

# Zhaohui Wang

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## RESEARCH INTERESTS

My research addresses critical security and privacy challenges across the computing stack, ranging from low-level hardware vulnerabilities to high-level application interactions. I tackle these systemic challenges by designing formal models, building systematic analysis frameworks, and creating practical defensive systems that enhance trust and reliability.

- **IoT Security & Privacy:** Physical and Digital Adversarial Attack Detection; Unintended Information Flow Prevention; Automated Policy and Automation Conflict Resolution
- **System & Hardware Security:** Hardware-Level Threat Analysis and Defense; Kernel-User Space Integrity Protection; Firmware Security Analysis and Hardening

## EDUCATION

- **University of Kansas** Lawrence, KS, USA  
Ph.D. candidate in Computer Science; Advisors: Prof. Fengjun Li & Prof. Bo Luo Aug. 2019 – Present
- **Harbin Institute of Technology** Harbin, Heilongjiang, P.R.China  
M.S. in Information and Communication Engineering; Advisors: Prof. Yubin Xu & Prof. Lin Ma Aug. 2013 – Jul. 2015
- **University of Electronic Science and Technology of China** Chengdu, Sichuan, P.R.China  
B.S. in Network Engineering Aug. 2008 – Jul. 2012

## PUBLICATIONS

- [1] **Zhaohui Wang**, Bo Luo, and Fengjun Li. InteractionShield: Harnessing Event Relations for Interaction Threat Detection and Resolution in Smart Homes. *(Accepted to appear in the Proceedings of ACSAC 2025)*.
- [2] **Zhaohui Wang**, Bo Luo, and Fengjun Li. PrivacyGuard: Exploring Hidden Cross-App Privacy Leakage Threats In IoT Apps. *Proceedings on Privacy Enhancing Technologies (PETS)*, 2025, 776-791.
- [3] Kevin Li, **Zhaohui Wang**, Ye Wang, Bo Luo, and Fengjun Li. Poster: Ethics of Computer Security and Privacy Research - Trends and Standards from a Data Perspective. *Proceedings of the 2023 ACM SIGSAC Conference on Computer and Communications Security (CCS)*, 2023, 3558-3560.
- [4] **Zhaohui Wang**, Bo Luo, and Fengjun Li. Poster: SmartAppZoo: a Repository of SmartThings Apps for IoT Benchmarking. *Proceedings of the 8th ACM/IEEE Conference on Internet of Things Design and Implementation (IoTDI)*, 2023, 448-449.
- [5] Xin Hao, Qiuyu Wu, **Zhaohui Wang**, Changxing Lin. Parallel Timing Synchronization Algorithm and Its Implementation in High Speed Wireless Communication Systems. *2019 International Conference on Electronics, Information, and Communication (ICEIC)*, 2019, 1-6.
- [6] Xin Hao, **Zhaohui Wang**, Qiuyu Wu, Changxing Lin. A refined phase estimation based parallel carrier recovery algorithm in high speed wireless communication systems. *2018 IEEE 18th International Conference on Communication Technology (ICCT)*, 2018, 732-735.
- [7] **Zhaohui Wang**, Xin Hao, Changxing Lin, Qiuyu Wu. An efficient hardware LDPC encoder based on partial parallel structure for CCSDS. *2018 IEEE 18th International Conference on Communication Technology (ICCT)*, 2018, 136-139.
- [8] Qiuyu Wu, Changxing Lin, Bin Lu, Li Miao, Xin Hao, **Zhaohui Wang**, Yi Jiang, Wenqiang Lei, Xianjing Den, Hongbin Chen, Jun Yao, Jian Zhan. A 21 km 5 Gbps real time wireless communication system at 0.14 THz. *2017 42nd International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz)*, 2017, 1-2.

## TEACHING EXPERIENCE

- **University of Kansas** Lawrence, KS, USA  
Teaching Assistant
  - EECS 330: Data Structures and Algorithms Fall 2025
  - EECS 569: Computer Forensics Fall 2024
  - EECS 565: Introduction to Information and Computer Security Fall 2023, Fall 2024
  - EECS 447: Introduction to Database Systems Spring 2024

## PROFESSIONAL EXPERIENCE

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### • University of Kansas

Research Assistant

Lawrence, KS, USA

May. 2019 – Present

#### – Rowhammer-based Memory Attacks and Defenses

- \* Implemented a tool to reverse-engineer DRAM address mappings across diverse CPU microarchitectures
- \* Exploited page-table walks to perform rowhammer attacks, enabling controlled bit-flips for privilege escalation
- \* Conducting research on kernel-level program exploitation, exploring cross-privilege boundary vulnerabilities

#### – Rule Conflicts Detection and Resolution

- \* Developed a comprehensive framework leveraging logic reasoning to detect and resolve rule conflicts
- \* Formalized event relationships and systematically identified event interferences to categorize rule conflicts
- \* Employed model checking and SMT solving techniques to identify potential rule conflicts
- \* Implemented a genetic algorithm-based method to resolve detected rule conflicts efficiently
- \* Provided a GUI integrating real-world environmental factors and physical constraints

#### – Privacy Leakage Detection

- \* Identified a novel cross-app privacy leakage risk in IoT apps and conducted a systematic study on inference threats
- \* Formalized cross-app chaining problems and defined trigger-condition-action relations to model interactions between apps
- \* Inferred device profiles based on usage context, ensuring accurate modeling for devices with varying sensitivity levels
- \* Quantified privacy inference probabilities to assess both direct exposure and implicit inference risks
- \* Developed a GUI to provide users with visual insights into privacy risks and enable better decision-making

#### – Large-Scale Real-World IoT App Dataset

- \* Collected and cleaned a large-scale dataset of real-world open-source IoT apps from diverse sources
- \* Filtered out invalid apps using regular-expression matching and symbolic execution techniques
- \* Eliminated identical and near-duplicate apps by computing fuzzy hashes and applying clustering algorithms

### • Normalyze, Inc.

Security Engineer Intern

Software Engineer Intern

Los Altos, CA, USA

May. 2022 – Aug. 2022

May. 2021 – Aug. 2021

#### – Intelligent Document Analytics and Scalable Cloud Deployment

- \* Developed and implemented a document clustering system to automatically group similar documents
- \* Designed and built a document classification pipeline for assigning documents to predefined categories
- \* Devised algorithms to detect structural and semantic similarities among databases and tables
- \* Deployed real-time prediction and clustering modules on AWS, enabling scalable data processing
- \* Built and maintained database operations and REST APIs with comprehensive automated tests
- \* Optimized Dockerfiles to containerize services and streamline CI/CD for reliable deployments

### • Microsystem & Terahertz Research Center

Assistant Research Scientist

Chengdu, Sichuan, P.R.China

Jul. 2015 – Jul. 2019

#### – High-Throughput LDPC Encoder and Decoder

- \* Proposed a fully parallel LDPC encoder based on the Richardson–Urbanke method for high-throughput coding
- \* Designed novel partially parallel LDPC decode algorithms optimized for performance and hardware efficiency
- \* Implemented LDPC encoders on Xilinx Virtex-7 FPGAs, achieving >10 Gbps via pipelined recursive coding
- \* Developed an LDPC decoder with LUT-based layered decoding, sustaining 5 Gbps throughput

## PRESENTATIONS

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- InteractionShield: Harnessing Event Relations for Interaction Threat Detection and Resolution in Smart Homes, 18th Central Area Networking and Security Workshop (CANSec), Oct. 25, 2025, University of Missouri, Kansas City, MO, USA
- PrivacyGuard: Exploring Hidden Cross-App Privacy Leakage Threats In IoT Apps, 25th Privacy Enhancing Technologies Symposium (PETS), Jul. 15, 2025, George Washington University, Washington, DC, USA
- SmartAppZoo: a Repository of SmartThings Apps for IoT Benchmarking, I2S Student Organization (ISO) Meeting, Nov. 3, 2023, University of Kansas, Lawrence, KS, USA

## SERVICE AND ACTIVITIES

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### • Paper Review

#### – Journal Reviewer

- \* Journal of Computer Security (JCS)
- \* IEEE Transactions on Dependable and Secure Computing (TDSC)

#### – External Reviewer

- \* 2023 53rd Annual IEEE IFIP International Conference on Dependable Systems and Networks (DSN)
- \* 2022 52nd Annual IEEE IFIP International Conference on Dependable Systems and Networks (DSN)
- \* 2022 IEEE International Conference on Trust, Security and Privacy in Computing and Communications (TrustCom)

### • Community Service

- Session Moderator, EAI SecureComm 2022, Oct. 17-19, 2022, Kansas City, MO, USA
- Assistant Coach, National Collegiate Cyber Defense Competition, Feb. 11, 2022, Lawrence, KS, USA

### • Competitions

- Top 10%, roles: Web/Crypto/RE/Forensics/AI-Misc, Roo CTF 2025, Oct. 24-25, 2025, Kansas City, MO, USA
- Second Prize, Chinese Mathematics Competition, Oct. 24, 2009, Chengdu, Sichuan, P.R.China

## HONORS AND AWARDS

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| • ACSAC Student Conferenceship Award<br><i>Applied Computer Security Associates, National Science Foundation</i> | Oct. 2025            |
| • Graduate Student Travel Fund Award<br><i>University of Kansas</i>  | Oct. 2025            |
| • CANSec Travel Grant Award<br><i>Central Area Networking and Security Workshop, National Science Foundation</i> | Oct. 2022, Oct. 2025 |
| • Graduate Engineering Association Award<br><i>University of Kansas</i>  | Jul. 2025            |
| • David D. and Mildred H. Robb Award<br><i>University of Kansas</i>  | Jun. 2025            |
| • First-Class Academic Scholarship<br><i>Harbin Institute of Technology</i>                                      | Oct. 2013, Oct. 2014 |
| • Outstanding Undergraduate Award<br><i>University of Electronic Science and Technology of China</i>             | Jul. 2012            |
| • National Encouragement Scholarship<br><i>University of Electronic Science and Technology of China</i>          | Sep. 2009, Sep. 2011 |
| • MediaTek First-Class Scholarship<br><i>University of Electronic Science and Technology of China</i>            | Sep. 2010            |

## SKILLS

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- **Programming:** Python, C, C++, Java, SQL, Go, Assembly, Shell, MATLAB, R, Lua, Nix, Groovy, Javascript, Verilog, VHDL
- **Tools:** AWS, BeautifulSoup, Docker, Git,  $\text{\LaTeX}$ , Matplotlib, NumPy, NuSMV, Pandas, PyTorch, scikit-learn, SciPy, Seaborn, Selenium, spaCy, SPIN, SymPy, TikZ, Z3

## REFERENCES

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|---|---|
| • <b>Prof. Fengjun Li (Advisor)</b><br>fli@ku.edu | <i>University of Kansas</i><br>Deane E. Ackers Professor        |
| • <b>Prof. Bo Luo (Co-advisor)</b><br>bluo@ku.edu | <i>University of Kansas</i><br>H.J. and Joan O. Wertz Professor |
| • <b>Dr. Yang Zhang</b><br>yangzhang.cs@gmail.com | <i>Cyberhaven</i><br>Senior Director of Engineering             |