosh Mohsenin. *Energy-efficient hardware for language guided reinforcement learning.* In: *Proceedings of the 2020 on Great Lakes Symposium on VLSI*. 2020
- Addison W Bohannon and Vernon J Lawhern and **Nicholas R Waytowich** and Radu V Balan. *The autoregressive linear mixture model: A time-series model for an instantaneous mixture of network processes.* In: *IEEE Transactions on Signal Processing*. 2020
- Divya Ramesh and Anthony Z Liu and Andres J Echeverria and Jean Y Song and **Nicholas R Waytowich** and Walter S Lasecki. *Yesterday's reward is today's punishment: Contrast effects in human feedback to reinforcement learning agents.* In: *Proceedings of the 19th international conference on autonomous agents and âÀ.* 2020
- 2019 Vinicius G Goecks and Gregory M Gremillion and Vernon J Lawhern and John Valasek and **Nicholas R Waytowich**. *Integrating behavior cloning and reinforcement learning for improved performance in dense and sparse reward environments.* In: *arXiv preprint arXiv:1910.04281*. 2019
- Vinicius G Goecks and Gregory M Gremillion and Vernon J Lawhern and John Valasek and **Nicholas R Waytowich**. *Efficiently combining human demonstrations and interventions for safe training of autonomous systems in real-time.* In: *Proceedings of the AAAI conference on artificial intelligence*. 2019
- Bharat Prakash and Mohit Khatwani and **Nicholas R Waytowich** and Tinoosh Mohsenin. *Improving Safety in Reinforcement Learning Using Model-Based Architectures and Human Intervention..* In: *FLAIRS*. 2019
- Bharat Prakash and Mark Horton and **Nicholas R Waytowich** and William David Hairston and Tim Oates and Tinoosh Mohsenin. *On the use of deep autoencoders for efficient embedded reinforcement learning.* In: *Proceedings of the 2019 Great Lakes Symposium on VLSI*. 2019
- Nicholas Waytowich** and Sean L Barton and Vernon Lawhern and Garrett Warnell. *A narration-based reward shaping approach using grounded natural language commands.* In: *arXiv preprint arXiv:1911.00497*. 2019
- Nicholas Waytowich** and Sean L Barton and Vernon Lawhern and Ethan Stump and Garrett Warnell. *Grounding natural language commands to StarCraft II game states for narration-guided reinforcement learning.* In: *Artificial intelligence and machine learning for multi-domain operations applications*. 2019
- Derrick Asher and Michael Garber-Barron and Sebastian Rodriguez and Erin Zaroukian and **Nicholas Waytowich**. *Multi-agent coordination profiles through state space perturbations.* In: *2019 international conference on computational science and computational intelligence (CSCI)*. 2019

- Mohit Khatwani and W David Hairston and **Nicholas Waytowich** and Tinoosh Mohsenin. *A low complexity automated multi-channel EEG artifact detection using EEGNet*. In: *2019 IEEE EMBS Conference on Neural Engineering*. 2019
- Erin Zaroukian and Sebastian S Rodriguez and Sean L Barton and James A Schaffer and Brandon Perelman and **Nicholas R Waytowich** and Blaine Hoffman and Derrik E Asher. *Algorithmically identifying strategies in multi-agent game-theoretic environments*. In: *Artificial intelligence and machine learning for multi-domain operations applications*. 2019
- DE Asher and SL Barton and E Zaroukian and **NR Waytowich**. *Effect of cooperative team size on coordination in adaptive multi-agent systems*. In: *Artificial intelligence and machine learning for multi-domain operations applications*. 2019
- Sean L Barton and Erin Zaroukian and Derrik E Asher and **Nicholas R Waytowich**. *Evaluating the coordination of agents in multi-agent reinforcement learning*. In: *International Conference on Intelligent Human Systems Integration*. 2019
- Pietro Pierpaoli and Harish Ravichandar and **Nicholas Waytowich** and Anqi Li and Derrik Asher and Magnus Egerstedt. *Inferring and learning multi-robot policies by observing an expert*. In: *arXiv preprint arXiv:1909.07887*. 2019
- Ritwik Bera and Vinicius G Goecks and Gregory M Gremillion and John Valasek and **Nicholas R Waytowich**. *Podnet: A neural network for discovery of plannable options*. In: *arXiv preprint arXiv:1911.00171*. 2019
- Pawan Lapborisuth and Josef Faller and Jonathan Koss and **Nicholas R Waytowich** and Jonathan Touryan and Paul Sajda. *Investigating evoked EEG responses to targets presented in virtual reality*. In: *2019 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*. 2019
- Sunil Gandhi and Tim Oates and Tinoosh Mohsenin and **Nicholas R Waytowich**. *Learning behaviors from a single video demonstration using human feedback*. In: *Proceedings of the 18th International Conference on Autonomous Agents and AI*. 2019
- Yilun Zhou and Derrik E Asher and **Nicholas R Waytowich** and Julie A Shah. *On memory mechanism in multi-agent reinforcement learning*. In: *arXiv preprint arXiv:1909.05232*. 2019
- Sunil Gandhi and Tim Oates and Tinoosh Mohsenin and **Nicholas Waytowich**. *Learning from observations using a single video demonstration and human feedback*. In: *arXiv preprint arXiv:1909.13392*. 2019
- Vernon J Lawhern and Amelia J Solon and **Nicholas R Waytowich**. *Review on EEG-BCI classification techniques advancements*
- 2018 Vernon J Lawhern and Amelia J Solon and **Nicholas R Waytowich** and Stephen M Gordon and Chou P Hung and Brent J Lance. *EEGNet: a compact convolutional neural network for EEG-based brain-computer interfaces*. In: *Journal of neural engineering*. 2018
- Garrett Warnell and **Nicholas Waytowich** and Vernon Lawhern and Peter Stone. *Deep tamer: Interactive agent shaping in high-dimensional state spaces*. In: *Proceedings of the AAAI conference on artificial intelligence*. 2018

Nicholas Waytowich and Vernon J Lawhern and Javier O Garcia and Jennifer Cummings and Josef Faller and Paul Sajda and Jean M Vettel. *Compact convolutional neural networks for classification of asynchronous steady-state visual evoked potentials*. In: *Journal of neural engineering*. 2018

Mohit Khatwani and Morteza Hosseini and Hirenkumar Paneliya and Tinoosh Mohsenin and W David Hairston and **Nicholas Waytowich**. *Energy efficient convolutional neural networks for eeg artifact detection*. In: *2018 IEEE Biomedical Circuits and Systems Conference (BioCAS)*. 2018

Sean L Barton and **Nicholas R Waytowich** and Erin Zaroukian and Derrik E Asher. *Measuring collaborative emergent behavior in multi-agent reinforcement learning*. In: *International conference on human systems engineering and design: future*. 2018

Nicholas R Waytowich and Vinicius G Goecks and Vernon J Lawhern. *Cycle-of-learning for autonomous systems from human interaction*. In: *arXiv preprint arXiv:1808.09572*. 2018

Sean L Barton and **Nicholas R Waytowich** and Derrik E Asher. *Coordination-driven learning in multi-agent problem spaces*. In: *arXiv preprint arXiv:1809.04918*. 2018

Josef Faller and Neil Weiss and **Nicholas Waytowich** and Paul Sajda. *Brain-Computer Interfaces for Mediating Interaction in Virtual and Augmented Reality*. In: *Brain-Computer Interfaces Handbook*. 2018

Vernon J Lawhern and Amelia J Solon and **Nicholas R Waytowich** and Stephen M Gordon and Chou P Hung and Brent J Lance. *EEGNet: a compact convolutional neural network*. In: *EEGNet A Compact Convolutional Neural Netw 2018*. 2018

Nicholas R Waytowich and Erin Zaroukian. *Measuring Collaborative Emergent Behavior in Multi-agent Reinforcement Learning*. In: *Human Systems Engineering and Design: Proceedings of the 1st International Conference on Human Systems Engineering and Design (IHSED2018): Future Trends and Applications, October 25-27, 2018, CHU-Universit  de Reims Champagne-Ardenne, France*. 2018

2017 **Nicholas R Waytowich** and Dean J Krusienski. *Development of an extensible SSVEP-BCI software platform and application to wheelchair control*. In: *2017 8th International IEEE/EMBS Conference on Neural Engineering (NER)*. 2017

2016 Haiqiang Wang and Yu Zhang and **Nicholas R Waytowich** and Dean J Krusienski and Guoxu Zhou and Jing Jin and Xingyu Wang and Andrzej Cichocki. *Discriminative feature extraction via multivariate linear regression for SSVEP-based BCI*. In: *IEEE Transactions on Neural Systems and Rehabilitation Engineering*. 2016

Nicholas R Waytowich and Vernon J Lawhern and Addison W Bohannon and Kenneth R Ball and Brent J Lance. *Spectral transfer learning using information geometry for a user-independent brain-computer interface*. In: *Frontiers in neuroscience*. 2016

Nicholas R Waytowich and Josef Faller and Javier O Garcia and Jean M Vettel and Paul Sajda. *Unsupervised adaptive transfer learning for steady-state visual evoked potential brain-computer interfaces*. In: *2016 IEEE International Conference on Systems, Man, and Cybernetics (SMC)*. 2016

Nicholas R Waytowich and Yusuke Yamani and Dean J Krusienski. *Optimization of checkerboard spatial frequencies for steady-state visual evoked potential brain-Computer interfaces*. In: *IEEE Transactions on Neural Systems and Rehabilitation Engineering*. 2016

Sameer Saproo and Josef Faller and Victor Shih and Paul Sajda and **Nicholas R Waytowich** and Addison Bohannon and Vernon J Lawhern and Brent J Lance and David Jangraw. *Cortically coupled computing: A new paradigm for synergistic human-machine interaction*. In: *Computer*. 2016

Nicholas R Waytowich and Dean J Krusienski. *Multiclass steady-state visual evoked potential frequency evaluation using chirp-modulated stimuli*. In: *IEEE Transactions on Human-Machine Systems*. 2016

Addison W Bohannon and **Nicholas R Waytowich** and Vernon J Lawhern and Brian M Sadler and Brent J Lance. *Collaborative image triage with humans and computer vision*. In: *2016 IEEE International Conference on Systems, Man, and Cybernetics (SMC)*. 2016

2015 MM Rashid and MH Kabir and MM Hossain and MR Bhuiyan and MA Iqbal Khan. *Eco-friendly management of chilli anthracnose (*Colletotrichum capsici*)*. 2015

Nicholas Waytowich and Dean Krusienski. *Spatial decoupling of targets and flashing stimuli for visual brain-computer interfaces*. In: *Journal of Neural Engineering*. 2015

Nicholas R Waytowich. *Development of a practical visual-evoked potential-based brain-computer interface*. In: *Old Dominion University*. 2015

2014 **Nicholas Waytowich** and Dean Krusienski. *Novel Characterization of the Steady-State Visual Evoked Potential Spectrum of EEG*. In: *BrainKDD: International Workshop on Data Mining for Brain Science*. 2014

2011 Garrett Johnson and **Nicholas Waytowich** and Dean J Krusienski. *The challenges of using scalp-EEG input signals for continuous device control*. In: *International Conference on Foundations of Augmented Cognition*. 2011

2010 **Nicholas Waytowich** and Andrew Henderson and Dean Krusienski and Daniel Cox. *Robot application of a brain computer interface to Staubli tx40 robots-early stages*. In: *2010 World Automation Congress*. 2010

Garrett D Johnson and **Nicholas R Waytowich** and Daniel J Cox and Dean J Krusienski. *Extending the discrete selection capabilities of the P300 speller to goal-oriented robotic arm control*. In: *2010 3rd IEEE RAS & EMBS International Conference on Biomedical Robotics and Biomechatronics*. 2010

Nick Waytowich and Ganna Kudrey and Daniel Cox. *Assistive Robotic Applications of a Staubli Manipulator for Use with the BCI 2000*. In: *Proceedings 23rd Florida Conference on Recent Advances in Robotics (FCRAR 2010)*. 2010

Ph.D. Dissertation

Title *Development of a Practical Visual Evoked Potential Based Brain-Computer Interface*

Advisor Dean J. Krusienski

Description Optimized visual stimulus design and developed novel paradigmatic approaches to create a practical visual evoked potential based brain-computer interface. Additionally, a custom BCI software platform was developed and implemented with the Google Glass (HMD device) for ergonomic deployment.

Honors, Awards, Societies and Service

- 2021 Won 1st place and the award for the most human-like agent at the NeurIPS 2021 MineRL Benchmark for Agents that Solve Almost-Lifelike Tasks (BASALT) competition.
- 2018 Winner of the Counter-sUAS Hackathon hosted by MD5 and the Army Futures Command, Austin Texas
- 2018 Human Research and Engineering (HRED) Excellence in Science award for the development Deep-TAMER (teaching agents manually through evaluative reinforcement), Army Research Lab.
- 2017 Human Research and Engineering (HRED) Excellence in Engineering award for the development of the Human-AI Image Labeler (HAIL), Army Research Lab.
- 2012 Graduate Assistantship In Areas of National Need (GAANN) Scholarship Award Recipient (2012)
- 2011-Present Member of Association for the Advancement of Artificial Intelligence (AAAI), IEEE Member, Society for Neuroscience, American Society of Mechanical Engineers
- 2009-2010 President of the Florida Engineering Society at the University of North Florida Chapter
- 2010 1st place regional winner of the MATE ROV (Marine Advanced Technology Education for Remotely Operated Vehicles) Competition in Coco Beach FL

Skills

- Research Machine Learning and Reinforcement Learning, Multi-agent systems, Deep Convolutional Neural Networks, Signal Processing, Reinforcement Learning, EEG Signal Mapping and Characterization, BCI Development, Data Mining and Visualization
- Programming Tensorflow, PyTorch, Python, ROS, Matlab, C, C++, C#, Java, Android, .NET, HTML, Javascript, OpenGL, DirectX, XNA, \LaTeX , OpenOffice, Linux, Embedded Systems, Microcontroller Programming