

Zheng Yu

zheng.yu@northwestern.edu | +1 312-520-5936

EDUCATION

Northwestern University	Chicago, IL, USA
<i>Ph.D. Candidate in Computer Science (Advisor: Prof. Xinyu Xing)</i>	<i>Sep 2022 – Expected March 2026</i>
University of Waterloo	Waterloo, ON, Canada
<i>Visiting Graduate Researcher</i>	<i>Jun 2025 – Sep 2025</i>
Shanghai Jiao Tong University	Shanghai, China
<i>Bachelor of Science in Computer Science ACM Honors Program</i>	<i>Sep 2018 – Jun 2022</i>

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

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

CONFERENCE PRESENTATIONS

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

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)