

Alexander Nemecek

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EDUCATION

Case Western Reserve University – Cleveland, OH <i>Ph.D. Candidate, Computer Science</i> Focus: Watermarking in Large Language Models (LLMs), AI Governance	Aug 2023 – Expected May 2027
Ohio University – Athens, OH <i>B.S., Computer Science – B.S., Psychology</i>	Aug 2019 – May 2023

TECHNICAL SKILLS

Languages: Python, C/C++, JavaScript, TypeScript, SQL, Bash
AI/ML: PyTorch, TensorFlow, Hugging Face Transformers, LangChain
Tools & Platforms: AWS, Git, Linux, React Native, Slurm, Snowflake, Tableau
Data Analysis: Pandas, NumPy

EXPERIENCE

Case Western Reserve University – Cleveland, OH <i>Graduate Researcher</i>	Aug 2023 – Present
▪ Developed semantic-aware watermarking scheme for LLMs using topic-aligned token partitioning in PyTorch , maintaining text quality at industry-leading levels and increasing adversarial robustness by 30%.	
▪ Directed cross-disciplinary AI Governance analysis, designing a three-layer policy-technical framework adopted to align regulatory expectations with watermarking capabilities.	
▪ Engineered and deployed end-to-end AI stress detection platform (AWS Lambda , Fitbit API , React) with personalized models; led an Agile team of 10 junior engineers.	
Sandia National Laboratories – Albuquerque, NM <i>Research and Development Intern</i>	May 2024 – Present
▪ Built real-time threat detection pipeline leveraging fine-tuned LLMs with LoRA in PyTorch , improving model accuracy by 18% and enabling production deployment.	
▪ Implemented adaptive LoRA fine-tuning infrastructure for dynamic model swapping, speeding up knowledge graph extraction workflows.	
▪ Designed a prompt engineering framework with semantic guardrails; adopted by security teams for strategic threat prioritization.	
Cisco Systems – Richfield, OH <i>Software Engineer Intern</i>	May 2023 – Aug 2023
▪ Rebuilt full-stack BOM analysis platform (Python , Snowflake , React), automating manual processes into user-friendly application and transforming hardware engineering workflows from error-prone to efficient.	
▪ Developed Python data pipeline standardizing vendor BOM formatting into Snowflake warehouse with integrated SQL pipelines, reducing analysis time by 60%.	
▪ Created interactive pricing trend visualizations in React that accelerated procurement decision cycles from three months to one month across cross-functional teams.	
Sherwin-Williams – Cleveland, OH <i>Software Engineer Intern</i>	May 2022 – Aug 2022
▪ Constructed SQL and Snowflake pipelines to centralize nationwide automotive paint data, improving accessibility and operational efficiency.	
▪ Designed Tableau analytics platform visualizing 20+ KPIs, resolving data inconsistencies to improve inventory management and sales forecasting decisions.	
Ohio University – Athens, OH <i>Student Researcher</i>	Sep 2021 – Mar 2023
▪ Implemented secure cross-platform mobile app for foster care memory preservation with AWS backend storage and privacy-compliant architecture, implementing CI/CD pipeline with automated testing.	
▪ Developed VR/AR control interfaces for industrial robotics using Meta Quest and HoloLens , improving remote worker safety operations.	

PUBLICATIONS & PREPRINTS

- A. Nemecek, Y. Jiang, E. Ayday, “The Feasibility of Topic-Based Watermarking on Academic Peer Reviews,” [IJCNLP-AACL](#), December 2025.
- M. Namazi, A. Nemecek, E. Ayday, “ZKPROV: A Zero-Knowledge Approach to Dataset Provenance for Large Language Models,” [arXiv](#), June 2025.

- **A. Nemecek**, Y. Jiang, E. Ayday, “Watermarking Without Standards Is Not AI Governance,” [*ICML Technical AI Governance \(TAIG\) Workshop*](#), May 2025.
- **A. Nemecek**, E. Yilmaz, E. Ayday, “Cluster-Aware Attacks on Graph Watermarks,” [*arXiv*](#), Apr 2025.
- **A. Nemecek**, Y. Jiang, E. Ayday, “Topic-Based Watermarks for Large Language Models,” [*arXiv*](#), Feb 2025.

PRESENTATIONS

- **A. Nemecek**, R. Abbott, C. Garasi, “Can Smaller Expert Modules Enhance RAG Performance?,” [*Chesapeake Large-Scale Analytics Conference \(CL SAC\)*](#), Nov 2024.
- **A. Nemecek**, Y. Jiang, E. Ayday, “Topic-Based Watermarks for Large Language Models,” [*Privacy Enhancing Technologies Symposium \(PETS\)*](#), July 2024.
- **A. Nemecek**, C. Mourning, “Detection of Network Attacks using Machine Learning Models,” [*The Ohio Journal of Science*](#), Apr 2023.