Zechun Cao

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EDUCATION

Ph.D. Computer Science, University of Houston, 2020

M.S. Computer Science, University of Houston, 2013

B.E. Electrical Engineering, China University of Petroleum-Beijing, 2008

APPOINTMENTS

2021– Texas A&M University-San Antonio
Assistant Professor, Department of Computational, Engineering, and Mathematical Sciences

2021 Texas A&M University-San Antonio
Visiting Assistant Professor, Department of Computing and Cyber Security

2019–20 Texas A&M University-San Antonio
Lecturer, Department of Computing and Cyber Security

2015–19 University of Houston
REU Program Assistant (NSF-1659755), Department of Computer Science

2010–13 University of Houston
Graduate Teaching Assistant, Department of Computer Science

RESEARCH AREAS

Privacy: privacy-preserving algorithms for foundational computational problems and AI-driven systems

Security: vulnerability analysis and intrusion detection through graph-centric computing with AI models

PUBLICATIONS[1]

Journal Articles

2025 Z. Cao, *B. Kishiyama*, and J. Yang, "PrivNN: A Private and Efficient Framework for Spatial Nearest Neighbor Query Processing", *Journal of Information Security and Applications*, vol.94, 2025: pp.104244. doi:10.1016/j.jisa.2025.104244

2025 Y. Lee, S.J. Boshra, J. Yang, Z. Cao, G. Liang, "Machine Learning-Based Vulnerability Detection in Rust Code Using LLVM IR and Transformer Model", *Machine Learning and Knowledge Extraction*, vol. 7, p. 79, 2025. doi:10.3390/make7030079

[1] Texas A&M University-San Antonio student author *italicized*.

2025 R. Jonnala, J. Yang, Y. Lee, G. Liang, Z. Cao, "Measuring and Improving the Efficiency of Python Code Generated by LLMs Using CoT Prompting and Fine-Tuning", *IEEE Access*, vol. 13, pp. 119657–119681, 2025. doi:10.1109/ACCESS.2025.3585742

2024 Z. Cao, *G. Villafuerte*, and *J. Almaznaai*, "EPSSNet: A Lightweight Network With Edge Processing and Semantic Segmentation for Mobile Robotics", *International Journal on Semantic Web and Information Systems*, vol.20, no.1 2024: pp.1-22. doi:10.4018/ijswis.342087

2023 Z. Cao and SH. S. Huang, "A Behavioral Graph Model for Host-Based Intrusion Detection", *Journal of Information Assurance & Security*, vol.18, no.2 2023: pp.48.

2020 SH. S. Huang and Z. Cao, "Detecting Malicious Users Behind Circuit-Based Anonymity Networks", *IEEE Access*, Volume 8, pp. 208610-208622, November 2020. doi:10.1109/access.2020.3038141

2019 Z. Liang, Y. Huang, Z. Cao, T. Liu, and Y. Wang, "Creativity in Trusted Data: Research on Application of Blockchain in Supply Chain", *International Journal of Performability Engineering*, Volume 15, Issue 2, pp. 526-535, February 2019. doi:10.23940/ijpe.19.02.p17.526535

2007 N. Zhang, R. Liu, A. Zhang, R. Yu, and Z. Cao, "Study and Research on Computer Network Based on Plastic Optical Fiber", *Journal of Optoelectronics Laser*, Volume 18, Issue 9, pp. 1071-1073, 2007.

Conference Proceedings

2025 E. Oseghale et al., "Container Image Security in HPC: A Comprehensive Large-Scale Evaluation", *2025 IEEE Cloud Summit*, Washington, DC, USA, pp. 54–59, 2025. doi:10.1109/Cloud-Summit64795.2025.00016

2025 D. Deanda, Y. Masupalli, J. Yang, Y. Lee, Z. Cao, G. Liang, "Benchmarking Robustness of Contrastive Learning Models for Medical Image-Report Retrieval", *39th Annual AAAI Conference on Artificial Intelligence (AAAI) Workshop*, March 2025, in press.

2024 Y. Tian, Z. Cao, and SH. S. Huang, "Detecting VPN Traffic in Real-Time with Active Probing", *The 22nd International Symposium on Network Computing and Applications (NCA 2024)*, October 2024.

2024 *H. Wang*, J. Yang, G. Liang, Y. Lee, and Z. Cao, "Analyzing the Usability, Performance, and Cost-Efficiency of Deploying ML Models on BigQuery ML and Vertex AI in Google Cloud", *Proceedings of the 2024 8th International Conference on Cloud and Big Data Computing*, 2024. doi:10.1145/3694860.3694863

2024 B. Han, *C. Moran*, J. Yang, Y. Lee, Z. Cao, and G. Liang, "Multi-Scale Self-Supervised Consistency Training for Trustworthy Medical Imaging Classification", *2024 46th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)* (pp. 1-6). IEEE. doi:10.1109/EMBC53108.2024.10782322

2024 Z. Cao, *G. Villafuerte*, A. Jalooli, R. Balyan, S. R. Moosavi, and F. Iacobelli, "Bridging Language Barriers in Healthcare Education: An Approach for Intelligent Tutoring Systems with Code-Switching Adaptation", *2024 ASEE Annual Conference & Exposition*, Portland, Oregon. doi:10.18260/1-2–46776

2024 J. Yang, Y. Lee, M. Abdel-Rahman and Z. Cao, "Enhancing Urban Mobility: SmartSAT's Impact on Public Transportation Services and Commuting Experience", *2024 ASEE Annual Conference & Exposition*, Portland, Oregon. doi:10.18260/1-2–46840

2022 Z. Cao and SH. S. Huang, "Host-Based Intrusion Detection: A Behavioral Approach using

Graph Model", *Proceedings of the 18th International Conference on Information Assurance and Security (IAS)*, Springer, vol 647. December 2022. doi:10.1007/978-3-031-27409-1_122

2019 SH. S. Huang, Z. Cao, C. E. Raines, M. N. Yang, and C. Simon, "Detecting Intruders by User File Access Patterns", *Proceedings of the 13th International Conference on Network and System Security (NSS)*, Sapporo, Japan, pp. 320-335, December 2019. doi:10.1007/978-3-030-36938-5_19

2018 Z. Cao and SH. S. Huang, "Detecting Intruders and Preventing Hackers from Evasion by Tor Circuit Selection", *Proceedings of the 17th IEEE International Conference On Trust, Security And Privacy In Computing And Communications/12th IEEE International Conference On Big Data Science And Engineering (TrustCom/BigDataSE)*, New York, NY, pp. 475-480, August 2018. doi:10.1109/trustcom/bigdatase.2018.00074

2013 Z. Cao, S. Wang, G. Forestier, A. Puissant, and C. F. Eick, "Analyzing the composition of cities using spatial clustering". *2nd ACM SIGKDD International Workshop on Urban Computing (UrbComp '13)*. Association for Computing Machinery, New York, NY, USA, Article 14, 1–8. doi:10.1145/2505821.2505827

PRESENTATIONS

2024 "Bridging Language Barriers in Healthcare Education: An Approach for Intelligent Tutoring Systems with Code-Switching Adaptation", 2024 ASEE Annual Conference & Exposition, Portland, Oregon, June 26.

2024 "Privacy Preserving Tutoring System for Health Education of Low Literacy Hispanic Populations", 2024 NSF CISE-MSI Grantees Meeting, Denver, May 23.

2024 "Fine Tuning Large Language Models for Research Applications", TAMUSA Jag-AI Summer Workshop, June 21.

2024 "Empowering Research Across Disciplines: Harnessing Large Language Models for Innovative Insights", TAMUSA Jag-AI Spring Workshop, March 22.

2022 "Host-Based Intrusion Detection: A Behavioral Approach using Graph Model", 18th International Conference on Information Assurance and Security (IAS), virtual, December 11.

2019 "Detecting Intruders by User File Access Patterns", 13th International Conference on Network and System Security (NSS), Sapporo, Japan, December 20.

2018 "Detecting Intruders and Preventing Hackers from Evasion by Tor Circuit Selection", 17th IEEE International Conference On Trust, Security And Privacy In Computing And Communications/12th IEEE International Conference On Big Data Science And Engineering (TrustCom/BigDataSE), New York, August 18.

2017 Poster presentation, PhD Research Colloquium, University of Houston, Texas, May 2.

GRANTS AND AWARDS

Grants and Fellowships[2]

2024–25 Toward Automatic and Sound Memory Safety Bug Repair ($80,000 + $10,000 Google Cloud Credit, TAMUSA Site $35,000). CAHSI-Google Institutional Research Program research grant. co-PI.

[2]Proposal under review *italicized*.

2024–25 AI-Ready Institution Transforming Tomorrow's Research and Education with AI Focused on Health and Security (Jag-AI) ($385,475). National Science Foundation (NSF) research grant. co-PI.

2022–25 Collaborative Research: Privacy Preserving Tutoring System for Health Education of Low Literacy Hispanic Populations ($113,439). National Science Foundation (NSF) research grant. PI.

2023–24 JagCoach: AI-Assisted Coaching Platform to Enhance Oral Communication Skills for College Students ($9,999). Texas A&M University-San Antonio Research Council grant. PI.

2021–24 Building a Smart Mobility Network for the San Antonio Transit to Improve Transit Service and Social Impact (SmartSAT) ($299,897). National Science Foundation (NSF) research grant. Senior Personnel.

2022 Investigating NLP and ML Techniques for Developing a Secure and Privacy-Preserving Health-Centric ITS ($10,000). American Society for Engineering Education (ASEE) research grant. co-PI.

2021 Funds to Host Visiting Presenters($2,000). College of Arts and Sciences, Texas A&M University-San Antonio grant. co-PI.

2015–17 University of Houston Graduate Tuition Fellowship (approx. $2,1000)

2010–13 University of Houston Graduate Tuition Fellowship (approx. $2,4000)

Honors and Awards

2025 Invited Panelist on AI & Cyber, IEEE International Carnahan Conference on Security Technology (ICCST)

2025 Mentored Student Featured on TAMUSA University News

2025 TAMUSA Most Influential Mentor Award

2024 TAMUSA Award for Excellence in Securing Grants and External Funding

2024 CoAS Outstanding Faculty Award for Excellence in Scholarship

2023 TAMUSA Award for Excellence in Securing Grants and External Funding

2023 Research Project Featured on TAMUSA University News

2022 Invited Panelist for ASEE NSF Proposal Development Workshop

2013 University of Houston Honorable Award at Research Showcase

COURSES TAUGHT

Texas A&M University-San Antonio

Artificial Intelligence (UG/G)

Senior Project

Discrete Structures for Computing

Data Structures

Programming Fundamentals II

Computer Networks

Scripting Languages

Systems Analysis and Design

Management Information Systems

University of Houston

Computer Science & Programming - Lab

SERVICE

Conferences Organized

2022 The International Workshop on Real-time Cybersecurity Analysis in the Cloud (RTCAC). San Antonio, Texas. Sep 5–7.

Conference Sessions Chaired

2022 International Conference on Hybrid Intelligent Systems (HIS). Virtual, Dec 12–14.

2022 International Conference on Intelligent Systems Design and Applications (ISDA). Virtual, Dec 12–14.

Conference Peer Review

IEEE International Conference on Omni-layer Intelligent Systems

IEEE International Conference on Data Mining

IEEE International Conference on Advanced Information Networking and Applications

Service to the Field

Panelist, DoD National Defense Science and Engineering Graduate (NDSEG) Fellowship, 2024

Cyber Security Panelist, IEEE Aerospace and Electronic Systems Society, 2024–

Technical Program Committee, IEEE International Conference on Omni-layer Intelligent Systems, 2022–

Service to the University

TAMUSA IEEE Student Organization (faculty advisor), 2024–

CEMS Hiring Search Committee (chair), 2024

TAMUSA Student Research Symposium (faculty judge), 2024

CoAS Awards and Nomination Committee, 2023–24

CEMS Hiring Search Committees, 2023–24

Department of Counseling, Health, and Kinesiology Hiring Search Committee, 2023–24

TAMUSA IBM zSystems Chapter Machine Learning, AI and ChatGPT Panel (faculty panelist), 2023

TAMUSA Faculty Senate (senator), 2022–23

Hack the Port 22 (TAMUSA coach and facilitator), 2022

Department of Computing and Cybersecurity Hiring Search Committee, 2022

TAMUSA Jaguar Day (departmental representative), 2021-23

TAMU Aggies Invent - Cyber (faculty mentor), 2019

Service to the Community

John Jay Science & Engineering Academy Science and Engineering Fair (judge), 2021

Master Committees

Andrew Trombly, TAMUSA, dissertation committee

Jesse Guerrero, TAMUSA, dissertation committee

Students Mentored

Brian Kishiyama, TAMUSA, graduate

Andrew Trombly, TAMUSA, graduate

Jesse Guerrero, TAMUSA, graduate

Yuktha Priya Masupalli, TAMUSA, graduate

Jorge Munoz, TAMUSA, undergraduate

Rudy Ramos, TAMUSA, undergraduate

Jin Seo, TAMUSA, undergraduate

German Z. Villafuerte, TAMUSA, undergraduate

Joseph Almaznaai, TAMUSA, undergraduate

Francisco Vasquez, TAMUSA, undergraduate

Juan Quijano, TAMUSA, undergraduate

Jared Theis, TAMUSA, undergraduate

Yongyi Zhou, Rice University, undergraduate

Cristina Gomez, California State University Dominguez Hills, undergraduate

Daniel Burnett, Hendrix College, undergraduate

Jason Schwartzman, Binghamton University, undergraduate

Ethan Endres, Marshall University, undergraduate

Jerred Chen, Georgia Institute of Technology, undergraduate

Jonathan Lacanlale, California State University Northridge, undergraduate

Mai Nou Yang, University of Wisconsin Oshkosh, undergraduate

Camille Simon, Harvey Mudd College, undergraduate

Edward Hwang, Edward S. Marcus High School, high schooler

MEMBERSHIPS

Institute of Electrical and Electronics Engineers (IEEE)

IEEE Aerospace and Electronic Systems Society

IEEE Computer Society

IEEE Young Professional

Association for Computing Machinery (ACM)

CERTIFICATES AND CREDENTIALS

Creating and Maintaining Effective Research Teams, Computing Alliance of Hispanic-Serving Institutions (CAHSI)

Inclusive Teaching for Equitable Learning Certificate, ACUE and the American Council on Education

Deep Learning Specialization Certificate, DeepLearning.ai

Oracle Certified Professional, Java SE Programmer

PROFESSIONAL EMPLOYMENT

2013–15 Software Engineer, Baylor College of Medicine, Houston, Texas

Updated January 2026