

# QIFAN ZHANG

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## EDUCATION

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### University of California, Irvine

Sept 2020 - Jul 2025 (expected)

Ph.D. candidate in Computer Engineering

**Advisor:** Prof. Zhou Li

Department of EECS, the Henry Samueli School of Engineering

### ShanghaiTech University

Aug 2016 - Jul 2020

B.E. in Computer Science and Technology

Minor in Innovation and Entrepreneurship

## RESEARCH INTERESTS

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**Domain Name System (DNS).** I'm interested in security, privacy and reliability of DNS. My past research covered protocol security [Security'23][NDSS'23], and automated vulnerability detection with fuzzing techniques. I have also surveyed DNS operational issues by mining, labelling and classifying main-stream public DNS forums [IEEE Access'22].

**Machine Learning for Security.** I'm also interested in solving security and privacy issues via machine-learning based methods. Recently, my research demonstrates model extraction on Autonomous Vehicle using Gradient-Descent based methods [ACSAC'22].

## PUBLICATIONS

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### Conference Papers

- **Qifan Zhang**, Junjie Shen, Zhe Zhou, Zhou Li, Haipeng Zhang. *Play the Imitation Game: Model Extraction Attack against Autonomous Driving Localization*. Accepted by The 38th Annual Computer Security Applications Conference (**ACSAC**), 2022.
  - Achieve cm-level precision with 40-second driving data.
  - **Skills involved:** model establishment and training on PyTorch, Optimization, Baidu Apollo, Autonomous Driving controller algorithms.
- Xiang Li, Chaoyi Lu, Baojun Liu, **Qifan Zhang**, Zhou Li, Haixin Duan and Qi Li. *The Maginot Line: Attacking the Boundary of DNS Caching Protection*. Accepted by the 32nd USENIX Security Symposium (**Security**), 2023.
  - **Vulnerability acknowledged** by CVE-2021-25220 (BIND 9), CVE-2021-43105 (Technitium), CVE-2022-32983 (Knot Resolver).
  - Awarded \$1,000 by Microsoft Security Response Center.
  - **Skills involved:** Network environment settings on Virtual Machine, debugging via GDB and CLion, Python Scapy, Code analysis on DNS software.
- Xiang Li, Baojun Liu, Xuesong Bai, Mingming Zhang, **Qifan Zhang**, Zhou Li, Haixin Duan and Qi Li. *Ghost Domain Reloaded: Vulnerable Links in Domain Name Delegation and Revocation*. Accepted by the 30th Annual Network and Distributed System Security Symposium (**NDSS**), 2023.
  - **Vulnerability acknowledged** by CVE-2022-30250, CVE-2022-30251 (Knot Resolver), CVE-2022-30252 (PowerDNS Recursor), CVE-2022-30254 (Simple DNS Plus), CVE-2022-30256 (MaraDNS), CVE-2022-30257, CVE-2022-30258 (Technitium), CVE-2022-30698, CVE-2022-30699 (Unbound)

- **Skills involved:** Network scanning and measurement, Network environment settings on Docker, Python Scapy, Code analysis on DNS software.

## Journal Papers

- Xiaoran Liao, Jiachen Xu, **Qifan Zhang**, Zhou Li. *A Comprehensive Study of DNS Operational Issues by Mining DNS Forums*. Accepted by IEEE Access, 2022.
  - **Skills involved:** Data mining on DNS forums, DNS ticket labelling and classification.

## PROJECTS

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### Find DNS Vulnerabilities via Fuzzing

May 2022 - Feb 2023

In this project, we first summarized *Common Vulnerabilities and Exposures* (CVEs) of popular DNS software, such as BIND, Unbound, Knot, etc. Based on our observation from the CVE study, we implemented a DNS fuzzer using *Probabilistic Context-Free Grammar* (PCFG) and byte-level mutation. Then, we performed constrained stateful fuzzing by focusing on the short query-response sequence. We found new vulnerabilities, such as *MaginotDNS* [Security'23]. This project is now under review.

**Skills involved:** CVE reading and summary, Grammar-based fuzzing, Network environment settings on Docker, Python Scapy, Code analysis on DNS software, Cloudflare API, concurrent programming.

### Cardiac Ablation Aiding System

Dec 2018 - Sept 2019

**Instructor:** Prof. Zhihao Jiang (ShanghaiTech University, Shanghai, China)

This project aims at extracting features of different kinds of cardiac arrhythmias, especially tachycardias and proposed a way that transfers electric signs into a graph to determine possible tachycardias. It will also instruct doctors which place of heart to be detected next, which could be used to aid doctors in cardiac ablation operation. The final model is stimulated on Matlab and Stimulink.

**Skills involved:** Matlab/Stimulink, unit test, code coverage, software validation.

### Line-Based 3D Panorama

May 2019 - Jun 2019

Build a 3D panorama with LSD, line merging and line tracking. We use feature matching, seven-point algorithm and scale propagation to calculate relative pose estimation.

**Skills involved:** OpenCV, line merging, pose calculation, bundle adjustment.

## SERVICES

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### External Reviewers

- NDSS: 2023, 2022, 2021
- AsiaCCS: 2022, 2021

## TECHNICAL SKILLS

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### Programming Language Software & Tools

Python, Java, C/C++, Rust  
Matlab/Simulink, VMware Workstation Player, Docker,  
Cloudflare API, OpenCV, CLion, GDB

## TEACHING

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### Teaching Assistant

University of California, Irvine

- EECS 40 (F22): Objected Oriented System and Programming (#students: 95)

### Teaching Assistant

Pennsylvania State University

*Penn State First program, cooperated with CIEE Shanghai*

- MATH 110 (F20): Techniques of Calculus I (Section 5-7) (#students: 57)

### Teaching Assistant

ShanghaiTech University

- SI 100C (F17): Introduction to Computer Science and Technology (#students: 127)
- CS 100 (F18): Programming (#students: 243)
- CS 277 (F19): Introduction to Data Science and FinTech (#students: 23)
- (core TA) SI 100B (S18, S19, S20): Introduction to Information Science and Technology (#students: 203/174/410)

## **STUDENTS ADVISED**

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### **University of California, Irvine**

#### *Graduate Student Advisor*

- Shenghan Zheng (Senior undergraduate at ShanghaiTech University), UCInspire, 2022.
- Wenhao Zhang (B.S. at SUSTech), UCInspire, 2021. now a Ph.D. student at Northwestern University.
- Xiaoran Liao (B.S. at UC Irvine), 2021.

## **HONORS**

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### **University of California, Irvine**

- Associated Graduate Students Conference Stipend (Winter 2022)
- 2022 ACSAC Student Conferenceship
- Student travel grant for NDSS (2021)
- Student travel grant for USENIX Security (2021)
- Student travel grant for IEEE Symposium on Security and Privacy (2021)
- Henry Samueli Endowed Fellowship (2020-2021)

### **ShanghaiTech University**

- 2020 ShanghaiTech Outstanding Graduate
- SIST Outstanding Teaching Assistant (2020, 2019, 2018)
- Merit Student (2018-2019, 2017-2018, 2016-2017)
- Outstanding Personnel in 2017 Summer Camp