

## Education

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<b>University of California, Riverside</b> Ph.D in Electrical Engineering, GPA: 3.71/4.00 – Advisors: Prof. Nael Abu-Ghazaleh	Riverside, CA 2021.9–Current
<b>University of California, Irvine</b> M.S. in Computer Engineering, GPA: 3.78/4.00 – Thesis: “Stealing Deep Learning Model Secret through Remote FPGA Side-channel Analysis”	Irvine, CA 2018.9–2021.6
<b>Sichuan University</b> B.S. in Electrical Engineering and Automation, GPA: 3.53/4.00 – Thesis: “Fault detection in power transmission system using Machine Learning”	Chengdu, China 2014.9–2018.6

## Professional Experience

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<b>University of California, Riverside</b> Research Assistant in Secure and Efficient Architectures and Systems (SEAS) Lab – AR/VR Security, Computer Architecture Support for Security. – I worked with my advisor Prof. Nael B. Abu-Ghazaleh on research topics including security in AR/VR systems and side-channel attack & defense on computer architecture	Riverside, CA 2021.9–Current
<b>University of California, Riverside</b> Graduate Student Mentor in UCR Graduate Student Mentorship Program (GMSP) – I worked with Prof. Philip Brisk to help first-year graduate students transition from undergraduate programs or careers into graduate study.	Riverside, CA 2022.9–Current
<b>University of California, Irvine</b> Teaching Assistant in Department of Electrical Engineering and Computer Science – Assisted course instructors in course website design, grading, and lecturing	Irvine, CA 2018.9–2021.6

## Peer-reviewed Publications

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### Conference Papers

1. Carter Slocum, **Yicheng Zhang**, Jiasi Chen, Nael B. Abu-Ghazaleh, “Going through the motions: AR/VR keylogging from user head motions”, *In Proceedings of the 32nd USENIX Security Symposium (USENIX Security)*, Anaheim, CA, USA, August, 2023.
2. **Yicheng Zhang**, Carter Slocum, Jiasi Chen, Nael B. Abu-Ghazaleh, “It’s all in your head(set): side-channel attacks on augmented reality systems”, *In Proceedings of the 32nd USENIX Security Symposium (USENIX Security)*, Anaheim, CA, USA, August, 2023.
3. Wei Junyi\*, **Yicheng Zhang**\*, Zhe Zhou, Zhou Li, and Mohammad Abdullah Al Faruque, “Leaky DNN: Stealing Deep-Learning Model Secret with GPU Context-Switching Side-Channel”, *In 2020 50th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN)*, Valencia, Spain, June, 2020.

\*Junyi Wei and Yicheng Zhang are both first author.

## Journal Articles

1. **Yicheng Zhang**, Rozhin Yasaei, Hao Chen, Zhou Li and Mohammad Abdullah Al Faruque, “Stealing Neural Network Structure through Remote FPGA Side-channel Analysis”, *In IEEE Transactions on Information Forensics and Security (TIFS)*, August, 2021.

## Posters

1. **Yicheng Zhang**, Rozhin Yasaei, Hao Chen, Zhou Li and Mohammad Abdullah Al Faruque, “Poster : Stealing Neural Network Structure through Remote FPGA Side-channel Analysis”, *In 29th ACM/SIGDA International Symposium on Field-Programmable Gate Arrays (FPGA)*, February, 2021.

## Teaching Experience

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<b>Teaching Assistant</b> at University of California, Irvine <i>Organization of Digital Computers (EECS112)</i>	Spring 2021
<b>Teaching Assistant</b> at University of California, Irvine <i>Next Generation Search Systems (CS125)</i>	Winter 2021
<b>Teaching Assistant</b> at University of California, Irvine <i>Object Oriented System &amp; Programming (EECS40)</i>	Fall 2020
<b>Teaching Assistant</b> at University of California, Irvine <i>Sytem Software (EECS111)</i>	Spring 2020
<b>Teaching Assistant</b> at University of California, Irvine <i>Continuous-Time Signals and Systems (EECS150)</i>	Winter 2019

## Presentations and Talks

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1. “Poster: Stealing Neural Network Structure through Remote FPGA Side-channel Analysis” at FPGA’21, virtual, February 2021
2. “Leaky DNN: Stealing Deep-Learning Model Secret with GPU Context-Switching Side-Channel” at DSN’20, virtual, June 2020

## Skills

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- **Programming:** C/C++, Python, Java, Verilog/System Verilog, TensorFlow, PyTorch, Linux (Bash), Assembly
- **Tools:** Altera Quartus, Xilinx Vivado/ISE, Vivado HLS, Jupyter Notebook
- **Softwares:** Matlab, Arduino, Unity, Unreal Engine, Android Studio

## Professional Service

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- Reviewer for ICPS’ 20, CYBER’ 21, CYBER’ 22, IEEE TIFS, IEEE TC, IJACT, SCN
- Artifact Evaluation for Micro’ 22

## Research Projects

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### AR/VR typing inference using head motion tracking

- Developed a system, **TyPose**, that automatically infers words and characters typed by a user, including a Segmenter to divide a stream of sensor readings into the corresponding words/characters and a Classifier to infer the text corresponding to those segments.

- Collected user traces of AR/VR typing behavior and evaluated our attack on these traces. The results show that **TyPose** can detect segments and identify words with high accuracy.
- The related paper was accepted in Usenix Security 2023.

### **Side-channel attacks on Mixed Reality systems via Rendering Performance Counters**

- Presented a taxonomy of the potential targets and leakage sources of software-based side-channel attacks on AR/VR devices and applications.
- Demonstrated five end-to-end side-channel attacks that illustrate three types of targets: Inferring (1) user interactions (hand gesture inputs, voice commands, and virtual keyboard inputs); (2) information about concurrent applications (fingerprinting newly launched applications); and (3) information about the environment (detecting and ranging a person in the environment).
- The related paper was accepted by Usenix Security 2023 (First author).

### **Remote Side-Channel Attack on FPGA to Steal Neural Network Structure**

- Developed a novel FPGA power side-channel-based attack on Machine learning models.
- Used NearestNeighbors, GradientBoosting, DecisionTree, RandomForest, NeuralNetwork, NaiveBayes, AdaBoost, and XGB classifiers to recover hyper-parameters of victim model from side-channel signals.
- The related paper was accepted by FPGA 2021 and IEEE TIFS (First author).

### **Machine Learning Model Stealing Attacks via GPU Context-Switching Side-Channel**

- Developed a novel GPU side-channel based on context-switching penalties.
- Implementation of LSTM-based inference model to identify the structural secret of VGG16, ZFNET, AlexNet and MLP.
- The related paper was accepted by IEEE DSN 2020 (First author).

## **Academic Supervision and Mentorship**

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### **Undergraduate Students**

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|---------------------------|--------------------------|
| • Clarity Shimoniak       | UCR CSE, 2023–Current    |
| • Cheng Gu                | UCR CSE, 2022–Current    |
| • Xuchang Zhan            | UCI EECS, 2019-2020      |
| • Kendus Tisdale-Jeffries | Alabama A&M, 2019 summer |

### **Graduate Students**

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|--------------------------------|-----------------------|
| • Sriraksha Srirangapatna Arun | UCR CSE, 2023–Current |
| • Yuxin Qiu                    | UCR CSE, 2023–Current |
| • Ziyang Men                   | UCR CSE, 2023–Current |

## **Honors and Awards**

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| • International Peer Educator Training Program Certification (IPTPC)              | 2023      |
| • UCR GSA Conference Travel Grant   | 2023      |
| • Student Travel Grant for gem5 Boot Camp   | 2022      |
| • 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 |

## Volunteering, Diversity & Inclusion

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- **Mentor** at UCR Graduate Student Mentorship Program (GSMP) 2022-2023
- **Mentor** at UCR International Student Peer Mentor Program (ISPMP) 2022-2023
- **Mentor** domestic and international undergraduate students in UCI 2019-2020
- **Volunteer** at 120th Anniversary of Sichuan University 2016.9