Jay Rothenberger

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Education

University of Oklahoma   Norman, OK
Ph.D., Computer Science. GPA 4.0   Expected Graduation Date 05/2026
Relevant Coursework: Advanced Machine Learning, Cryptography, Data Mining, Computer Security, Artificial Intelligence, Parallel Distributed and Network Programming

University of Virginia   Charlottesville, VA
B.S., Computer Science. Major GPA 3.66   Graduation Date 05/2021
Relevant Coursework: Computational Learning Theory, Machine Learning, Algorithms, Advanced Software Design, Advanced Linear Algebra, Real Analysis, Number Theory, Numerical Analysis, Abstract Algebra, Probability Theory

Working Experience

University of Oklahoma   Norman, OK
Graduate Researcher   08/2021 - Current

- Designed and developed a deep convolutional neural network model for image classification capable of producing its own class activation maps as an explanation for each prediction. Approach is several hundred times faster than comparable post hoc methods
- Implemented parallel training strategies for the University of Oklahoma OSCER supercomputer to accelerate model training and enable model scaling for institutional members
- Actively performing research in the areas of Semi-Supervised Learning, Representation Learning, and Explainable Artificial Intelligence (XAI) for Computer Vision

University of Oklahoma   Norman, OK
LumenUs Scientific   Oklahoma City, OK
Machine Learning Engineer Intern   05/2024 - 08/2024

- Developed efficient data pipelines for data integration, compression, and AI-ready processing
- Evaluated data storage and compression and storage formats for large datasets used during model training
- Developed and trained a foundation model for the The Earth Surface Mineral Dust Source Investigation (EMIT) Imaging Spectrometer

Vaisala   Louisville, CO
Machine Learning Intern   05/2023 - 08/2023

- Developed and trained a new Deep Learning model for hail prediction that achieves state-of-the-art nowcasting performance improving upon prior work by 32% CSI
- Model was operationalized and deployed as a hail now-casting product
- Designed, implemented, and applied standard explainable artificial intelligence (XAI) techniques including SHAP, PFI, and Integrated Gradients for higher dimensional observations in an HPC setting

Grant Awards

NSF Travel Grant   11/2023
$1,500

Oklahoma Center for Advancement of Science & Technology   05/2024
Machine Learning Algorithms for Oil and Gas Leak Detection and Operator Notification
$30,000

National AI Readiness Resource Pilot
Training a Foundation Model for the EMIT Instrument
12,000 GPU Hours

Publications

2024
- *A Review of Pseudo-Labeling for Computer Vision*
  Jay Rothenberger, Patrick Kage, Pavlos Andreadis, Dimitris I. Diochnos

2023
- *Two Views are Better than One: Meta Co-Training*
  Jay Rothenberger, Dimitris I. Diochnos

Conference Presentations

2025
- *Improving Road Surface Classification with Co-Training Algorithms - American Meteorological Society (AMS)*
  Jay C. Rothenberger, Tiffany Le, Carly Sutter, Kara J. Sulia, Dimitrios I. Diochnos
  Best Student Presentation - Honorable Mention
- *Predicting Forecast Error of Numerical Weather Prediction Models using an LSTM - American Meteorological Society (AMS)*
  David Aaron Evans, Kara J. Sulia, Nicp P. Bassill, Christopher D. Thorncroft, Lauriana Gaudet, Jay C. Rothenberger

2024
- *Two Views are Better than One: Meta Co-Training - International Symposium on Artifical Intelliegence and Mathematics (ISAIM)*
  Jay C. Rothenberger, Dimitrios I. Diochnos

- *Explaining The Role of Lightning Data in Hail Nowcasting - American Meteorological Society (AMS)*
  Jay C. Rothenberger, Eric P. Grimit, Martin J. Murphy, Robinson Wallace

- *The Promise of Foundation Models for Improving Automated Detection of Methane Sources in Hyperspectral Imagers: A Case Study for the EMIT Instrument - American Geophysical Union (AGU)*
  Jay C. Rothenberger, Sean Crowell, William Keely, Dan Cusworth, Kate Howell

2023
- *Classifying Road Surface Conditions with Self-Trained Artificial Intelligence - American Meteorological Society (AMS)*
  Vincent Ferrerra, Jay C. Rothenberger, Melissa Wilson Reyes, Carly Sutter, Andrew H. Fagg, Dimitrios I. Diochnos

2022

- *Classifying Road Surface Conditions with Self-Trained Artificial Intelligence - New York State Mesonet AI Symposium*
  Vincent Ferrerra, Jay C. Rothenberger, Melissa Wilson Reyes, Carly Sutter, Andrew H. Fagg, Dimitrios I. Diochnos

Invited Talks

2024

- *Best Practices for Effective and Visible Documentation* - AI2ES
- *Tuning Deep Learning Training & Evaluation Performance on the OU Supercomputer* - AI2ES

2023

- *Introduction to Utilizing HPC resources for AI* - OU AI Club
- *Two Views are Better than One: Meta Co-Training* - Apple Computer Vision Team
- *Explaining Machine Learning Predictions on Higher Dimensional Data* - AI2ES

Academic Service

2024

- *Special Interest Group on Knowledge Discovery and Data Mining (KDD)* - Program Committee Member
- *International Conference on Machine Learning (ICML)* - Sub-Reviewer
- *American Meteorological Society - Artificial Intelligence for Earth Systems (AIES)* - Reviewer

2023

- *American Meteorological Society - Artificial Intelligence for Earth Systems (AIES)* - Reviewer
- *Neural Information Processing Systems (NeurIPS)* - Sub-Reviewer

2022

- *IEEE Conference on Artificial Intelligence (CAI)* - Sub-Reviewer

Mentorship

Luke Terry   08/2024 – Current
Undergraduate Research Mentee

- Guiding a year-long research experience in semi-supervised learning.

Tiffany Le   08/2023 – 05/2024
Undergraduate Research Mentee

- Guided a year-long research experience in semi-supervised learning focusing on co-training methods.
- Work performed as part of this experience will appear in the proceedings of the Annual Meeting of the American Meterological Society 2025

Alberto Liu   08/2022 – 05/2023
Undergraduate Research Mentee

- Guided a year-long research experience in semi-supervised learning focusing on co-training methods.

Vincent Ferrera   05/2022 – 08/2022
AI2ES Undergraduate Research Experience Mentee

- Guided a three month research experience in semi-supervised learning focusing on self-training methods.
- Work performed as part of this experience will appeared in the proceedings of the Annual Meeting of the American Meterological Society 2023

Leadership & Activities

Computer Science Graduate Student Association · Norman, OK
President · 01/2023 – Current

- Organized and hosted weekly club events including student research presentations, technical demonstrations, skill-building sessions, and tea time.
- Conducted invited presentations to other student organizations about utilizing university HPC resources
- Served as the graduate student representative to the faculty by attending monthly faculty meetings and representing graduate peers

Skills & Interests

Technical: Python, PyTorch, TensorFlow, NumPy, Pandas, SciPy, SkLearn, Transformers, Graph Neural Networks, Convolutional Neural Networks, Big Data, Peta-Scale Compute

Interests: Deep Learning, Semi-Supervised Learning, Parallel Distributed and Networked Programming, Model Compression