# Chenyuan Yang

cy54@illinois.edu | yangchenyuan.github.io

# **Research Interest**

My research focuses on enhancing the *reliability* of software systems, such as machine learning models, compilers, and operating system kernels. To achieve this, I employ a combination of *testing*, *analysis*, and *verification* techniques, with a particular emphasis on leveraging the power of *large language models* (LLMs).

To date, my work has uncovered over **400** previously unknown bugs in widely-used machine learning systems, including PyTorch, TensorFlow, JAX, as well as 9 CVEs for the Linux kernel.

# Education

University of Illinois at Urbana-Champaign			
Ph.D. Student in Computer Science, advised by Prof. Lingming Zhang			

# Nanjing University

B.Sc. in Computer Science and Technology, graduated with honors

- Enrolled in *Elite Class*, GPA 91.2/100, rank 1/24

# PUBLICATION

# AutoVerus: Automated Proof Generation for Rust Code *Preprint 2024*.

Chenyuan Yang, Xuheng Li, Md Rakib Hossain Misu, Jianan Yao, Weidong Cui, Yeyun Gong, Chris Hawblitzel, Shuvendu Lahiri, Jacob R. Lorch, Shuai Lu, Fan Yang, Ziqiao Zhou, Shan Lu. [paper] [website]

# TestEval: Benchmarking Large Language Models for Test Case Generation *Preprint 2024*.

Wenhan Wang<sup>\*</sup>, <u>Chenyuan Yang</u><sup>\*</sup>, Zhijie Wang<sup>\*</sup>, Yuheng Huang, Zhaoyang Chu, Da Song, Lingming Zhang, An Ran Chen, Lei Ma. [paper] [code]

# KernelGPT: Enhanced Kernel Fuzzing via Large Language Models

#### Preprint 2023.

Chenyuan Yang, Zijie Zhao, Lingming Zhang. [paper] [code]

# WhiteFox: White-box Compiler Fuzzing Empowered by Large Language Models

Object-Oriented Programming, Systems, Languages, and Applications 2024 (in PACM PL) (OOPSLA) 2024.

Chenyuan Yang, Yinlin Deng, Runyu Lu, Jiayi Yao, Jiawei Liu, Reyhaneh Jabbarvand, Lingming Zhang. [paper] [code]

# Large Language Models are Edge-Case Generators: Crafting Unusual Programs for Fuzzing Deep Learning Libraries

46th IEEE/ACM International Conference on Software Engineering (ICSE) 2024. Yinlin Deng, Chunqiu Steven Xia, Chenyuan Yang, Shizhuo Dylan Zhang, Shujing Yang, Lingming Zhang. [paper]

# Large Language Models are Zero-Shot Fuzzers: Fuzzing Deep-Learning Libraries via Large Language Models

32nd ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA) 2023. Yinlin Deng, Chunqiu Steven Xia, Haoran Peng, Chenyuan Yang, Lingming Zhang. [paper] [code]

# Fuzzing Automatic Differentiation in Deep-Learning Libraries

45th IEEE/ACM International Conference on Software Engineering (ICSE) 2023. Chenyuan Yang, Yinlin Deng, Jiayi Yao, Yuxing Tu, Hanchi Li, Lingming Zhang. [paper] [code]

# Fuzzing Deep-Learning Libraries via Automated Relational API Inference

30th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE) 2022.

Yinlin Deng\*, Chenyuan Yang\*, Anjiang Wei, Lingming Zhang. [paper] [code]

Aug. 2022 - Present IL, US

Sept. 2018 - Jul. 2022 Nanjing, China Free Lunch for Testing: Fuzzing Deep-Learning Libraries from Open Source 44th IEEE/ACM International Conference on Software Engineering (ICSE) 2022. Anjiang Wei, Yinlin Deng, Chenyuan Yang, Lingming Zhang. [paper] [code]

\* denotes joint first authors

# PROFESSIONAL EXPERIENCE

Research Intern at Systems Research Group, Microsoft Research Hosted by Shan Lu Topic: AutoVerus – Automated Proof Generation for Rust Code	May. 2024 - August 2024
<b>SWE Intern at Project Starline, Google</b> Hosted by Srinivas Kaza and Lukas Murmann Topic: JAXGL – Integrate High Performance Graphics Primitives into ML	May. 2023 - August 2023
Research Assistant at PL/FM/SE Group, UIUC Advised by Prof. Lingming Zhang Topic: Fuzzing DL libraries	May. 2021 - Present
Research Assistant at SPAR Group, Nanjing University Advised by Prof. Yanyan Jiang Topic: Testing	Aug. 2020 - Apr. 2021

AWARDS

SIGSOFT CAPS Travel Grant for ESEC/FSE 2022	Sept. 2022
China National Scholarship   Top 0.2%	Oct. 2020
Special Scholarship for Undergraduates in Basic Science, Nanjing University   $1/24$	Nov. 2021
Elite Program First-class Scholarship, Nanjing University	Oct. 2019
Talks	
<ul><li>Fuzzing Automatic Differentiation in Deep-Learning Libraries</li><li>Advanced Software Technologies Lab, ETH Zurich</li></ul>	May 2023
<ul> <li>Fuzzing Deep-Learning Libraries via Automated Relational API Inference</li> <li>Software Engineering Retreat, University of Illinois at Urbana-Champaign</li> </ul>	Sept. 2022
Free Lunch for Testing: Fuzzing Deep-Learning Libraries from Open Source • iSE symposium, Nanjing University	May 2022
TEACHING EXPERIENCE	
<b>Teaching Assistant at Nanjing University</b> Problem Solving, a core course for the students in the elite program	Sept. 2021 - Jul. 2022
Skill Stack	

• Common: Python, C, TypeScript, docker, Vim, Git, SQL,  ${\rm IAT}_{\rm E}{\rm X},$  libFuzzer

• Machine Learning: PyTorch, TensorFlow, JAX