

Zheng Yu

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EDUCATION

Northwestern University

Ph.D. Candidate in Computer Science (Advisor: Prof. Xinyu Xing)

Chicago, IL, USA

Sep 2022 – Expected March 2026

University of Waterloo

Visiting Graduate Researcher

Waterloo, ON, Canada

Jun 2025 – Sep 2025

Shanghai Jiao Tong University

Bachelor of Science in Computer Science | ACM Honors Program

Shanghai, China

Sep 2018 – Jun 2022

CORE COMPETENCIES

High-Impact Open-Source Leadership

5,000+ Combined GitHub Stars | Industry & Government Recognition

- **Project Leadership:** Created [GPT-Fuzzer \(500+ stars\)](#), an LLM robustness testing framework integrated into Microsoft Azure's PyRIT security toolkit. Developed [PatchAgent \(100+ stars\)](#), an AI-powered automated program repair system that achieved DARPA AIXCC finalist status among 50+ international teams.
- **Core Maintainer Contributions:** Served as core developer for [Qiling Framework \(5,000+ stars\)](#), implementing hardware emulation modules. Contributed security patches and performance improvements to critical infrastructure projects including Linux Kernel, PHP interpreter, Assimp, GPAC, and Yasm assembler.
- **Competitive Programming Excellence:** [Silver medalist at China National Olympiad in Informatics \(NOI 2017\)](#), ranking top 100 among 10,000+ participants nationwide. Leveraged algorithmic expertise as Teaching Assistant for competitive programming and data structures courses at Shanghai Jiao Tong University.
- **Full-Stack Engineering:** Architected and deployed end-to-end systems across the technology stack. Expert proficiency in front-end technologies (JavaScript, React, CSS), back-end development (C/C++, Python, Java, Go, Rust), and cloud-native infrastructure (Docker, Kubernetes, CI/CD pipelines) for production-grade applications.

Pioneering Agentic System Design for Security Purpose

IEEE S&P & USENIX Security Publications | DARPA AIXCC Finalist

- **Patch Backporting Agent:** First-authored [PortGPT](#), an LLM-based agent system for automated backporting with hierarchical workflow design to mitigate hallucination and context limitations. Published at IEEE S&P 2026 and backported 9 Linux kernel patches from mainline to stable versions, garnering coverage by tech media.
- **Automated Vulnerability Repair:** First-authored [PatchAgent](#) with innovative middleware layer between LLM and execution environment, enabling enhanced tool utilization. Accepted at USENIX Security 2025 and repaired 10 real-world CVEs across open-source projects including Pcapplusplus, libredwg, Assimp, libssh2, and HDF5.
- **End-to-End DARPA AIXCC System:** Core team member of 42-b3yond-6ug at DARPA AIXCC, architecting [BugBuster](#)—an LLM-powered system for automated vulnerability discovery and repair. Advanced to finalist position among 50+ international teams.

Deep Expertise in Low-Level Security & Systems

50+ CVE Discoveries | Compiler-Based Defenses | Highly-Cited AI Security Research

- **Compiler & Kernel Security:** First-authored [ShadowBound](#) and co-authored [CAMP](#) for userspace and kernel hardening, both published at USENIX Security. Implemented custom LLVM optimization passes, showing mastery of compiler and low-level memory management across privilege boundaries.
- **Vulnerability & Exploit Study:** Discovered [50+ CVEs](#) across userspace applications and the Linux kernel through systematic security analysis. [Top 5 finalist at DEFCON CTF Finals \(2022-2023\)](#) with team StrawHat, showcasing deep understanding of binary exploitation and defense mechanisms.
- **AI Security Research Impact:** Co-authored [GPT-Fuzzer](#) (published as LLM-Fuzzer at USENIX Security 2024), which has become a foundational work in LLM jailbreak assessment. The framework was integrated into Microsoft Azure's PyRIT security toolkit.

PUBLICATIONS

** denotes equal contribution*

Patch Validation in Automated Vulnerability Repair

Zheng Yu, Wenxuan Shi, Xinqian Sun, Zheyun Feng, Meng Xu, Xinyu Xing

(In Submission) ACM Conference on Computer and Communications Security (CCS) 2026

pPatch: Automated Vulnerability Unpatching

Tianyi Jing, Pengyu Ding, Meng Xu, Yinhao Hu, **Zheng Yu**, Dongliang Mu
(In Submission) ACM International Conference on the Foundations of Software Engineering (FSE) 2026

PortGPT: Towards Automated Backporting Using Large Language Models

Zheng Yu*, Zhaoyang Li*, Jingyi Song, Meng Xu, Yuxuan Luo, Dongliang Mu
IEEE Symposium on Security and Privacy (S&P) 2026

PatchAgent: A Practical Program Repair Agent Mimicking Human Expertise

Zheng Yu, Ziyi Guo, Yuhang Wu, Jiahao Yu, Meng Xu, Dongliang Mu, Yan Chen, Xinyu Xing
USENIX Security Symposium 2025

ShadowBound: Efficient Heap Memory Protection Through Advanced Metadata Management and Customized Compiler Optimization

Zheng Yu, Ganxiang Yang, Xinyu Xing
USENIX Security Symposium 2024

LLM-Fuzzer: Scaling Assessment of Large Language Model Jailbreaks

Jiahao Yu, Xingwei Lin, **Zheng Yu**, Xinyu Xing
USENIX Security Symposium 2024

CAMP: Compiler and Allocator-based Heap Memory Protection

Zhenpeng Lin, **Zheng Yu**, Ziyi Guo, Simone Campanoni, Peter Dinda, Xinyu Xing
USENIX Security Symposium 2024

FIRST: Exploiting the Multi-Dimensional Attributes of Functions for Power-Aware Serverless Computing

Lu Zhang, Chao Li, Xinkai Wang, Weiqi Feng, **Zheng Yu**, Quan Chen, Jingwen Leng, Minyi Guo, Pu Yang, Shang Yue
IEEE International Parallel and Distributed Processing Symposium (IPDPS) 2023

TEACHING EXPERIENCE

Operating Systems (COMP_SCI 343)

Graduate Teaching Assistant, Northwestern University

Sep 2025 – Dec 2025

Instructor: Dr. Branden Ghena

Introduction to Computer Security (COMP_SCI 350)

Graduate Teaching Assistant, Northwestern University

Sep 2024 – Dec 2024

Instructor: Prof. Xinyu Xing

Programming Design and Data Structures (CS151)

Undergraduate Teaching Assistant, Shanghai Jiao Tong University

Jun 2019 – Sep 2019

Instructor: Prof. Huiyu Weng

PROFESSIONAL EXPERIENCE

Google Summer of Code (Part-time)

Project Mentor – Qiling Framework

Remote

Apr 2022 – Oct 2022

- Mentored international contributors on MCU emulation and firmware analysis implementations.
- Guided development of RISC-V and Cortex-M architecture support for the Qiling emulation framework.

JD.COM, Inc.

Security Engineer – Application Security Team

Beijing, China

Jun 2021 – May 2022

- Conducted vulnerability research and security assessments for large-scale e-commerce infrastructure.
- Developed automated security testing tools and contributed to internal security training programs.

Shanghai Jiao Tong University

Infrastructure Engineer – Information and Network Center

Shanghai, China

Sep 2019 – May 2021

- Maintained and optimized university-wide computing infrastructure serving 40,000+ users.
- Implemented monitoring solutions and performance improvements for critical campus systems.

SELECTED PROJECTS

PortGPT | LLM-based Automated Patch Backporting

[\[GitHub\]](#)

- Engineered an LLM-powered system for automatically backporting security patches across software versions, addressing a critical challenge in software maintenance that traditionally requires significant manual expert effort.
- Implemented novel prompt engineering techniques and validation mechanisms to ensure backport correctness.

PatchAgent | AI-Powered Program Repair System

[\[GitHub\]](#)

- Built an intelligent program repair agent that mimics human debugging workflows using large language models, achieving state-of-the-art performance on standard benchmarks and recognition as a DARPA AIXCC finalist.
- Designed multi-stage repair pipeline incorporating static analysis, dynamic testing, and iterative refinement.

- ShadowBound** | *Compiler-Based Memory Safety* [\[GitHub\]](#)
- Developed novel heap memory protection mechanism using advanced metadata management and LLVM-based compiler optimizations, achieving significant performance improvements over existing solutions.
 - Implemented custom LLVM passes for fine-grained memory instrumentation with minimal runtime overhead.
- GPT-Fuzzer** | *LLM Security Testing Framework* [\[GitHub\]](#)
- Created scalable fuzzing infrastructure for evaluating LLM safety properties and jailbreak resistance, now integrated into Microsoft Azure's PyRIT security toolkit used by enterprise customers worldwide.
 - Pioneered template-based generation techniques for systematic exploration of prompt injection vulnerabilities.
- Qiling Framework** | *Advanced Binary Emulation* [\[GitHub\]](#)
- Core contributor to multi-platform binary emulation framework with 5,000+ GitHub stars. Implemented comprehensive MCU emulation module supporting STM32, GigaDevice, and SiFive microcontrollers across ARM Cortex-M and RISC-V architectures.
 - Extended firmware analysis capabilities and integrated AFL fuzzing support for embedded systems testing.
- Pymx Compiler** | *Educational Compiler Infrastructure* [\[GitHub\]](#)
- Designed and implemented a complete compiler for Java-like language targeting RISC-V architecture, featuring lexical analysis, parsing, semantic analysis, optimization passes, and code generation to RV32IM assembly.
- RISC-V CPU Implementation** | *Hardware Design* [\[GitHub\]](#)
- Architected RISC-V processor in Verilog HDL implementing Tomasulo algorithm for out-of-order execution, with instruction cache, load buffer, and branch prediction for enhanced performance on FPGA platforms.

HONORS & AWARDS

CSAW Applied Research Competition Finalist / Runner-up in Technical Impact Award <i>NYU Tandon School of Engineering – PatchAgent Project</i>	2025
USENIX Security Student Grant Recipient <i>USENIX Association</i>	2024, 2025
DARPA AIXCC Advanced Finals <i>Top Finalist – Team 42-b3yond-6ug</i>	2024
ACM CCS Student Grant Recipient <i>ACM SIGSAC Conference on Computer and Communications Security</i>	2024
DEFCON CTF Finals – 5th Place <i>Team StrawHat (7th Place in 2022)</i>	2023
Outstanding Graduate Award <i>Shanghai Jiao Tong University</i>	2022
Zhiyuan Honor Scholarship <i>Shanghai Jiao Tong University (Top 2% annually)</i>	2018–2021
China National Olympiad in Informatics – Silver Medal <i>China Computer Federation (CCF) – Top 100 Nationally</i>	2017

CONFERENCE PRESENTATIONS

Reversing MCU with Firmware Emulation <i>BlackHat Europe</i>	Dec 2022 <i>London, UK</i>
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ACADEMIC SERVICE

Program Committee Member

AI/ML/SE Conferences

- LLM4Code Workshop, co-located with ICSE – 2026
- International Conference on Learning Representations (ICLR) – 2025, 2026
- Conference on Neural Information Processing Systems (NeurIPS) – 2024, 2025
- International Conference on Machine Learning (ICML) – 2025
- Artificial Intelligence and Statistics (AISTATS) – 2025
- AAAI Undergraduate Consortium (AAAI-UC) – 2025

Artifact Evaluation Committee Member

Security & Systems Conferences

- ACM Conference on Computer and Communications Security (CCS) – 2023, 2024, 2025

- USENIX Security Symposium – 2024, 2025
- Network and Distributed System Security Symposium (NDSS) – 2025
- USENIX Annual Technical Conference (ATC) – 2024
- Operating Systems Design and Implementation (OSDI) – 2024
- International Symposium on Software Testing and Analysis (ISSTA) – 2024

Peer Reviewer

Academic Journals

- IEEE Transactions on Dependable and Secure Computing (TDSC)
- PeerJ Computer Science

TECHNICAL SKILLS

Programming Languages: C/C++ (Expert), Python (Expert), Rust, Java, JavaScript/TypeScript, Go, OCaml, Verilog HDL

Security & Binary Analysis: IDA Pro, Ghidra, Angr, Unicorn Engine, Qiling Framework, Binary Ninja, GDB

AI/ML Frameworks: PyTorch, LangChain, Transformers, OpenAI API, Anthropic API

Systems & Compilers: LLVM/Clang, GCC, Linux Kernel Development, QEMU, Unicorn

Development Tools: Git, Docker, Kubernetes, CI/CD (GitHub Actions, Jenkins), Vivado, VSCode, Emacs

Databases & Infrastructure: MySQL, PostgreSQL, Redis, Apache Spark, Elasticsearch

Languages: English (Fluent), Chinese (Native)