Zhaohui Wang

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Research Interest

My research focuses on **IoT Security & Privacy** and **System Security**. I study cross-app privacy leakage and rule conflicts in IoT platforms, developing formal models, reasoning frameworks, and user-facing tools for risk detection and mitigation. On the system side, I investigate rowhammer-based memory attacks and Linux kernel vulnerabilities, focusing on kernel level exploitation techniques and the analysis of cross-privilege boundary attacks.

Education

- **University of Kansas** — *Lawrence, Kansas, United States*
  Ph.D. candidate in Computer Science, *Advisor: 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, *advisor: Prof. Yubin Xu* — 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, Kansas, United States*
  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 2024
  - EECS 447: Introduction to Database Systems — Spring 2024
  - EECS 565: Introduction to Information and Computer Security — Fall 2023

Professional Experience

- **University of Kansas** *Lawrence, Kansas, United States*
  Research Assistant 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.** *Los Altos, California, United States*
  Security Engineer Intern May. 2022 – Aug. 2022
  Software Engineer Intern May. 2021 – Aug. 2021
  - **Intelligent Document Analytics and Scalable Cloud Deployment**
    - Developed and implemented a clustering system to group similar documents into distinct clusters
    - Designed and built a document classification system to assign documents to predefined categories
    - Created methods to identify structurally and semantically similar databases or tables
    - Deployed real-time prediction and clustering modules integrated with AWS for scalable data processing
    - Implemented database operations using Javascript and Python, with PostgreSQL as the backend database
    - Wrote automated unit tests for functions and REST APIs using Javascript and Python
    - Composed and optimized Dockerfiles to containerize and streamline system deployment

- **Microsystem & Terahertz Research Center** *Chengdu, Sichuan, P.R.China*
  Electronic Engineer 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.

Service and Activity

- **Presentations**
  - PrivacyGuard: Exploring Hidden Cross-App Privacy Leakage Threats In IoT Apps, 25th Privacy Enhancing Technologies Symposium (PETS), Jul. 15, 2025, Washington, DC, United States
- **External Paper Review**
  - 2023 53nd 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)
- **Volunteer**
  - Session Moderator, EAI SecureComm 2022, Oct. 17-19, 2022, Kansas City, MO, United States
  - Competition Observer, National Collegiate Cyber Defense Competition, Feb. 11, 2022, Lawrence, KS, United States

Honors and Awards

- **University of Kansas** *Lawrence, Kansas, United States*
  - Graduate Student Travel Fund Award — Oct. 2025
  - Graduate Engineering Association Award — Jul. 2025
  - David D. and Mildred H. Robb Award — Jun. 2025
  - CANSec Travel Grant Award — Oct. 2022
- **Harbin Institute of Technology** *Harbin, Heilongjiang, P.R.China*
  - Third-Class Academic Scholarship — Oct. 2014
  - First-Class Academic Scholarship — Oct. 2013
- **University of Electronic Science and Technology of China** *Chengdu, Sichuan, P.R.China*
  - Outstanding Undergraduate Award — Jul. 2012
  - National Encouragement scholarship — Sep. 2011
  - MediaTek First-Class Scholarship — Sep. 2010
  - Second Prize in Chinese Mathematics Competition — Oct. 2009
  - National Encouragement scholarship — Sep. 2009

Skills

Programming: Python, Java, C, C++, SQL, Assembly, Shell, MATLAB, R, Lua, Nix, Groovy, Javascript, Go, Verilog, VHDL
Tools: AWS, BeautifulSoup, Docker, Git, LaTeX, Matplotlib, NumPy, Pandas, PyTorch, scikit-learn, SciPy, Seaborn, Selenium, spaCy, SymPy, Ti*k*Z

References

Fengjun Li (Advisor): fli@ku.edu — *Deane E. Ackers Professor, University of Kansas*
Bo Luo (Co-advisor): bluo@ku.edu — *H.J. and Joan O. Wertz Professor, University of Kansas*
Yang Zhang: yangzhang.cs@gmail.com — *Senior Director of Engineering, Cyberhaven*