Matthew I. Swindall, Ph.D.

✉ matthew.swindall@outlook.com
in linkedin.com/in/matthew-swindall
 https://github.com/mis2n

 https://mis2n.github.io/
 Darien, IL USA

Professional Profile

Accomplished computational scientist with AI and machine learning research experience and a background in physics and astronomy. My current research focuses on augmented and virtual reality (AR/VR) software for nuclear forensics. My previous work involves interdisciplinary applications of AI methodologies including object detection, Handwritten Text Recognition (HTR/OCR), Natural Language Processing (NLP), and statistical analysis. I am the creator of the AL-PUB Dataset, a large-scale, crowdsourced image dataset containing Greek characters on ancient papyri for computer vision tasks. Additional interests include robotics, quantum computing, HPC, blockchain and smart contracts, and graph databases.

Education

Ph.D. Computational Science	Middle Tennessee State University	2024
M.S. Computer Science	Middle Tennessee State University	2024
B.S. Physics	Middle Tennessee State University	2016
A.S. Physics	Columbia State Community College	2016

Skills

AI/ML Concepts	Deep Learning, Neural Networks, Convolutional Neural Networks, Recurrent Neural Networks, Generative Adversarial Networks, Reinforcement Learning, Transfer Learning, Autoencoders, Transformers
AI/ML Libraries	TensorFlow, PyTorch, Keras, SciKitLearn, spaCy, BERTopic, NLTKs
Computer Science	AR/VR, AI/ML, Parallel processing, cluster computing (SLURM), Ethereum Blockchain & Smart Contracts, Neo4j (Graph Database), Windows, iOS, Unix/Linux
Coding Languages	Python, C/C++, R, JavaScript, HTML, CSS, SQL, Solidity, Cypher, Swift, SwiftUI, C#, ColdFusion
Python Libraries	NumPy, Pandas, Scikit-Learn, SciPy, Matplotlib, OpenCV
Mathematics	Linear Algebra, Calculus, Differential Equations, Probability, Statistics
Physical Sciences	Physics, Astronomy, Chemistry, Engineering, Electronics
Additional Technical	Unity, Blender, Reality Composer Pro, Iot, Raspberry Pi, Arduino, Robotics, 3D Printing, CAD, CNC, ROS, Vision OS
Soft Skills	Research, Publications, Public Speaking, Teaching, Science Outreach, Technical Writing, Project Management, Team Leadership

Internships & Honors

- **La Serena School for Data Science, Class of 2021** NFS & CMM/UChile funded Data Science for Astronomy Program in partnership with NOIRLab/AURA–O
- **MTeach Summer Internship, 2016** STEM teaching internship in partnership with the Discovery Center at Murfree Spring.

Refereed Conference Proceedings

- Graham West, Matthew I. Swindall, James H. Brusuelas, Francesca Maltomini, Marius Gerhardt, Marzia D'Angelo, John F. Wallin. A deep learning pipeline for the palaeographical dating of ancient Greek papyrus fragments. in the Machine Learning for Ancient Languages (ML4AL) Workshop at the 62nd Annual Meeting of the Association for Computational Linguistics (ACL). 2024

- Swindall, M. I., Upadhyay, K., Brusuelas, J. H., West, G., & Wallin, J. F. (2024, May). Smart Digital Edition Management: A Blockchain Framework for Papyrology. Proceedings of the 2024 Computers and People Research Conference. https://doi.org/10.1145/3632634.3655860

- Swindall, M. I., West, G., Brusuelas, J. H., Williams, A. C., & Wallin, J. F. (2024, March). Towards a Platform for AI-Assisted Papyrology. Past Meets Future Workshop at the 2024 International Conference on Intelligent User Interfaces (IUI 2024).

- Swindall, M. I., West, G., Brusuelas, J. H., & Wallin, J. F. (2022, November). Crowdsourcing Image Datasets: An Examination of Ground-Truth in Labeling, Text Segmentation, & Sampling Bias. The Tenth AAAI Conference on Human Computation and Crowdsourcing Doctoral Consortium.

- Swindall, M., Player, T., Keener, B., Williams, A., Brusuelas, J., Nicolardi, F., D'Angelo, M., Vergara, C., McOsker, M., & Wallin, J. (2022). Dataset Augmentation in Papyrology with Generative Models: A Study of Synthetic Ancient Greek Character Images. 4948–4954.

- Swindall, M. I., Croisdale, G., Hunter, C. C., Keener, B., Williams, A. C., Brusuelas, J. H., Krevans, N., Sellew, M., Fortson, L., & Wallin, J. F. Exploring Learning Approaches for Ancient GreekCharacter Recognition with Citizen Science Data. 2021 17th International Conference on EScience (EScience), 128–137.

Refereed Journal Articles

- West, G., Swindall, M. I., Keener, B., Player, T., Williams, A. C., Brusuelas, J. H., & Wallin, J. F. (2024). Incorporating Crowdsourced Annotator Distributions into Ensemble Modeling to Improve Classification Trustworthiness for Ancient Greek Papyri. Journal of Data Mining & Digital Humanities, Documents historiques et reconnaissance automatique de texte. https://jdmdh.episciences.org/12958

Invited Talks

- **Understanding Ancient Manuscripts Using Crowd-sourcing and Data Science.** Matthew I. Swindall, Graham West, James H. Brusuelas, John F. Wallin. AWS Human-in-the-Loop Science Summer Seminar Series. Presented Virtually. August 17, 2023.

- **Generative AI and Higher Education.** John F. Wallin, Matthew I. Swindall, Isaac Shirk. Middle Tennessee State University AI Initiative Research Conference. Murfreesboro, TN. November 10, 2023.

- **A.I. Assisted Papyrology: Integrating Deep Learning into the Scholarly Workflow.** Matthew I. Swindall, Graham West, James H. Brusuelas, John F. Wallin. Alpha, Aleph, and AI: Languages of the Ancient Mediterranean and Near East Conference. Bristol, United Kingdom. June 14, 2023.

- **Dataset Augmentation in Papyrology with Generative Models: A Study of Synthetic Ancient Greek Character Images.** Matthew I. Swindall. Middle Tennessee State University Scholars Day. Murfreesboro, TN. March 22, 2022.

Academic Service

- **Instructor** for the Coding for Science Camp at Argonne National Laboratory. 2025
- **Member at Large** Postdoctoral Society of Argonne, participating in various committees and PSA board. 2025
- **Program Committee** for Machine Learning for Ancient Languages (ML4AL) Workshop at the 62nd Annual Meeting of the Association for Computational Linguistics (ACL). 2024
- **Reviewer** for ACM SIGMIS Computers and People Research (CPR)2024

Certifications

- **Neo4j Graph Database** Certified Professional

Employment

Postdoctoral Appointee   01/2025 - Current   Argonne National Laboratory

- Collaboration on multiple nuclear forensics projects for the Strategic Security Sciences Division.
- Developing Spatial Computing (AR/VR/XR) software for national security aligned projects.
- Software Development: Developing various software products related to national security, cybersecurity defense, and operation of microfluidics hardware.
- 3D Modeling: Design and testing of components for radiological and x-ray imaging experiments including chemical flow cells and containment hardware.
- Interdisciplinary AI/ML Research & Software Development.
- Publication & Editing of various reports, proposals, and peer-reviewed articles.

Graduate Assistant   09/2019 - 05/2024   Middle Tennessee State University

- Management of various computational projects involving Optical Character Recognition (OCR) and object detection/recognition, semantic segmentation, micro-controllers, microcomputers, electrical circuits, robotics, 3D printing, laser etching/cutting, and augmented/virtual reality.
- Design & Prototype STEM demonstrations and institutional hardware/software tools.
- Equipment training and technology coaching.
- Designed & curated numerous STEM exhibits including a Lego block sorting robot, a Bluetooth enabled LED text sign with Android app, and a real-time object detection/segmentation exhibit.

Physics & Astronomy Tutor   01/2015 - 12/2016   Middle Tennessee State University

- Tutored students in physics courses including Calculus-Based Physics 1 and 2, Electricity and Magnetism, and Classical Mechanics.
- Tutored students in astronomy courses including Introductory Astronomy, Solar System Astronomy, and Stars Galaxies and Cosmology.
- Tutored students in first year chemistry courses (Chemistry 1 and 2).
- Tutored students in advanced mathematics courses including Calculus 1, 2, and 3.