

# YICHENG ZHANG

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## EDUCATION

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**Ph.D candidate in Electrical Engineering** | University of California, Riverside 09/2021 - present  
**M.S. in Computer Engineering** | University of California, Irvine 09/2018 - 06/2021  
**B.S. in Electrical Engineering and Automation** | Sichuan University 09/2014 - 06/2018

## WORK EXPERIENCE

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**Associate Instructor** | University of California, Riverside 06/2024 - 09/2024  
*Lecturing for upper-division undergraduate class CS 153 - Design of Operating Systems*

**Research Intern** | Pacific Northwest National Laboratory 06/2023 - 09/2023  
*Research on micro-architecture security in multi-GPU systems (NVLink)*

## RESEARCH AREA

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**Hardware Security; AR/VR Security; Side-channel Attacks; Machine Learning**

## TECHNICAL SKILLS

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**Programming Languages & Software:** C++, Python, CUDA, TensorFlow, MATLAB, PyTorch, Verilog, Xilinx Vivado, Unity, Unreal Engine

**Selected Courses:** Autonomous Cyber-Physical Systems (A+), GPU Architecture & Parallel Programming (A), Advanced Operating Systems (A), Pattern Recognition (A), Advanced Computer Vision (A), Advanced System Security (A), Machine Learning & Artificial Intelligence (A)

## SELECTED PROJECTS (GOOGLE SCHOLAR)

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**Research Assistant** | [University of California, Riverside, Riverside, CA](#) 09/2021 - present  
*Acoustic injection attacks targeting IMU sensors in AR/VR systems ([under review in Oakland'25](#))*

- Revealed the vulnerability of accelerometers and gyroscopes to resonant frequencies, allowing attackers to manipulate IMU outputs and mislead AR/VR user experiences.
- Demonstrated acoustic injection attacks that target IMU sensors in AR/VR systems, significantly impacting SLAM performance and device accuracy.

*Attacking Linux file system via system call `Syncfs` ([under review in Oakland'25](#))*

- Reverse-engineered the system call `syncfs` and identified how it leaks victim's I/O operations.
- Conducted fingerprinting attacks that classify websites, videos, and apps accessed by the victim, achieving high accuracy in both closed and open-world scenarios on Linux and Android.

*Attacking NVIDIA GPUs using RFM Rowhammer Mitigation ([under review in Usenix Security'25](#))*

- Reverse-engineered the RFM operation and identified opportunities for timing leakage.
- Demonstrated a series of RFM leakage-based covert channel and side-channel attacks on NVIDIA GPUs.

*Shared State Attacks in Multi-User Augmented Reality Applications ([Usenix Security'24](#))*

- Demonstrated a series of innovative and robust attacks on multiple AR frameworks with shared states, focusing on three publicly accessible frameworks from Meta and Google.
- Proposed several potential mitigation strategies that help enhance the security of multi-user AR applications.

*AR/VR typing inference using head motion tracking ([Usenix Security'23](#))*

- Developed a system named **TyPose** that autonomously deduces words and characters typed by users from their head motion sensor data.
- Collected tens of user traces depicting AR/VR typing behavior and conducted a thorough evaluation of our attack on these traces, achieving a high level of accuracy.

*Side-channel attacks on AR/VR systems via Rendering Performance Counters ([Usenix Security'23](#))*

- Introduced a taxonomy outlining potential targets and sources of leakage for software-based side-channel attacks on AR/VR systems.

- Demonstrated five end-to-end side-channel attacks across three distinct AR/VR-specific attack scenarios, achieving a high degree of accuracy.

**Research Intern** | Pacific Northwest National Laboratory, Richland, WA

06/2023 - 09/2023

*Covert and Side Channel Attacks on NVIDIA's NVLink* ([SEED'24](#), under review in [ISCA'25](#))

- Reverse-engineered timing and performance counters of NVIDIA Multi-GPU's NVLink interconnect.
- Performed covert and side-channel attacks on the NVIDIA DGX system and Google Compute Platform.

*Accuracy-Constrained Efficiency Optimization for Detecting Drainage Crossing* ([SC Workshop'23](#))

- Demonstrated the efficacy of resource-aware Neural Architecture Search (NAS) in refining the hyperparameters of SPP-Net, leading to significant enhancements in inference efficiency.
- Performed comprehensive profiling of the drainage crossing detection models on GPU systems, pinpointing the performance bottlenecks unique to single GPU configurations.

**Research Assistant** | University of California, Irvine, Irvine, CA

08/2018 - 06/2021

*Remote Side-Channel Attack on FPGA to Steal Neural Network Structure* ([IEEE TIFS'21](#), [FPGA'21](#))

- Developed a novel ring oscillator (RO)-based remote power attack on FPGAs to steal machine learning models.
- Employed a range of classifiers to effectively recover the hyperparameters of the victim model from side-channel leakages.

*DNN Model Stealing Attack via GPU Context-Switching Side-Channel* ([DSN'20](#))

- Developed a novel GPU side-channel based on context-switching penalties.
- Implemented LSTM-based inference models to identify the structural secrets of a group of CNN models.

## PRESENTATIONS AND TALKS

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- "Beyond the Bridge: Contention-Based Covert and Side Channel Attacks on Multi-GPU Interconnect" at IEEE SEED 2024, Orlando, Florida, USA, May, 2024
- "Accuracy-Constrained Efficiency Optimization and GPU Profiling of CNN Inference for Detecting Drainage Crossing Locations" at SC'23 Workshop, Denver, CO, USA, November, 2023
- "It's all in your head(set): side-channel attacks on augmented reality systems" at USENIX Security'23, Anaheim, CA, USA, August, 2023
- "Poster: Stealing Neural Network Structure through Remote FPGA Side-channel Analysis" at FPGA'21, virtual, February 2021
- "Leaky DNN: Stealing Deep-Learning Model Secret with GPU Context-Switching Side-Channel" at DSN'20, virtual, June 2020

## MEDIA COVERAGE

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*Side channel attacks on AR/VR headset via rendering performance counters*

- Reported by [UCR News](#), [ZME Science](#), [Tech Xplore](#), [Analytics Insight](#), [Gillett News](#), 2023

*AR/VR keylogging from user head motions*

- Reported by [UCR News](#), [Fagen Wasanni](#), [Analytics Insight](#), [Game Is Hard](#), [Knowridge](#), [Inside](#), 2023

## TEACHING EXPERIENCE

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*Associate Instructor at University of California, Riverside*

- Design of Operating Systems (CS 153) – [Syllabus](#)

Summer 2024

*Teaching Assistant at University of California, Irvine*

- Organization of Digital Computers (EECS 112)
- Next Generation Search Systems (CS 125)
- Object Oriented System & Programming (EECS 40)
- System Software (EECS 111)
- Continuous-Time Signals and Systems (EECS 150)

Spring 2021

Winter 2021

Fall 2020

Spring 2020

Winter 2019

## HONORS AND AWARDS

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- International Peer Educator Training Program Certification (IPTPC) Level 1 2023
- Student Travel Grant for IEEE Symposium on Security and Privacy 2021,2022
- Student Travel Grant for ACM Conference on Computer and Communications Security 2021
- Student Travel Grant for USENIX Security Symposium 2021
- Dean's Distinguished Fellowship Award (UC Riverside) 2021
- Sichuan University Scholarship (China) 2014–2018