

# TAO LYU (吕涛)

My previous name is TAO LV.

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## EDUCATION

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**University of Chinese Academy of Sciences**, Beijing, China ..... September 2018 - June 2021  
M.S. in Cyber Security, Institute of Information Engineering ..... GPA: 3.83/4.00  
Advisor: Kai Chen.

**Huazhong University of Science and Technology**, Wuhan, China ..... September 2014 - June 2018  
B.E. in Information Security, School of Computer of Science and Technology ..... GPA: 87.93/100.00

## RESEARCH INTERESTS

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I am broadly interested in operating systems, software engineering and computer security at all layers (e.g., software, system and hardware security). Recently, I focus on vulnerability discovery, including fuzzing and static analysis.

## PUBLICATIONS

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- [1] **RTFM! Automatic Assumption Discovery and Verification Derivation from Library Document for API Misuse Detection.** Tao Lv, Ruishi Li, Yi Yang, Kai Chen, Xiaojing Liao, XiaoFeng Wang, Peiwei Hu and Luyi Xing. In *Proceedings of the ACM Conference on Computer and Communications Security (CCS)*, November, 2020.  
This research utilizes sentimental analysis to recover APIs' integration assumptions (IAs) from documentation and translates them to verification code for a compliance check on the softwares integrating these IAs. We implemented this design and evaluated it on 5 popular libraries (OpenSSL, SQLite, libpcap, libdbus and libxml2) and 39 real-world applications. 193 API misuses were detected at the end.
- [2] **FuzzGuard: Filtering out Unreachable Inputs in Directed Grey-box Fuzzing through Deep Learning** Peiyuan Zong, Tao Lv, Dawei Wang, Zizhuang Deng, Ruigang Liang and Kai Chen. In *Proceedings of the USENIX Security Symposium (Security)*, August, 2020.  
To predict the reachability of testcases before executing, helping directed grey-box fuzzing filtering the unreachable ones to boost the performance of fuzzing, we propose step-forwarding and representative data selection approach to solve the challenge: lacking of balanced, labeled and representative data. Evaluations on 45 real vulnerabilities show that our approach boosts the efficiency of the state-of-the-art AFLGo up to 17x.

## PROJECT EXPERIENCES

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**Software Clone Detection** ..... September 2018 - December 2018

- Implement the CFG-3D clone detection methods on the Windows and Linux platform.
- Run on hundreds of softwares to construct a feature database.
- Contribute 2K+ lines of C/C++ code.

**Malware's Behaviors Display Based on the Analysis of Continuous Dumped Memory** . April 2017 - July 2017

- Run malwares in Qemu and then dump the memory continuously.
- Extract process information from the dumped memory through the tool Volatility.
- Display the information through D3.js webpages.

## INTERNSHIP EXPERIENCES

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**NSFOCUS**, Xi'an, China ..... July 2018 - August 2018

- Security Service Engineer: vulnerability exploit training for China Mobile and China Unicom.

## PROFESSIONAL SKILLS

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**Vulnerability discovery:** Proficient in fuzzing and static analysis (e.g., CodeQL).

**Program analysis techniques:** Taint analysis, symbolic execution, software reversing and writing LLVM Pass.

**Natural language processing:** Preliminary in sentiment analysis, dependency parsing, word embedding, Part-of-speech tagging and shallow parsing.

**Programming language:** Proficient in C, Python and x86\_64 assembly language.

## HONORS AND AWARDS

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<b>National Scholarship</b> , China Ministry of Education (Top 2%, 10/500)	2020
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<b>Merit Student</b> , University of Chinese Academy of Sciences (Top 15%, 76/500)	2020
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<b>Outstanding Graduates</b> , Huazhong University of Science and Technology	2018
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<b>Merit Student</b> , Huazhong University of Science and Technology (Top 3%, 1/30)	2017
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<b>First Class Prize</b> , The 10th National College Student Information Security Contest (15%, 38/246)	2017
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## REPORTED BUGS

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**Tcpreplay:** Heap Overflow

**Apache:** Information Leakage

**VTK:** NULL Dereference

**PoDoFo:** CVE-2019-10723, Stack Overflow, NULL Dereference, Segmentation Fault, Infinite Loop

## LANGUAGE PROFICIENCY

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**GRE: 320 + 3.0** (Verbal: 155/170; Quantitative: 165/170; Analytical Writing: 3.0/6.0).

## REFERRERS

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### Dr. Kai Chen (Master Advisor)

Professor of Cyber Security  
Chinese Academy of Sciences

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### Dr. Luyi Xing (Publication Co-advisor)

Assistant Professor of Computer Science  
Indiana University Bloomington

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### Dr. Xiaojing Liao (Publication Co-advisor)

Assistant Professor of Computer Science  
Indiana University Bloomington

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### Dr. Guozhu Meng

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