YIZHUO ZHAI

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EDUCATION

Xidian University *Xi'an, Shaanxi Province, P.R. China (Sept 2012 - June 2016)*

BS in Software Engineering GPA: 3.82/4.0, 91/100 (ranked 1st)
University of Limerick (Study Abroad) *Ireland (Sept 2015 - June 2016)*

University of California Riverside *Riverside, CA (Sept 2016 - Present)*

PhD candidate Co-advised by Srikanth V. Krishnamurthy and Zhiyun Qian
Computer Science Overall GPA: 3.92/4.00 Expected Grad: 2021

WORK EXPERIENCE

Research Internship @ Baidu X-Lab June 2020 - September 2020
Security Team (host: Shengjian Guo)

· Kernel fuzzing, Apollo Code Review

Research Assistant @UCR September 2016 - Current
Seclab

· Doing system security and static analysis
· Published/co-authored papers accepted by or submitted to top-tier venues

PUBLICATION

UBITect: A Precise and Scalable Method to Detect Use-before-Initialization bugs in Linux Kernel
Yizhuo Zhai, Yu Hao, Hang Zhang, Daimeng Wang, Chengyu Song, Zhiyun Qian, Mohsen Lesani, Srikanth V. Krishnamurthy, and Paul Yu
In Proceedings of the 2020 ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE'20)

SELECTED PROJECTS

IncAnalyzer Sept 2019 - Current
Research Project

· A framework to enable **incremental analysis** across different versions of the software.
· The analysis is applied to LLVM IR and aims to report bugs in a short time after the software release.
· Reducing the analysis time for large scale software and observe the lifetime of a bug.

UBITECT Sept 2016 - Aug 2019
Research Project

· Created a two-phase **program analysis tool** detecting use-before-initialization (UBI) bugs scaling to the whole **Linux kernel** in LLVM IR level.
· UBITect first uses field-, flow-, context-sensitive analysis to generate potential warnings, then use **symbolic execution** to further reduce false positives.
· UBITECT successfully finds 138 new UBI bugs while 52 are confirmed by Linux maintainers.
· Paper accepted by ESEC/FSE 2020 (Conference Website: `https://2020.esec-fse.org`)

LLVMCookBook April 2019 - Aug 2019

· Established a llvm front end for the self-defined language in LLVMCookBook, registered new optimization passes in IR level.
· Refer, update and test the code in the book to be compatible with LLVM 7.0.0.
· Became more familiar with LLVM. While further understood how compiler front end, optimizer and back end works. (Github:`https://github.com/YizhuoZhai/LLVMCookBook`)

Cat Classifier June 2019
Deep Learning Project

- Applied **Logistic Regression**, **Two-layer Neural Networks** and **L-layer Neural Networks** to classify the cat vs. non-cat.
- Reach an accuracy of 80% by using L-layer Neural Networks.

Router Malware Clustering Sept 2017 - Dec 2017
Data Mining Class Project

- Clustering different kinds of router malware based on their execution trace.
- Two distinguished features are: the system call times and the memory usage over time, **dynamic time wrapping** is used to deal with the second feature.
- Eight clusters are calculated via the algorithm.

CTF Style Binary Exploits Jan 2017 - Mar 2017
Security Lab

- The lab required student to understand both offensive techniques (e.g., how exploit works) and the defensive techniques (e.g., how to patch a vulnerability).
- Topics included stack overflow, heap overflow, format string, return oriented programming, etc. (Schedule:`https://www.cs.ucr.edu/~csong/seclab/17/cal.html`)
- Solved 80/100 challenges within 10 weeks.

TowelRoot Sept 2016 - Dec 2016
OS Class Project

- Fully understand CVE-2014-3153 and can utilize it to compromise an Android device.
- CVE-2014-3153 shows some flaw when using Linux data structure. The logic is hard to understand while the proof of concept (PoC) is non-trivial.
- Get the root privilege of an Android device within 1 minutes.

Voter Oct 2013 - Nov 2013
Science Society Project

- An Android app which creates a vote and visualizing the voting result.
- This is a project of the college science society, students work in group to come up with their own ideas and build an Android app within one month.
- Successfully implement the Voter using Java and demostrate it in the final meeting.
- Github:`https://github.com/brotherroot/Voter` (Contributor: aiweiyangxiao)

TECHNICAL STRENGTHS

Computer Languages(In order of strength):	C++, C, Java, Python, Swift, Shell Script
Software & Tools	LLVM, Linux, Clang, Hadoop

SELECTED VOLUNTEER WORK

UCR MESA Sept 2017 - Current

I currently work as a volunteer for the UCR MESA (https://mesa.engr.ucr.edu) events. I mainly help with the middle school and high school technique competitions.

- 6/2018 GEMS(Girls Excelling in Mathematics and Succeeding) events: Student Organizer
- 3/2018 2018 Seaperch Competition: Runner
- 2/2018 MESA Day: Judge for High School NEDC (National Engineering Design Competition)
- 11/2017 MESA Robotics Invitational: High School Judge

SELECTED CLASSES

System:	Advanced OS, Program Verification, Advanced Compiler Construction, Computer Security
AI:	Machine Learning, Data Mining, Artificial Intelligence, Probablistic Module of AI

NOTABLE AWARDS

05/2019 IEEE SSP Student Travel Grant
06/2016 President's Volunteer Award (Bronze)
10/2014 National Scholarship
10/2014 Special Scholarship by college
03/2013 Special Scholarship by college
09/2016 Dean's Distinguished Fellowship
04/2015 First Prize Scholarship by college
03/2013 Special Scholarship by college
10/2013 First Prize Scholarship by college