

Shirley (Shaghayegh) Shajarian

AI and Network Security Researcher

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Research Interests

My research lies at the intersection of **cybersecurity, networking and artificial intelligence**, with a focus on **generative and agentic AI for network security**. I build LLM-driven multi-agent systems that carry security operations past detection into the steps that still depend on human analysts such as analyzing attack behavior, reasoning about root cause, and generating remediation grounded in network state. My broader work spans **autonomous networks** and **network management, explainable AI, malware analysis, IoT and edge security, security for AI and cybersecurity education**.

Highlights

Funding and Selected Awards

- Supported by continuous NSF-funded research assistantships since 2023, such as Excellence in Research, SaTC, and CyberTraining programs.
- Best Poster Award, N2Women workshop at ACM SIGCOMM 2026; selected participant, AAAI/ACM SIGAI Doctoral Consortium at AAAI 2025.
- Five competitive travel and registration awards (2024–2026): NSF student travel grants for ACM CoNEXT 2024 (one of two U.S.-based awardees) and ACM MobiCom 2026; N2Women travel awards for ACM SIGCOMM 2026 and MobiCom 2026; AAAI student travel and registration grants, 2025.

Research and Publications

- 6 peer-reviewed publications (5 first- or co-first-authored): 2 journal papers, 1 conference paper, 1 doctoral consortium paper, 1 workshop paper, and 1 poster. Four additional manuscripts under review or in preparation, including a survey of self-running networks submitted to ACM Computing Surveys (Preprint in TechRxiv).
- Collaborations with researchers at Purdue University, the University of Texas at San Antonio, NC State University and Tennessee Tech University.
- Venues include IEEE Access, Discover Artificial Intelligence, AAAI, IEEE ICNC, ACM CoNEXT, and the ACM S3 Workshop at MobiCom.

Teaching and Mentoring

- Instructor for Artificial Intelligence and Machine Learning courses; designed the course curriculum and instructional materials.
- Lead teaching assistant for AI and Machine Learning, Generative AI and Large Language Models, and Security of Emergent Networks.
- Mentored an M.S. student to a successful thesis defense and co-authorship on an ICNC 2026 paper.

Selected Service

- Technical Committee Member: ACM SIGCSE 2026 and the ACM S3 Workshop at ACM MobiCom 2026.
- Journal reviewer for twelve different venues; 30+ reviews for the Grace Hopper Celebration 2025. Judge and panelist at NSBE'25 and student volunteer at ACM HotNets'25.

Education

North Carolina Agricultural and Technical State University
Greensboro, NC

Ph.D. in Computer Science

Expected May 2027; Advanced to Candidacy: April 2026

Dissertation: Towards Autonomous Network Security Operations:
A Closed-Loop Multi-Agent Framework for LLM-Driven Network Traffic
Analysis

Committee: Dr. Sajad Khorsandroo (advisor), Dr. Mahmoud Abdelsalam
(Co-Advisor), Dr. Xiaohong Yuan, Dr. Shaohu Zhang, and Dr. Jingsheng Xu

Science and Research Branch Azad University
Tehran, Iran

M.S. in Computer Software Engineering
2019

University of Mazandaran
Babolsar, Iran

B.S. Computer Software Engineering
2016

Research Experience

Autonomous Cybersecurity and Resilience (ACR) Lab

North Carolina Agricultural and
Technical State University
Jan 2023 – Present

- Lead research on NSF-funded projects in autonomous networks, cybersecurity, network resilience, and self-running network operations.
- Authored or co-authored 6 peer-reviewed publications, including 5 as first or co-first author.
- Mentoring of an M.S. student resulted in a peer-reviewed publication.
- Collaborate with Purdue University, University of Texas at San Antonio, NC State University and Tennessee Tech University on interdisciplinary research in networking, cybersecurity, education and autonomous systems.

Distributed Systems Lab

Science and Research Branch of Azad
University
Nov 2017 – Aug 2019

- Formulated latency–power trade-offs in fog-based IoT resource allocation as an optimization problem and designed heuristic allocation schemes evaluated through simulation. Lead biweekly research group discussions on emerging topics, recent literature, and ongoing projects in IoT research.

Internet of Things Group

University of Mazandaran
Nov 2015 – Aug 2016

- Investigated Internet of Things applications for smart home environments.

Peer-Reviewed Publications

Conference rankings refer to the ICORE 2026 ranking of the parent conference.

- [6] **Shaghayegh Shajarian**, Sajad Khorsandroo, Mahmoud Abdelsalam. (To appear). "Agentic AI at the Edge: Self-Explaining Autonomous Framework for IoT Incident Response." *In Proceedings of the ACM Workshop on Wireless of the Students, by the Students, and for the Students (S3 Workshop; ACM MobiCom 2026)*.
Parent conference: ACM MobiCom - ICORE A*

- [5] **Shaghayegh Shajarian**, Kennedy Marsh, James Benson, Sajad Khorsandroo, Mahmoud Abdelsalam. (2026, February). “Regain: Retrieval-grounded AI framework for network traffic analysis.” *In 2026 International Conference on Computing, Networking and Communications*.(IEEE ICNC’26).
(Full paper main track; Acceptance rate: 27%).
- [4] **Shaghayegh Shajarian**. (2025, March). “Towards Autonomous Network Management: AI-Driven Framework for Intelligent Log Analysis, Troubleshooting and Documentation.” *Doctoral Consortium Track, In Proceedings of the 39th Annual AAAI Conference on Artificial Intelligence (AAAI’25)*.
Parent conference: AAAI - ICORE A*
- [3] Harikha Manthena† , **Shaghayegh Shajarian†**, Jeffrey Kimmel, Mahmoud Abdelsalam, Sajad Khorsandroo, Maanak Gupta. (2025, March). “Explainable Artificial Intelligence (XAI) for Malware Analysis: A Survey of Techniques, Applications, and Open Challenges.” IEEE ACCESS. **(Co-First Author)**
Q1 Journal
- [2] **Shaghayegh Shajarian**, Sajad Khorsandroo, Mahmoud Abdelsalam. (2024, December). “Poster: Intelligent Network Management: RAG-Enhanced LLMs for Log Analysis, Troubleshooting, and Documentation.” *Poster Track, In Proceedings of the 20th International Conference on Emerging Networking EXperiments and Technologies (ACM CoNEXT’24)*
Parent conference: ACM CoNEXT - ICORE A
- [1] Fikirte Demmese, **Shaghayegh Shajarian**, and Sajad Khorsandroo. (2024, July). “Transfer learning with ResNet50 for malicious domain classification using image visualization.” *Discover Artificial Intelligence*, Springer.
Q1 Journal

Manuscripts in Preparation or Under Review

- [5] **Shaghayegh Shajarian**, Sajad Khorsandroo, Mahmoud Abdelsalam, Elisa Bertino. (2026, August). “Self-Running Networks: A Comprehensive Survey of Foundations, Applications, and Challenges.” *Submitted to ACM Computing Surveys*. Preprint available on TechRxiv.
- [4] **Shaghayegh Shajarian**, Sajad Khorsandroo, Mahmoud Abdelsalam. “Multi-Agent Framework for Autonomous Network Attack Analysis and Remediation.” *In preparation for USENIX Security 2027*.
- [3] **Shaghayegh Shajarian**, Sajad Khorsandroo, Mahmoud Abdelsalam. “The Adversary Within: Reward Hacking as an Emergent Insider Threat in AI-Powered Autonomous Cyber Defense.” *In preparation for IEEE Communications Magazine*.
- [2] Benyamin Tabarsi, **Shaghayegh Shajarian**, Heidi Reichard, Tiffany Barnes. “AI-as-Challenger: A Pedagogical Model for Critical Evaluation in Computing Education.” *In preparation for ICML SEET 2027*.
- [1] **Shaghayegh Shajarian**, Sajad Khorsandroo, Mahmoud Abdelsalam. “Edge and agentic: How we should leverage agentic AI at the edge?.” *In preparation for IEEE Internet of Things*.

Honors and Awards

ACM MobiCom Travel Grant, <i>National Science Foundation</i>	2026
NSF-sponsored travel award supporting participation in ACM MobiCom	
ACM N2Women Travel Award, <i>MobiCom</i>	2026
Travel award supporting participation in ACM MobiCom	
Merit-Based Computer Science Department Travel Grant, <i>North Carolina A&T State University</i>	2026

Received a 2026 merit-based travel award from the Department of Computer Science to support conference travel and professional development.

ACM N2Women Best Poster Award, SIGCOMM 2026
First place in the N2Women poster presentation for our research “Toward Self-Healing Networks: A Multi-Agent Framework for Network Attack Analysis and Remediation.”

ACM N2Women Travel Award, SIGCOMM 2026
Travel award supporting participation in ACM SIGCOMM.

AAAI/ACM SIGAI Doctoral Consortium Selection 2025
One of 39 PhD students selected internationally; includes complimentary registration and a student travel grant.

ACM CoNEXT Travel Grant, National Science Foundation 2024
One of two US-based awardees for NSF-sponsored travel award supporting participation in ACM CoNEXT.

Winner of Three Minute Thesis (3MT) Competition, Science and Research Branch, Azad University 2019
First place for presenting thesis research to a non-specialist audience in under three minutes.

Ranked 2nd in Cumulative GPA, Science and Research Branch, Azad University 2019
Second-highest cumulative GPA among all Computer Engineering students.

Grants and Sponsored Research

NSF-Funded Research Assistantships, North Carolina A&T State University

- Excellence in Research: Cyber Threats Early Warning Framework for Operational Technology Systems (NSF #2200538).
My Role: Developed ReGAIN, a RAG-based LLM framework for network traffic analysis and attack detection, processing ~10K traffic records; co-developed a CNN classifier for malicious-domain detection; built a fully local, self-explaining incident-response agent for IoT gateways. Mentored an M.S. student through successful thesis defense.
- Collaborative Research: SaTC: EDU: A Hands-on Approach to Securing Self-Driving Networks (NSF #2113945).
My Role: Designed a human-in-the-loop multi-agent LLM framework for network log analysis, troubleshooting, and documentation; developed a closed-loop architecture and six-level maturity model for self-running networks.
- Collaborative Research: SaTC: EDU: Adversarial Malware Analysis – An Artificial Intelligence Driven Hands-On Curriculum for Next Generation Cyber Security Workforce (NSF #2230610).
My Role: Co-led a systematic study of explainable AI methods for ML-based malware detection across Windows, Android, PDF, Linux, and IoT malware; identified research gaps and open challenges, including the adversarial robustness of explanations.
- Collaborative Research: CyberTraining: Implementation: Small: Training AI-Skilled and Fairness-Aware Research Workforce for Cloud Infrastructure Cybersecurity (NSF #2416992).
My Role: Developed hands-on labs on retrieval-augmented generation, prompt engineering, and AI model evaluation for COMP 365 (AI and Machine Learning); taught the course as instructor in Spring 2025 (55 students) and supervising instructor in Fall 2025; developed LLM-focused instructional materials for COMP 485 (Generative AI and LLMs).

Teaching Experience

Generative AI and Large Language Models, COMP 485 (Lead Teaching Assistant) Fall 2026
Co-designed the course curriculum and instructional materials; deliver recitations and hands-on lab sessions and assess homework sets and quizzes.

Security of Emergent Networks, COMP 826 (Lead Teaching Assistant) Spring 2023, Spring 2026

Led recitations and hands-on lab sessions and assessed homework sets and quizzes across both offerings.

Artificial Intelligence and Machine Learning, COMP 365 (Supervising Instructor)

Fall 2025

Led the course following my own offering, overseeing delivery, materials, and assessment.

Mentored and supervised the incoming instructor through their first semester teaching the course.

Served as subject matter expert, developing materials adopted in subsequent offerings.

Artificial Intelligence and Machine Learning, COMP 365 (Instructor)

Spring 2025

Sole instructor of 55 undergraduate students.

Redesigned the course around hands-on labs in which students build and evaluate working AI systems, shifting emphasis from code completion toward critical evaluation of model outputs.

Designed instructional materials, lecture sequence, recitations, labs, homework sets, and quizzes.

Delivered all lectures and supervised one graduate teaching assistant.

Served as subject matter expert, developing materials adopted in subsequent offerings.

Artificial Intelligence and Machine Learning, COMP 365 (Lead Teaching Assistant)

2023 – 2024

Led recitations and hands-on lab sessions; wrote and assessed quizzes and homework sets across three offerings (Fall 2023, Spring 2024, Fall 2024).

Talks, Panels, and Media

Invited Talks and Media

Research Featured by N.C. A&T College of Engineering - Media Coverage

2026

North Carolina A&T State University

Featured for earning the First Place Best Poster Award at N2Women ACM SIGCOMM for the research “Toward Self-Healing Networks: A Multi-Agent Framework for Network Attack Analysis and Remediation.”

Transformers and Retrieval-Augmented Generation - Guest Lecturer

2026

North Carolina A&T State University

Presented the foundations of transformer architectures and RAG, with applications to intelligent, networked, and cloud-based systems.

Applying Generative AI to Computer Networks - Media Interview

2025

Association for the Understanding of Artificial Intelligence ([AIhub Interview](#))

Discussed the use of generative AI and large language models for network management, traffic analysis, troubleshooting, and cybersecurity.

RAG-Enhanced LLMs for Network Security - Research Talk

2025

AUCC Data Science Initiative - Atlanta University Center Consortium

Present a talk on applying retrieval-augmented generation and large language models to network security

Unlocking the Black Box: How Explainable AI (XAI) is Transforming Malware Detection - Media Blog

2025

EngiSphere - Educational Engineering Blog

Research feature highlighting our work on explainable artificial intelligence for malware analysis and cybersecurity, based on our peer-reviewed survey on XAI techniques, applications, and open challenges in malware analysis.

Intelligent Network Management: RAG enhanced LLMs for log analysis, troubleshooting, and documentation - ACM Lightning Talk

2024

The 20th International Conference on emerging Networking EXperiments and Technologies (ACM CoNEXT'24)

Presented an AI-driven framework for analyzing network and system logs, automating troubleshooting, and supporting secure and intelligent network operations.

Prompt Engineering in Action: Applications of Generative AI - Guest Lecturer 2023
North Carolina A&T State University
Introduced prompt-engineering techniques and practical applications of large language models for intelligent computing and technical problem solving.

From the Internet of Things to Fog Computing - Guest Lecturer 2018
Azad University, Distributed Systems Course
Presented the evolution of distributed computing architectures from IoT and cloud computing to fog and edge computing, highlighting distributed processing, communication, and resource-management concepts.

Cloud Computing - Guest Lecturer 2017
Azad University, Distributed Systems Course
Presented foundational cloud-computing concepts, including virtualization, service models, scalable distributed architectures, resource management, and security considerations in cloud environments.

Panel

AI Impact-A-Thon - Panelist, National Society of Black Engineers (NSBE) 2025
Discussed applications of AI to community needs in the Research Triangle, including services for people experiencing homelessness and tools for locating affordable housing.

Conference Presentations

A Multi-Agent Framework for Attack Analysis 2026
ACM N2Women Poster Session, MobiCom.

Agentic AI at the Edge: Self-Explaining Autonomous Framework for IoT Incident Response 2026
Conference talk at ACM S3 Workshop, MobiCom.

Toward Self-Healing Networks: A Multi-Agent Framework for Network Attack Analysis and Remediation 2026
ACM N2Women Poster Session, SIGCOMM 2026. Awarded Best Poster.

Retrieval-Grounded AI Framework for Network Traffic Analysis 2026
Conference Talk at IEEE ICNC. Presented our full paper on a retrieval-grounded framework for automated network traffic analysis in the main technical track.

Towards Autonomous Network Management: AI-Driven Framework for Intelligent Log Analysis, Troubleshooting and Documentation 2025
Present my PhD research on AAAI/ACM SIGAI Doctoral Consortium.

Intelligent Network Management and Security - North Carolina A&T State University 2025
Present our research at 14th Annual Dr. Bala Ram Graduate Research Poster Competition.

Intelligent Network Management: RAG-Enhanced LLMs for Log Analysis, Troubleshooting, and Documentation - 2024
Poster Presentation of the research at ACM CoNEXT'24.

Mentorship Experience

Kennedy Marsh (Computer Science Master's Student) Fall 2024 to Fall 2025
Mentored an M.S. student over a year to a successful thesis defense and co-authorship on an ICNC 2026 paper.

Professional Service and Memberships

Technical Committee Member

ACM Wireless of the Students, by the Students, and for the Students Workshop (S3), MobiCom	2026
ACM Technical Symposium on Computer Science Education (SIGCSE Virtual)	2026

Judge

AI Impact-A-Thon Competition, National Society of Black Engineers (NSBE'25)	Nov 2025
Academic Technical Bowl, National Society of Black Engineers (NSBE'25)	Oct 2025

Student Volunteer

HotNets'25, University of Maryland	Nov 2025
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Journal Reviewer

IEEE Transactions on Dependable and Secure Computing	Dec 2025
PeerJ	Jul, Dec 2025
Artificial Intelligence Review	Sep 2025
Computing (Springer)	Jul, Sep 2025
Peer-to-Peer Networking and Applications	Jul, Aug, Sep 2025
Journal of Intelligent Information Systems	Jul, Aug 2025
Knowledge and Information Systems	Jun, Aug 2025
Scientific Reports	Jul 2025
Grace Hopper Conference (30+ workshop, panel, and presentation reviews)	Jun, Jul 2025
Cluster Computing	Jun 2025
IEEE Access	Feb, Apr 2025

Memberships

SIGCOMM	2025 – Present
SIGMOBILE	2025 – Present
Association for the Advancement of Artificial Intelligence (AAAI)	2025 – Present
IEEE Student	2018; 2023 – Present
ACM Student	2023 – Present