John W. Williams

Ph.D. Candidate, Industrial & Systems Engineering · University of Tennessee, Knoxville
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Curriculum Vitae · Updated November 2026

RESEARCH INTERESTS

Human-AI collaboration; LLM-based agents and multi-agent systems; agent-based simulation; digital twins and machine learning for industrial and sociotechnical systems; optimization; graph and network methods; parallel and distributed computing.

EDUCATION

Ph.D., Industrial and Systems Engineering — Jun 2024 – Expected Dec 2027
University of Tennessee, Knoxville — *Knoxville, TN*
- Ph.D. candidate; comprehensive exams passed
- Research: Applied Systems Laboratory

M.S., Industrial and Systems Engineering — 2023 – 2026
University of Tennessee, Knoxville — *Knoxville, TN*
- Earned concurrently with the Ph.D. (transferred from the M.S. to the Ph.D. program)

B.S., Computer Science, Software Engineering concentration — 2019 – Mar 2023
Colorado Technical University — *Online*
- Summa Cum Laude; GPA 3.98/4.00

RESEARCH EXPERIENCE

Graduate Research Assistant, Applied Systems Laboratory — Jan 2024 – Present
Department of Industrial and Systems Engineering, University of Tennessee, Knoxville — *Knoxville, TN*
- Led development of an XR-enabled digital twin for predictive maintenance of industrial motors, including sensor data collection, statistical analysis, machine learning fault classification, LLM-generated maintenance instructions, and secure remote (VPN) connectivity; the software is copyrighted by UT and is being licensed to industry partners for commercialization
- Design and evaluate LLM-based agents and multi-agent systems for complex reasoning, planning, and decision-making
- Study how AI assistants affect human situational awareness and team performance through experimental research
- Apply agent-based simulation and machine learning to model sociotechnical systems

Graduate Research Assistant, Ideation Laboratory (iLab) — Aug 2023 – Jan 2024
Department of Industrial and Systems Engineering, University of Tennessee, Knoxville · Advisor: Dr. Xueping Li — *Knoxville, TN*
- Developed a digital twin framework for predictive maintenance combining machine learning (remaining useful life and motor fault analysis) with LLM-generated maintenance work instructions
- Contributed to rule-based automated cancer staging from scanned pathology reports

INTELLECTUAL PROPERTY AND TECHNOLOGY TRANSFER

XR Digital Twin for Industrial Motor Predictive Maintenance
Copyrighted software, University of Tennessee · Co-developer
- Developed the machine learning, statistical analysis, data collection pipeline, and secure network infrastructure
- Licensing to industry partners for commercialization in progress

PUBLICATIONS

Peer-Reviewed Journal Articles

1. **Williams, J.**, et al. (2026). Cross-domain digital twin architecture for predictive maintenance via machine learning and Large Language Models. *Computers & Industrial Engineering*. doi:10.1016/j.cie.2026.111914
2. Li, X., **Williams, J.**, et al. (2025). A machine learning approach to predictive maintenance: Remaining useful life and motor fault analysis. *Computers & Industrial Engineering*. doi:10.1016/j.cie.2025.111222

Conference Proceedings

3. Wilhoit, E., **Williams, J.**, et al. (2026, accepted). A neuro-symbolic agent-based model for OUD recovery calibrated with real-world data and spatial treatment access. *Proceedings of the Winter Simulation Conference*.

4. Wang, X., Wang, Z., **Williams, J.**, et al. (2024). Rule-based automated cancer staging from scanned pathology reports. *Proceedings of the IISE Annual Conference & Expo*.
5. **Williams, J.**, et al. (2024). A digital twin framework for predictive maintenance using large language models and machine learning methods. *Proceedings of the International Conference on Computers and Industrial Engineering (CIE)*.
6. Jones, G., **Williams, J.**, et al. (2024). Generative large language models for predictive maintenance planning. *Proceedings of the International Conference on Computers and Industrial Engineering (CIE)*.

PRESENTATIONS AND DEMONSTRATIONS

Digital Twin for Predictive Maintenance (live demonstration) Apr 2026
XR Symposium 2026, ORTECC, Oak Ridge, TN

Digital Twin for Predictive Maintenance (exhibit booth demonstration) Mar 2026
MARCON 2026, Knoxville Convention Center, Knoxville, TN

Digital Twin for Predictive Maintenance (live demonstration) Apr 2025
XR Symposium 2025, ORTECC, Oak Ridge, TN

Real-Time Predictive Maintenance: A Digital Twin Approach With LLM-Generated Work Instructions Dec 2024
Winter Simulation Conference, Orlando, FL (poster presentation)

MENTORING

Peer Mentor, Applied Systems Laboratory, University of Tennessee, Knoxville 2024 – Present
- Mentor fellow students in the lab on research methods, tooling, and project development
- Provide pre-submission feedback on lab members' manuscripts for journals and conferences

HONORS AND AWARDS

Summa Cum Laude, B.S. Computer Science, Colorado Technical University 2023

Upsilon Pi Epsilon, Computer Science Honor Society

Purple Beacon Award for quality performance, FedEx Office

PROFESSIONAL MEMBERSHIPS

- Association for Computing Machinery (ACM)
- Institute for Operations Research and the Management Sciences (INFORMS)
- Institute of Industrial and Systems Engineers (IISE)
- Upsilon Pi Epsilon

TECHNICAL SKILLS

Languages: Python, R, Java, C++, JavaScript, SQL
AI & ML: PyTorch, large language models, LLM agents and multi-agent systems, machine learning, data analysis and visualization
Modeling & Methods: Agent-based modeling, simulation, digital twins, optimization, graph theory, parallel computing, human-computer interaction

CERTIFICATIONS

- Agile Project Management; Waterfall Project Management — Project Management Institute
- Deep Learning with PyTorch: Zero to GANs (2021); Data Analysis with Python: Zero to Pandas (2020) — Jovian

PRIOR PROFESSIONAL EXPERIENCE

Medical Coder / Biller, Dermatopathology Partners Sep 2019 – Jun 2023
- Assigned ICD-10 diagnosis and pathology procedure codes; managed confidential patient records, billing, and claims

Store Manager, FedEx Office Mar 2012 – Sep 2019
- Managed store operations and supervised a team of up to 12 employees; subject matter expert on operational metrics and the service quality index