Colin Shea-Blymyer

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Education

B.S. Computer Science, May 2015
Virginia Tech, Blacksburg, VA

M.S. Computer Science, May 2019
Virginia Tech, Blacksburg, VA

Ph.D. Computer Science and Artificial Intelligence, Started August 2019
Oregon State University, Corvallis, OR
EECS Outstanding Scholar Fellow

Skills

- Programming – Mastery of Python; Extensive experience with Java, R, C, Shell Scripting, PHP, SQL, HTML, CSS, TI BASIC, and JavaScript.

- Design and Technology – Experience with Machine Learning, Deep Learning, Formal Logic, Natural Language Processing, Big Data, Formal Verification, Cryptography, Computational Biology, Map-Reduce, Parallelization, Virtualization, Human Computer Interaction, Algorithm Design, AWS, Web Development Frameworks, MATLAB, Eclipse, iOS and Android environments.

- Communication – Exemplary skill in Acting, Poetry, and Prose; Trained in Public Speaking, Debate, and Team Leadership; Extensive experience in running and playing TTRPGs.

Academic Interests

- AI Ethics
- Trustworthy AI
- Robust Machine Learning
- Adversarial Machine Learning

Publications

"A General Metric for the Similarity of Both Stochastic and Deterministic System Dynamics", C. Shea-Blymyer, S. Roy, B. Jantzen, *Entropy* 23.9, 1191. 2021

"Algorithmic Ethics: Formalization and Verification of Autonomous Vehicle Systems", C. Shea-Blymyer, H. Abbas, *ACM Transactions on Cyber-Physical Systems (TCPS)* 5.4, 1-25. 2021

"Learning a Robot's Social Obligations from Comparisons of Observed Behavior", C. Shea-Blymyer, H. Abbas, *2021 IEEE International Conference on Advanced Robotics and Its Social Impacts (ARSO)*. 2021

"A Deontic Logic Analysis of Autonomous Systems' Safety", C. Shea-Blymyer, H. Abbas, *Proceedings of the ACM 2020 Hybrid Systems Computation and Control Conference*. 2020

"Evaluating the Safety Effectiveness of Adaptive Cruise Control (ACC) Using a Microsimulation Workflow", N. Trivedi, C. Shea-Blymyer, et al., Submitted to *Transportation Research Board 98th Annual Meeting*

"Differentiation of Collective Behavior Based on Automated Discovery of Dynamical Kinds", A. Hashimoto, C. Shea-Blymyer, et al., *Proceedings of the ASME 2018 Dynamic Systems and Control Conference*. 2018

"Exploration of Extraterrestrial Planets Using Automated Intelligent Systems" R. Thiyagarajan, C. Shea-Blymyer, et al., *Naval Academy Science and Engineering Conference, Maryland*. 2014

Research Experience

Deontic Logic and Autonomous Systems Oregon State University | 2019-Present

Worked with Houssam Abbas to develop theory and algorithms for the analysis of autonomous systems using a deontic action logic.

Adversarial Machine Learning MITRE | 2019-Present

Synthesized a wide base of research in adversarial machine learning into a taxonomy and terminology on the subject, contributing to a NISTIR Draft with Michael Hadjimichael. Explored tools and techniques to develop a lab under Anne Townsend for the creation of AML best practices.

Analysis of Vehicle Microsimulations MITRE | 2018

Rapidly developed a verification and validation pipeline for traffic simulations using machine learning and ArcGIS. Aided Nirav Trivedi's team with anomaly detection and error correction. Selected as one of four interns for student showcase, and contributed to a publication.

Discovering Dynamic Similarity in EEGs Virginia Tech | 2018-2019

Analyzed EEG data with Nicole Abaid, Benjamin Jantzen, and Alexander Leonessa to determine kinds of activity as measured by EEG recordings during visuospatial working memory tasks.

Determining Kinds in Swarms Virginia Tech | 2017-2019

Performed research with Nicole Abaid and Benjamin Jantzen to distinguish dynamical kinds in various agent based swarm models, and animal swarms. This work resulted in a publication.

Automated Scientific Discovery Virginia Tech | 2015-2019

Worked with Benjamin Jantzen on a project to develop a suite of tools for automated scientific discovery.

Philosophy and Physical Computing Workshop Virginia Tech | 2017

Engaged in two weeks of intensive instruction and discourse on the intersection of philosophy of science and machine learning.

Outbreak News Summarization Virginia Tech | 2014

Collaborated with students under Edward Fox to develop software that summarized a disease outbreak event given a corpus of relevant news stories. Results published under VTechWorks.

Industry Experience

Research Engineering Graduate Intern MITRE | 2018, 2019-Present
Adversarial Machine Learning – Synthesized research for terminology and taxonomy for NISTIR. Developed lab build documents.

Connected Vehicles Simulation – Quickly designed and implemented a verification and validation process for traffic microsimulation. Presented work in company-wide Innovation Brown Bag Series. Contributing author in publication.

Software Engineer Harmonia Holdings Group | 2015-2016
Conforma – Worked to develop a tool that automates the security analysis of mobile device applications under a contract from the Defense Information Systems Agency.

USDA Management System – Applied experience in natural language processing and data analysis to groundwork of event clustering algorithm.

Software Engineer Intern Virginia Tech Applied Research Corporation | 2014
Business Analytics Tool – Built a finance and requisition management tool for the U.S. Army Rapid Equipping Force as part of Java development team. Received award for best contributions from an intern.

Teaching Experience

Teaching Assistant 2021
Oregon State University

Artificial Intelligence 530: Big Ideas in Artificial Intelligence –Graded programs, assignments, and presentations from graduate students of multiple skill levels; held office hours helping many students struggling with course content.

Teaching Assistant 2017
Virginia Tech

Computer Science 1114: Introduction to Software Design – Led two weekly labs, helped students through email, course internet forum, and office hours, and proctored exams.

Philosophy and Physical Computing Workshop 2017
Virginia Tech

Instructed a group of 20 middle-school aged children from south-west Virginia in the basics of python as part of an educational outreach initiative.

Professional Activities

Attendee: Monitoring and Testing of Cyber-Physical Systems Workshop 2020
Oregon State University

Presented work on model checking deontic logic specifications of autonomous cyber-physical systems.

Assistant: Technology on the Trail Workshop 2017
Virginia Tech

Aided the execution of the workshop events, participated in workshop discussion, and helped lead interaction with workshop's distinguished guests.

Advanced Course Work

Research Ethics – Youjin Kong, Spring 2021
Theory of Computation – Mike Rosulek, Spring 2021
Natural Language Processing with Deep Learning – Stefan Lee, Winter 2021
Algorithms & Data Structures – Amir Nayyeri, Winter 2021
Multiagent Systems – Kagan Tumer, Fall 2020
Probabilistic Graphical Models – Weng-Keen Wong, Winter 2020
Deep Learning – Fuxin Li, Winter 2020
Cyber-Physical Systems – Houssam Abbas, Autumn 2019
Large-Scale Convex/Non-Convex Optimization – Xiao Fu, Autumn 2019
Machine Learning Meets Physics – Anuj Karpatne, Autumn 2018
Optimization in Machine Learning – Bert Huang, Spring 2018
Datamining Large Networks and Time Series – Aditya Prakash, Autumn 2017
Machine Learning in Security – Gang Wang, Autumn 2017
Computational Cell Biology – Young Cao, Spring 2017
Technology on the Trail – Scott McCrickard, Spring 2017
Data Analytics – Chandan Reddy, Autumn 2016
Research Methodologies in Computer Science – Eli Tilevich, Autumn 2016