Austin Coursey

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Summary

3rd year computer science Ph.D. student at Vanderbilt University. Interested in developing and applying machine learning solutions to solve problems in real-world complex systems. Research interests include reinforcement learning, prognostics, anomaly detection, and continual learning. Recently completed a NASA System-Wide Safety project where I developed and deployd a controller that improved unmanned aerial vehicle control under strong wind disturbances. Currently researching the intersection of safe and continual reinforcement learning as part of my NSF Graduate Research Fellowship.

Education

PhD **Vanderbilt University**, Computer Science — Nashville, TN, Aug 2022 – present

- Member of the Modeling and Analysis of Complex Systems (MACS) lab under Professor Gautam Biswas at the Institute for Software Integrated Systems.

BS **Murray State University**, Computer Science and Mathematics — Murray, KY, Aug 2018 – May 2022

- Undergraduate Thesis - Data-driven Models for Remaining Useful Life Estimation of Aircraft Engines and Hard Disk Drives
- 4.0 GPA
- Honors Degree and Summa Cum Laude
- Outstanding Senior in Computer Science x2 and Mathematics
- Multiple leadership positions include President of Association for Computing Machinery and Vice President of Association of Information Technology Professionals

Experience

Vanderbilt University, NSF Graduate Research Fellow — Nashville, TN, Aug 2024 – present

- Researching the intersection of safe and continual reinforcement learning. Funded by National Science Foundation.

Vanderbilt University, Graduate Research Assistant — Nashville, TN, Jan 2023 – Aug 2024

- Graduate RA in the Modeling and Analysis of Complex Systems lab in the Institute for Software Integrated Systems at Vanderbilt University. Worked at a NASA-funded unmanned aerial vehicle (UAV) system-wide safety project. Developed a reinforcement learning controller to counteract wind and fault disturbances to maintain safety.

Vanderbilt University, Graduate Teaching Assistant — Nashville, TN, Aug 2022 – Dec 2022

- Graduate TA for five sections of Vanderbilt University's CS 2212 (Discrete Structures) course. Held office hours for dozens of students, graded homework and exams, and assisted professors with various tasks such as running class for the day.

Carnegie Mellon University, Undergraduate Researcher — Pittsburgh, PA, June 2021 – Aug 2021

- Summer researcher at Carnegie Mellon University's Research Experience for Undergraduates in Software Engineering (REUSE) program. Evaluated the quality of machine learning model documentation in the form of model cards, a standard proposed by Google. Designed a study to determine the effectiveness of a novel

tool that autogenerates model cards for Jupyter Notebooks. Presented findings at a poster session at the end of the summer. Paper published in CHI.

United Systems and Software, Software Development Intern — Benton, KY
June 2020 – June 2021

- Performed full-stack website development using Angular (TypeScript, CSS, and HTML), C# .NET, and SQL. Developed a web portal for utility customers across Kentucky and some surrounding states to pay their bills and participated in Agile, team-based development.

Land Between the Lakes National Recreation Area, Webmaster Intern — Golden Pond, KY
Aug 2019 – Aug 2022

- Developed and maintained a website with over 129,000 monthly page visits. Created over 50 individual web pages using WordPress, HTML, and CSS.

Awards and Honors

National Science Foundation Graduate Research Fellow 2024

Best Reviewer Award - KDD 2024 2024

Murray State University Outstanding Senior Computer Science Senior (x2) 2021-2022

Murray State University Outstanding Mathematics Senior 2022

Publications

FT-AED: Benchmark Dataset for Early Freeway Traffic Anomalous Event Detection Dec 2024

Austin Coursey, Junyi Ji, Marcos Quinones-Grueiro, William Barbour, Yuhang Zhang, Tyler Derr, Gautam Biswas, Daniel B Work

10.48550/arXiv.2406.15283 (Neural Information Processing Systems - NeurIPS 2024 Datasets and Benchmarks)

Quantifying the Sim-To-Real Gap in UAV Disturbance Rejection Oct 2024

Austin Coursey, Marcos Quinones-Grueiro, Gautam Biswas

10.4230/OASIcs.DX.2024.16 (International Conference on Principles of Diagnosis and Resilient Systems - DX 2024)

Data-Driven RUL Prediction Using Performance Metrics Oct 2024

Abel Diaz-Gonzalez, Austin Coursey, Marcos Quinones-Grueiro, Chetan S. Kulkarni, Gautam Biswas

10.4230/OASIcs.DX.2024.21 (International Conference on Principles of Diagnosis and Resilient Systems - DX 2024)

An Experimental Framework for Evaluating the Safety and Robustness of UAV Controllers Aug 2024

Austin Coursey, Marcos Quinones-Grueiro, Gautam Biswas

10.2514/6.2024-4548 (AIAA Aviation Forum 2024)

Hybrid control framework of uavs under varying wind and payload conditions July 2024

Austin Coursey, Marcos Quinones-Grueiro, Gautam Biswas

10.23919/ACC60939.2024.10645000 (American Control Conference - ACC 2024)

Determining the temporal factors of survival associated with brain and nervous system cancer patients: A hybrid machine learning methodology July 2024

Gopal Nath, Austin Coursey, Joseph Ekong, Elham Rastegari, Saptarshi Sengupta, Asli Z Dag, Dursun Delen

10.1080/20479700.2023.2196101 (International Journal of Healthcare Management)

R Code Authorship Attribution using the ASAP Tool July 2024

Austin Coursey, Matthew Tennyson, Vlad Krotov

10.17705/3jmwa.000090 (Journal of the Midwest Association for Information Systems)

Time-Series Few Shot Anomaly Detection for HVAC Systems June 2024

Yuxin Huang, Austin Coursey, Marcos Quinones-Grueiro, Gautam Biswas

10.1016/j.ifacol.2024.07.255 (IFAC Symposium on Fault Detection, Supervision and Safety for Technical Processes - Safe Process 2024)

Comparison of Transfer Learning Techniques for Building Energy Forecasting June 2024

Shansita Das Sharma, Austin Coursey, Marcos Quinones-Grueiro, Gautam Biswas

10.1016/j.ifacol.2024.07.214 (IFAC Symposium on Fault Detection, Supervision and Safety for Technical Processes - Safe Process 2024)

A Flexible Data-Driven Prognostics Model Using System Performance Metrics June 2024

Abel Diaz-Gonzalez, Austin Coursey, Marcos Quinones-Grueiro, Gautam Biswas

10.1016/j.ifacol.2024.07.221 (IFAC Symposium on Fault Detection, Supervision and Safety for Technical Processes - Safe Process 2024)

An interactive web-based tool for predicting and exploring brain cancer survivability Nov 2023

Gopal Nath, Austin Coursey, Yang Li, Srikanth Prabhu, Harish Garg, Shaymal C Halder, Saptarshi Sengupta

10.1016/j.health.2022.100132 (Healthcare Analytics)

Enhancing Prognostics with Self-Supervised Imputation Sept 2023

Austin Coursey, Abel Diaz-Gonzalez, Marcos Quinones-Grueiro, Gautam Biswas

International Workshop on Principles of Diagnosis - DX'23 - Workshop Paper

On Learning Data-Driven Models For In-Flight Drone Battery Discharge Estimation From Real Data June 2023

Austin Coursey, Marcos Quinones-Grueiro, Gautam Biswas

10.1109/SMARTCOMP58114.2023.00038 (IEEE International Conference on Smart Computing - SMARTCOMP 2023)

Large-scale End-of-Life Prediction of Hard Disks in Distributed Datacenters June 2023

Rohan Mohapatra, Austin Coursey, Saptarshi Sengupta

10.1109/SMARTCOMP58114.2023.00069 (IEEE International Conference on Smart Computing - SMARTCOMP 2023 - Workshop Paper)

Aspirations and practice of ml model documentation: Moving the needle with nudging and traceability Apr 2023

Avinash Bhat, Austin Coursey (joint primary), Grace Hu, Sixian Li, Nadia Nahar, Shurui Zhou, Christian Kästner, Jin LC Guo

10.1145/3544548.3581518 (CHI Conference on Human Factors in Computing Systems - CHI 2023)

Incorporating a machine learning model into a Web-based administrative decision support tool for predicting workplace absenteeism June 2022

Gopal Nath, Yawei Wang, Austin Coursey, Krishna K Saha, Srikanth Prabhu, Saptarshi Sengupta

10.3390/info13070320 (Information)

Remaining useful life estimation of hard disk drives using bidirectional lstm networks Dec 2021

Austin Coursey, Gopal Nath, Srikanth Prabhu, Saptarshi Sengupta

10.1109/BigData52589.2021.9671605 (IEEE International Conference on Big Data - Big Data 2024)

Theses

Data-driven models for remaining useful life estimation of aircraft engines and hard disk drives May 2022

Austin Coursey

digitalcommons.murraystate.edu/honorstheses/116

Conferences and Refereeing

AIAA Aviation Forum July 2024

- System-Wide Safety session Co-Chair.

IEEE Conference on Smart Computing June 2023

- Student volunteer.

Refereeing

- International Workshop on Principles of Diagnosis (DX 2024)
- Journal of Aerospace Information Systems (JAIS)
- IEEE Transactions on Industrial Informatics
- ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD 2024) **Best Reviewer Award**
- IFAC Symposium on Fault Detection, Supervision and Safety for Technical Processes (Safe Process 2024)
- American Control Conference (ACC 2023, 2024)
- Expert Systems with Applications