Sofiia Druchyna

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Academic Experience

Graduate Research Assistant 01/2025 – Present
Google DeepMind Princeton *Princeton,NJ*

- Developed human-centered frameworks for integrating AI tools and LLM assistants into undergraduate proof-based courses and assessed their impact on student learning and teaching workflows.
- Proposed a new method for controlling linear dynamical systems under adversarial disturbances. Developed algorithm that matches the best known regret guarantees while exponentially improving runtime complexity.
- Proposed a mixed-methods framework for assessing the real-world impact of data-driven tools, focusing on how human decision-makers use algorithmic recommendations in educational settings.
- Introduced the first method, SpectraLDS architecture, for system identification of a symmetric linear dynamical system with provable robustness guarantees and with performance independent of the effective memory of the system or state dimension of the underlying system.

Undergraduate Research Assistant 06/2022 – 05/2024
Tulane University *New Orleans,LA*

- Measured the Qualitative Performance and the Hardware Power Usage of Newly Developed LLMs.
- Researched Impact of Government-as-a-Service and Cybersecurity Digital Essentials in a Post-COVID World.
- Designed and Developed Flexible Emergency Response Mobile Application Product in Android Studio.
- Developed Emergency Information Notification System that Responds to Imminent Cyberthreats via Drones.

Assistant Instructor 01/2023 – Present
Tulane/Princeton Universities *LA/NJ*

- Taught and Assisted in Machine Learning, Computer Systems Design, Computer Systems Networking, and Introduction to Computer Science I and II (Java, C, C++, Python) Programming Courses.

Professional Experience

Software Development Engineer (AGI) Intern 05/2025 – 08/2025
Amazon *Bellevue, WA*

- Designed a new product feature to launch HPC workflows from customers' application templates, accelerating testing by **14** days and reducing overhead in the development lifecycle.
- Implemented infrastructure components to enable seamless onboarding of **1,000**+ concurrent ML training workflows improving scalability and resource efficiency by over **80**%.

Program Analyst (AppSec) Intern 01/2024 – 04/2024
BeyondTrust *Remote*

- Conducted Quantitative Data Analysis for the Complete Organizational Application Security Coverage.
- Implemented and Optimized Static Code Analysis with CodeQL to Provide **95%** Security Coverage.
- Developed Scalable User-Oriented Vulnerability Scanning Solution, reducing Manual Triage Time by **60%**.

IT Department Operations Manager 01/2023 – 5/2024
Tulane University *New Orleans, LA*

- Led Planning and Organization for Nation-Wide Cybersecurity NCL Competitions with **100**+ College Teams.
- Managed Information Technology Departmental Data Center to Ensure **24/7** Continuous Operations.

Education

Princeton University Princeton, NJ
Masters of Science and Engineering in Computer Science (GPA: 4.0/4.0) *9/2024 – 5/2026*

- Advisor: Professor Elad Hazan (Google Deep Mind Research).
- Master's Thesis: *"Spectral Credit Redistribution for GRPO in Long-Horizon RLHF."*
- Concentration: Online Learning and Optimization, Online Control and RL, AI and Education.

Tulane University New Orleans, LA
Bachelors of Science in Computer Science and Cybersecurity (GPA: 4.0/4.0) *8/2022 – 5/2024*

- Summa Cum Laude with Honors in Computer Science.
- Honors Thesis: *"Enhancing Undergraduate Teaching Methods of File Systems from Educational Perspective."*

Publications

- Romina Mahinpei and Sofiia Druchyna (May 2025). "Language Models as TA Companions: Evidence from Experiments in a Proof-Based Course". In: *Submitted to AIED 2026*. URL: https://arxiv.org/abs/2602.23635
- Romina Mahinpei, Sofiia Druchyna, and Xinran Bi (Feb. 2026). "CNPE: A Human-Centered Framework for Integrating Interactive Theorem Provers into Proof Education". In: *SIGCSE TS 2026*. URL: https://dl.acm.org/doi/10.1145/3770761.3777193
- Anand Brahmbhatt et al. (May 2025). "Efficient Spectral Control of Partially Observed Linear Dynamical Systems". In: *NEURIPS 2025*. URL: https://arxiv.org/pdf/2505.20943
- Anand Brahmbhatt et al. (Jan. 2026). "A New Approach to Controlling Linear Dynamical Systems". In: *ICRL 2026*. URL: https://www.arxiv.org/pdf/2504.03952
- Devan Shah et al. (May 2025). "SpectraLDS: Provable Distillation for Linear Dynamical Systems". In: *NEURIPS 2025*. URL: https://arxiv.org/pdf/2505.17868
- Craig P. Orgeron, William Rials, and Sofiia Druchyna (Jan. 2025). "The AI-Driven State: How Government-as-a-Service Is Transforming Public Service". In: *International Journal of Electronic Government Research (IJEGR)* 21.1, pp. 1–24. URL: https://www.igi-global.com/article/the-ai-driven-state/381327

Skills

Languages: Python, Java, JavaScript, C, C++, R, Matlab, Rust, Haskell, Go, Bash, SQL, and TypeScript.
Specializations: ML/AI, Data Science, Math, Cybersecurity, Probability and Statistics, and Causal Inference.
Soft Skills: Leadership, Presentations, Emotional Inteligence, Planning, Prioritization, Reliability, and Adaptability.

Honors and Awards

- Norman D. Kurtz '58 Fund for Innovation in Engineering Education (2025)
- International Tulanian Award for Academic Excellence (2024)
- Center for Engaged Learning and Teaching Undergraduate Research Award (2023-2024)
- Computer Science Teaching Assistantship Excellence Award (2022-2023)
- Scholar Athlete of the Year (2022-2024)
- Dean's List (2021-2024)

Organizations

- Phi Betta Kappa, Chi Alpha Sigma Honor Societies
- Tulane Cyber-Competition Team (2022-2024)
- Student Advisory Board for Tulane School of Professional Advancement (2023)
- Tulane Bowling Team (2022-2024)
- College Scholars (2023)

Academic Courses

- **Computer Science**:

  Information Theory, Theory of Deep Learning, Theory of Computation, Computational Geometry, Computer Architecture, Advanced Computer Networks, Algorithms, Artificial Intelligence, Empirical Research Methods in CS, Computer Systems and Networking, Data Science, Machine Learning, Theoretical Machine Learning, AI and Education, Systems and Machine Learning, Machine Behavior, Neural Networks.

- **Mathematics:**

  Linear and Non-linear Optimization, Calculus I-III, Discrete Math, Real Analysis I, Linear Algebra, Probability Theory and Stochastic Systems, Statistics, Applied Mathematics.

- **Cybersecurity**:

  Automation and Bot Development, Certified Ethical Hacker, Cyber Law and Policy, Cyber Threats and Cybersecurity, Digital Forensics and Information Assurance, Forensics Investigation and Response, Fundamentals of Cybersecurity, Hacking for Defense, IP Routing and Switching, IT Infrastructure Fundamentals, Network Security, Penetration Testing, Security +, Database Fundamentals, Technology and Ethics.