

## RESEARCH INTERESTS

[Network security] [AI for security] My research focuses on network security and AI for security, particularly practical, AI-driven solutions for both enduring and emerging threats in Internet routing. I build real-world systems that integrate AI techniques with domain expertise to detect, analyze, and interpret routing security incidents with semantics-aware intelligence. I am also exploring the use of agentic AI with open-source intelligence for proactive and autonomous defenses.

## EDUCATION

**Ph.D. in Computer Science, Tsinghua University, Beijing, China** Sep. 2021 – Jun. 2026  
Thesis: *Defense Mechanisms for Internet Inter-domain Routing Anomalies*  
Co-advisors: Prof. Jianping Wu and Prof. Qi Li

**B.Eng. in Computer Science, Tsinghua University, Beijing, China** Sep. 2017 – Jun. 2021  
Thesis: *BGP Anomaly Detection Based on Network Representation Learning*  
Advisor: Prof. Qi Li

## PUBLICATIONS

### PEER-REVIEWED PAPERS

**Understanding the Stealthy BGP Hijacking Risk in the ROV Era** 2026

Yihao Chen, Qi Li, Ke Xu, Zhuotao Liu, Jianping Wu

To appear at the *Network and Distributed System Security Symposium 2026 (NDSS'26)*

**Research on Lightweight Consensus Mechanism based on Validated Address** 2025

Yi Xu, Yihao Chen, Xiaoliang Wang, Ke Xu, Qi Li

To appear at the *Journal of Software (ISSN 1000-9825; in Chinese)*

**Learning with Semantics: Towards a Semantics-Aware Routing Anomaly Detection System** 2024

Yihao Chen, Qilei Yin, Qi Li, Zhuotao Liu, Ke Xu, Yi Xu, Mingwei Xu, Ziqian Liu, Jianping Wu

In proceedings of the *33rd USENIX Security Symposium (Security'24)*

**DISTINGUISHED PAPER AWARD 🏆 and INTERNET DEFENSE PRIZE WINNER 🏆**

**Low-Quality Training Data Only? A Robust Framework for Detecting Encrypted Malicious Network Traffic** 2024

Yuqi Qing, Qilei Yin, Xinhao Deng, Yihao Chen, Zhuotao Liu, Kun Sun, Ke Xu, Jia Zhang, Qi Li

In proceedings of the *Network and Distributed System Security Symposium 2024 (NDSS'24)*

**Generic and Robust Root Cause Localization for Multi-Dimensional Data in Online Service Systems** 2023

Zeyan Li, Junjie Chen, Yihao Chen, Chengyang Luo, Yiwei Zhao, Yongqian Sun, Kaixin Sui, ..., Dan Pei

*Journal of Systems and Software* 203 (2023): 111748

**LogParse: Making Log Parsing Adaptive through Word Classification** 2020

Weibin Meng, Ying Liu, Federico Zaiter, Shenglin Zhang, Yihao Chen, Yuzhe Zhang, Yichen Zhu, ..., Dan Pei

In proceedings of the *29th International Conference on Computer Communications and Networks (ICCCN'20)*

**LogAnomaly: Unsupervised Detection of Sequential and Quantitative Anomalies in Unstructured Logs** 2019

Weibin Meng, Ying Liu, Yichen Zhu, Shenglin Zhang, Dan Pei, Yuqing Liu, Yihao Chen, ..., Rong Zhou

In proceedings of the *28th International Joint Conference on Artificial Intelligence (IJCAI'19)*

### PATENTS

**Method for Efficient Inter-Domain Routing Simulation Using Matrix Operations** 2025

Qi Li, Yihao Chen, Ke Xu, Zhuotao Liu, Jianping Wu

*Chinese patent application (submitted)*

**Method for Detecting Stealthy Inter-Domain Routing Hijacks Using Cross-Vantage-Point Analysis** 2025

Qi Li, Yihao Chen, Ke Xu, Zhuotao Liu, Jianping Wu

*Chinese patent application (submitted)*

**Inter-Domain Routing Anomaly Detection Method Based on Network Representation Learning** 2024

Qi Li, Yihao Chen, Qilei Yin, Ke Xu, Zhuotao Liu, Yi Xu, Mingwei Xu, Ziqian Liu, Jianping Wu

*Chinese patent application (CN118413373A), US patent application (US20250350631A1)*

### STANDARD PROPOSALS

**Risk of Stealthy BGP Hijacking under Incomplete Adoption of Route Origin Validation (ROV)** 2025

Qi Li, Yihao Chen, Ke Xu, Zhuotao Liu, Jianping Wu

*IETF Internet Draft (draft-li-sidrops-stealthy-hijacking, under review)*

RESEARCH EXPERIENCE

**Network & Information Security Lab, Tsinghua University** Sep. 2020 – present  
Student Researcher, co-advised by Prof. Jianping Wu and Prof. Qi Li.  
**Research keywords:** Internet routing security, AI for security, network measurement, anomaly detection, traffic analysis

- Led the development and deployment of a BGP routing anomaly detection system at China Telecom, based on a novel network representation learning model that captures intrinsic AS routing policies in a semantics-rich vector space.
- Led the first systematic study of the emerging stealthy BGP hijacking threat under partial ROV deployment, establishing an online monitoring service, the first real-world incident dataset, and a comprehensive risk assessment framework.
- Leading an ongoing study to build an AI agent framework that reasons over open-source intelligence to uncover hidden relationships when domain-specific data falls short, and to distinguish malicious attacks of interest from benign events.
- Contributed to design discussions and writing of a lightweight consensus framework tailored for network-layer security, and an encrypted malicious traffic detection framework designed to handle low-quality training data.

**NetMan Lab, Tsinghua University** Sep. 2018 – Aug. 2020  
Student Research Intern, advised by Prof. Dan Pei.  
**Research keywords:** AI for operations, root cause localization, anomaly detection, log analysis

- Contributed to the design improvement and experimental evaluation of a robust root cause localization approach for multi-dimensional data from online services, efficiently identifying both internal and external faults.
- Contributed to the experimental evaluation of a semantics-aware unsupervised log anomaly detection framework, and an adaptive log parsing system tailored for log compression.

INVITED TALKS

**Understanding the Stealthy BGP Hijacking Risk in the ROV Era**  
*The 60th Asia Pacific Network Information Center Conference (APNIC'60) in Da Nang, Vietnam* 2025

**Learning with Semantics: Towards a Semantics-Aware Routing Anomaly Detection System**  
*2025 Asia Pacific Regional Internet Conference on Operational Technologies (APRICOT'25) in Petaling Jaya, Malaysia* 2025  
*2025 International Forum for Security Research (InForSec'25) in Beijing, China* 2025  
*The 8th Westlake International Forum on Cyber Security Research in Hangzhou, China* 2025  
*2024 Annual Conference of Chinese Association for Cryptologic Research (ChinaCrypt'24) in Hangzhou, China* 2024

HONORS & AWARDS

**National Scholarship (Doctorate)**, Ministry of Education of the P.R. China 2025  
**Internet Defense Prize Winner (1/2276, top 0.04%)**, the 33rd USENIX Security Symposium 2024  
**Distinguished Paper Award (15/2276, top 0.7%)**, the 33rd USENIX Security Symposium 2024  
**Best Poster Award (1/52, top 1.9%)**, the 8th Westlake International Forum on Cyber Security Research 2024  
**Deng Feng Fund for International Conference Travel**, Tsinghua University 2024  
**Comprehensive Excellence Scholarship (First-Tier)**, Tsinghua University 2023, 2024  
**Outstanding Social Service Scholarship**, Tsinghua University 2023  
**Outstanding Graduate**, Department of Computer Science and Technology, Tsinghua University 2021  
**Tsinghua-Sohu R&D Scholarship**, Tsinghua University and Sohu, Inc. 2020

ACADEMIC SERVICES

**TEACHING ASSISTANT**

**Foundations and Frontiers of Cyberspace Security (74120023-0, Tsinghua)** Fall 2022, Fall 2023, Fall 2024, Fall 2025  
Core graduate-level CS course (~80 students)  
I redesigned grading guidelines beyond regular TA work

**Internet Architecture and Security Foundation (74120013-0, Tsinghua)** Fall 2023, Fall 2024, Fall 2025  
Graduate-level CS course (~20 students)  
I prepared and led one session on BGP routing security beyond regular TA work

**Next Generation Internet (00240112-90, Tsinghua)** Spring 2023, Spring 2024  
Undergraduate-level CS course (~15 students)  
I designed and led one lab session on network measurement beyond regular TA work

**PEER REVIEWER**

**Journal Reviewer:** IEEE TDSC

**External Reviewer:** USENIX Security 2022/2023, ISOC NDSS 2022/2023/2024/2025/2026, ACM CCS 2022/2023/2024/2025, ACM WWW 2025, IEEE ICNP 2025, ACM ASIACCS 2022/2024