Yankai Jiang

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EDUCATION

Northeastern University   Boston, MA
Ph.D in Computer Engineering, Advisor: Prof. Devesh Tiwari   *Jul. 2023 – Present*
Northwestern University   Evanston, IL
Master of Science in Computer Engineering   *Sept. 2021 – Jun. 2023*
Xi'an Jiaotong University   Xi'an, China
Bachelor of Engineering in Automation (Youth Program, equivalent to Honors Program)   *Aug. 2016 – Jun. 2020*

EXPERIENCE

Research Assistant   Evanston, IL
PSEC Lab - Northwestern University   *Mar. 2022 – Oct. 2022*
- Advisors: Prof. Xinyu Xing, Northwestern University; Prof. Yueqi Chen, University of Colorado Boulder.
- Reproduced 100+ vulnerabilities in QEMU based on proof-of-concepts (PoC) generated from Syzkaller.
- Identified vulnerable objects manually with GDB, compared with the results generated from static analysis tool.
- Found allocation sites, free sites and allocation API & Flag of specific vulnerable objects.
- *"HotBPF: Nip Kernel Heap-based Exploitation in the Bud"*, submit to CCS 2023.

Research Assistant   Evanston, IL
Prescience Lab - Northwestern University   *Mar. 2022 – Jun. 2023*
- Advisors: Prof. Peter Dinda, Northwestern University.
- Customized runtime libraries and dependence of Parallel Standard ML language (Maple) in the Nautilus kernel.
- Ported Maple to an aerokernel (Nautilus), made Maple generated code compatible with Nautilus kernel.
- Implemented serilization & deserilization support in Maple, and executed MPI-Maple benchmark for evaluation.
- Run NAS-MPL benchmark to test the variation of performance of Maple codebase.

Research Assistant   Xi'an, China
Control Theory and Control Engineering Research Institute - Xi'an Jiaotong University   *Feb. 2020 – Aug. 2020*
- Advisors: Prof. Qingyu Yang, Xi'an Jiaotong University; Prof. Dou An, Xi'an Jiaotong University.
- Bachelor's thesis: *"Research on Privacy Protection Mechanism of Electric Energy Transaction via Blockchain"*.
- Researched on cross-domain privacy protection via blockchain based on undergraduate thesis.
- Deployed a distributed computer system and simulated transaction processes via blockchain.

Research Intern   Singapore
National Cybersecurity R&D Laboratories - National University of Singapore   *Jul. 2019 – Aug. 2019*
- Advisor: Prof. Ee-Chien Chang, National University of Singapore.
- Simulated Address Resolution Protocol (ARP) attacks in Oracle VM VirtualBox to display security of system.
- Implemented distributed system and SPLUNK platform to simulate ARP attacks for NUS teaching; created 10,000 Linux sessions for system evaluation.
- Designed two attacking scenarios to exploit vulnerability CVE-2017-7494, CVE-2019-12735, CVE-2019-13272.
- Participated in a paper work: *WATSON: Abstracting Behaviors from Audit Logs via Aggregation of Contextual Semantic"(NDSS 2021).*

Research Assistant   Xi'an, China
Laboratory of Intelligent Network and Network Security - Xi'an Jiaotong University   *May 2018 – Apr. 2019*
- Advisors: Prof. Pinghui Wang, Xi'an Jiaotong University; Dr. Jing Tao, Xi'an Jiaotong University.
- Created a system for retrieving Packet Capture (PCAP) and conducted software correlation analysis.
- Developed scripts to enable unattended installation for quick system restoration in virtual environments.
- Obtained isolated PCAP in virtual machines with Sniffer (packet analyzer) and Monkey (monkey testing tool).
- Applied Random Walks Algorithm on Directed Graph and analyzed software similarity from PCAP data.

PUBLICATIONS

HotBPF: On-demand Isolation of Vulnerable Kernel Objects Before Patches are Available
*ACM Conference on Computer and Communications Security (**CCS**) in submission 2023*

Teaching

CS340 Introduction to Computer Networks	Peer Mentor, Northwestern University, Fall 2022
CS340 Introduction to Computer Networks	Peer Mentor, Northwestern University, Winter 2023

Course Projects

Supervised Part-of-Speech Tagging based on Hidden Markov Model (HMM) and Viterbi Algorithm
- Used HMM and Viterbi algorithm to conduct supervised training, and achieved 0.966 prediction accuracy.
- Ranked 1st among 45 students in the Machine Learning (MATH525207) course project.

Single Voice Recognition System
- Extracted Mel Frequency Cepstrum Coefficient (MFCC) features with Python from 500 people's voice data.
- Used Dynamic Time Warping (DTW) to classify MFCC features with accuracy of 84.32%, compared to accuracy of machine learning algorithms: KNN (60.13%), CART (58.33%), Bayes (74.21%), and RNN (95.23%).
- Achieved an accuracy of 95.23% based on the voice input of number 0 through 9 in Chinese.

Technical Skills

Programming: Python, C++/C, C#, Java; SQL; MATLAB; Verilog, VHDL; LaTeX, Markdown
OS: Windows, Linux, MacOS
Tools: QEMU, GDB, SPSS, LabVIEW, IDA, Altium Designer