Andrei Cozma

acozma@vols.utk.edu · andreicozma.com

linkedin.com/in/andreicozma1 · github.com/andreicozma1

Education

Ph.D. in Computer Science, Intelligent Systems & Machine Learning Aug 2024 – Present
University of Tennessee, Knoxville GPA: 3.91

- Advisor: Dr. Hairong Qi, AICIP Lab

M.S. in Computer Science, Intelligent Systems & Machine Learning 2022 – 2024
University of Tennessee, Knoxville GPA: 3.86

- Thesis: Koopman-Inspired Proximal Policy Optimization (KIPPO); Advisor: Dr. Hairong Qi
- Research: Reinforcement learning, self-supervised learning, computer vision, generative models

B.S. in Computer Science; Minors: Cybersecurity, Business Administration 2018 – 2022
University of Tennessee, Knoxville Summa Cum Laude, GPA: 3.87

- Chancellor's Honors Program; BS/MS Combined Program
- Research: Web security, security patch adoption, phishing analysis, certificate ecosystems

Research Interests

Representation Learning · Reinforcement Learning · Computer Vision · Generative Models · Neuroscience and Cognitive Science · Attention Mechanisms · Dynamical Systems and Control · Federated Learning · Large Language Models

Publications

A. Cozma, L. Harris, H. Qi. *KIPPO: Koopman-Inspired Proximal Policy Optimization.* IJCAI 2025.

S. Tyagi, **A. Cozma**, O. Kotevska, F. Wang. *OmniFed: A Modular Framework for Scalable Federated Learning.* SC 2025.

L. Whatley, **A. Cozma**, J. Fan, H. Qi, F. Liu. *Learning Latent Linear Dynamics from Surgical Videos via Koopman-based Visual Representations.* ICRA 2025 RAMI Workshop.

M. Tang, **A. Cozma**, K. Georgiou, H. Qi. *Cross-Scale MAE: A Tale of Multiscale Exploitation in Remote Sensing.* NeurIPS 2023.

Experience

AICIP Lab, University of Tennessee Aug 2022 – Present
Graduate Research Assistant – Advisor: Dr. Hairong Qi Knoxville, TN

- Developed KIPPO, applying Koopman theory to reinforcement learning for 6–60% performance gains over PPO with up to 91% variance reduction across continuous control benchmarks
- Co-developed Cross-Scale MAE with scale augmentation and cross-scale consistency constraints at structural and semantic levels, eliminating need for aligned multi-scale satellite imagery; achieved state-of-the-

art performance across remote sensing benchmarks
- Applied Koopman-inspired latent dynamics to surgical video, enabling multi-step prediction for robotic control and tool-tissue interaction analysis
- Collaborated with start-up to build production diffusion-based design tool for interior, architecture, landscaping applications: FastAPI server, GPU inference on EC2, containerized deployment (ECS/ECR), S3 storage, CloudFront CDN

Oak Ridge National Laboratory May 2025 – Aug 2025
Graduate Researcher – Mentor: Sahil Tyagi Oak Ridge, TN

- Architected modular federated learning framework supporting centralized, decentralized, and hierarchical topologies with plug-and-play integration of 11+ FL algorithms scaling from edge to HPC
- Designed and implemented abstraction layer and API contracts with standardized lifecycle hooks enabling seamless algorithm integration
- Integrated Ray and Hydra for distributed orchestration with mixed-protocol communication (MPI, gRPC), enabling topology and algorithm reconfiguration through YAML configuration

Graduate Teaching Assistant – Biologically-Inspired Computation (COSC 420/527) Jan 2023 – May 2023
University of Tennessee, Instructor: Dr. Catherine Schuman Knoxville, TN

- Supported graduate course covering evolutionary algorithms, genetic algorithms, spiking neural networks, neuromorphic computing, and swarm intelligence

Zoom Video Communications Sep 2022 – Dec 2022
Software Development Engineer Intern – Security Architecture Remote

- Developed Electron application (Quasar/Vue.js/TypeScript) for automated discovery and visualization of business logic relationships, integrating with Jira for security review workflows
- Built visualization tools for discovering and analyzing business logic relationships across systems

University of Tennessee Mar 2021 – Dec 2021, May 2022 – Aug 2022
Research Assistant – Advisor: Dr. Doowon Kim Knoxville, TN

- Analyzed adoption rates and timeliness of security patches in web libraries, phishing blacklist dynamics, and certificate ecosystem vulnerabilities
- Built web crawlers and data pipelines for large-scale collection and analysis using MongoDB, SQL, and visualization tools
- Contributed sub-reviews for $\sim$4 security journal papers

Undergraduate Teaching Assistant – Introduction to Cybersecurity (COSC 366) Jan 2022 – May 2022
University of Tennessee, Instructor: Dr. Doowon Kim Knoxville, TN

- Supported undergraduate course covering cryptography, network security, web security, and system security fundamentals

Elo Touch Solutions Jan 2020 – Dec 2020, May 2021 – Aug 2021
Software Development Engineer Intern Knoxville, TN

- Developed Android (AOSP) system services and framework components for enterprise fleet management system; integrated into production OS release enabling remote device configuration and monitoring

- Built Android client applications integrating devices with cloud-based fleet management platform, supporting remote configuration and OTA updates for tens of thousands of deployed touchscreen devices
- Developed customer-facing demos and proof-of-concept applications showcasing new platform capabilities for sales presentations and business development

LEADERSHIP

VolHacks Hackathon Apr 2019 – Jul 2022
Co-President (2020–2021); previously Operations Manager for Sponsorships (2019) Knoxville, TN

- Led sponsor acquisition and management: negotiated packages, maintained relationships, coordinated on-site participation, securing funding and prizes for 200+ student hackathon
- Managed event operations and logistics: venue coordination, workshop/activity scheduling, food and supplies, participant registration for 36-hour event
- Directed organizer team through weekly meetings, task delegation, and mentoring; successfully adapted event to hybrid format after COVID

Pi Kappa Phi Fraternity Aug 2018 – May 2022
Chapter Secretary (Executive Board) & Housing Manager Knoxville, TN

- Served on executive board managing records, meeting minutes, membership roster, national headquarters correspondence, and chapter communications throughout undergraduate career
- Built custom web platform streamlining operations: member portal, calendar system, attendance tracking, resource repository, integrated communication channels

Smart Ledger (Senior Design) Aug 2021 – May 2022
Project Lead Knoxville, TN

- Architected full-stack shared expense tracking application (React, Flask, MongoDB, AWS); established coding standards and conducted code reviews
- Managed project timeline, coordinated task delegation, facilitated sprint planning, and ensured component integration across 6-person team

TECHNICAL SKILLS

Languages: Python, C/C++, JavaScript/TypeScript, Java, Kotlin

Machine Learning: PyTorch, TensorFlow, Scikit-learn, NumPy, Pandas, SciPy, Matplotlib, Seaborn

HPC & Distributed Systems: Linux, Git, Docker, SLURM, Ray, Hydra, MPI, gRPC

Web Development & Databases: React, Vue.js, FastAPI, SQL, MongoDB, AWS