# 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: June 2021

## TECHNICAL STRENGTHS

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

## 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 under submission of CCS 2020 (Conference Website: `https://www.sigsac.org/ccs/CCS2020/`)

**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.

## 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

09/2016 Dean's Distinguished Fellowship
06/2016 President's Volunteer Award (Bronze)
04/2015 First Prize Scholarship by college
10/2014 National Scholarship
10/2014 Special Scholarship by college
10/2013 First Prize Scholarship by college
03/2013 Special Scholarship by college
05/2014 Third Prize in the 12th "Huawei Cup" Programming Competition