

# Jianan Yao

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## EDUCATION

- Columbia University** New York, NY, USA  
Ph.D. in Computer Science 09/2019 – 06/2024  
Thesis title: Automated Verification of Safety and Liveness Properties for Distributed Protocols.  
Advisor: Prof. Ronghui Gu.
- Columbia University** New York, NY, USA  
M.S. in Computer Science 09/2019 – 02/2021
- Tsinghua University** Beijing, China  
B.Eng. in Computer Science and Technology 09/2015 – 07/2019

## RESEARCH INTERESTS

- Programming languages, distributed systems, and machine learning, with a focus on automating formal verification for systems software

## EMPLOYMENT

- The Edward S. Rogers Sr. Department of Electrical and Computer Engineering 07/2025-Present  
University of Toronto  
*Tenure-track Assistant Professor*
- Automated Reasoning Group, Amazon Web Services 06/2024-06/2025  
*Applied Scientist*

## RESEARCH EXPERIENCE

- Software Systems Laboratory, Columbia University 08/2019-06/2024  
*Graduate Research assistant, Advisor: Prof. Ronghui Gu*
- Microsoft Research. Redmond, WA, USA. 06/2023-08/2023  
*Research Intern. Mentors: Ziqiao Zhou, Weiteng Chen, Weidong Cui.*
- Meta Platforms. Menlo Park, CA, USA. 05/2022-08/2022  
*Research Intern. Supervisors: Junkil Park, David Dill, Shaz Qadeer.*
- CertiK. New York, NY, USA. 05/2021-08/2021  
*Software Engineering Intern. Supervisors: Xinyuan Sun, Zhaozhong Ni.*
- Language Technologies Institute, Carnegie Mellon University 07/2018-09/2018  
*Summer intern student. Advisor: Prof. Alexander G. Hauptmann*
- Knowledge Engineering Group, Tsinghua University 04/2017-06/2018  
*Research assistant. Advisor: Prof. Jie Tang*

## AWARDS & HONORS

- OSDI 2021 Jay Lepreau Best Paper Award 2021
- Outstanding Graduate, Tsinghua University 2019

## PUBLICATIONS

### Journal Articles

- **Mostly Automated Verification of Liveness Properties for Distributed Protocols with Ranking Functions.** [\[paper\]](#) [\[code\]](#)  
Jianan Yao, Runzhou Tao, Ronghui Gu, and Jason Nieh.  
*Proceedings of the ACM on Programming Languages (PACMPL)*, 8, **POPL**. 2024.
- **SciviK: A Versatile Framework for Specifying and Verifying Smart Contracts.** [\[paper\]](#)  
Shaokai Lin, Xinyuan Sun, Jianan Yao, and Ronghui Gu.  
[Invited paper] *Memorial Volume for Shoucheng Zhang, World Scientific*. 2021.

### Refereed Conference Papers

- **DuoAI: Fast, Automated Inference of Inductive Invariants for Verifying Distributed Protocols.** [\[paper\]](#) [\[code\]](#)  
Jianan Yao, Runzhou Tao, Ronghui Gu, and Jason Nieh.  
*Proceedings of 16th USENIX Symposium on Operating Systems Design and Implementation (OSDI 2022)*
- **Giallar: Push-Button Verification for the Qiskit Quantum Compiler.** [\[paper\]](#) [\[code\]](#)  
Runzhou Tao, Yunong Shi, Jianan Yao, Xupeng Li, Ali Javadi-Abhari, Andrew W Cross, Frederic T Chong, and Ronghui Gu.  
*Proceedings of the 43rd ACM SIGPLAN International Conference on Programming Language Design and Implementation (PLDI 2022)*
- **Formal Verification of a Multiprocessor Hypervisor on Arm Relaxed Memory Hardware.** [\[paper\]](#) [\[code\]](#)  
Runzhou Tao, Jianan Yao, Shih-Wei Li, Xupeng Li, Jason Nieh, Ronghui Gu.  
*Proceedings of the 28th ACM Symposium on Operating Systems Principles (SOSP 2021)*
- **DistAI: Data-Driven Automated Invariant Learning for Distributed Protocols.** [\[paper\]](#) [\[code\]](#)  
Jianan Yao, Runzhou Tao, Ronghui Gu, Jason Nieh, Suman Jana, and Gabriel Ryan.  
*Proceedings of the 15th USENIX Symposium on Operating Systems Design and Implementation (OSDI 2021)*  
**Best paper award**
- **Gleipnir: Toward Practical Error Analysis for Quantum Programs.** [\[paper\]](#) [\[code\]](#)  
Runzhou Tao, Yunong Shi, Jianan Yao, John Hui, Frederic T. Chong, and Ronghui Gu.  
*Proceedings of the 42nd ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI 2021)*
- **Learning Nonlinear Loop Invariants with Gated Continuous Logic Networks.** [\[paper\]](#) [\[code\]](#)  
Jianan Yao, Gabriel Ryan, Justin Wong, Suman Jana, and Ronghui Gu.  
*Proceedings of the 41st ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI 2020)*
- **CLN2INV: Learning Loop Invariants with Continuous Logic Networks.** [\[paper\]](#) [\[code\]](#)  
Gabriel Ryan, Justin Wong, Jianan Yao, Ronghui Gu, and Suman Jana.  
*Proceedings of 8th International Conference on Learning Representations (ICLR 2020)*

### Manuscripts

- **AutoVerus: Automated Proof Generation for Rust Code.**  
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.

*arXiv preprint arXiv: 2409.13082. 2024.*

- **Leveraging Large Language Models for Automated Proof Synthesis in Rust.**  
Jianan Yao, Ziqiao Zhou, Weiteng Chen, and Weidong Cui.  
*arXiv preprint arXiv:2311.03739. 2023.*

## TEACHING EXPERIENCE

- [CSOR 4231] Analysis of Algorithms (class size: 271) Spring 2022
- Blockchain Cyberdefense Design Challenge (class size: 32) Summer 2021
- [COMS W4115] Programming Languages & Translators (class size: 197) Spring 2021

## PROFESSIONAL SERVICE

- Program/Review Committee: CAV 2025, PLDI 2026
- Artifact Evaluation Committee: OSDI 2023, USENIX ATC 2023
- External Reviewer: POPL 2022, PLDI 2022, APLAS 2023, ASPLOS 2024

## INVITED TALKS & LECTURES

- Guest Lecture, "Formal Verification for Systems," University of Chicago, CS 331: Advanced Operating Systems, November 2024.
- "Mostly Automated Verification of Liveness Properties for Distributed Protocols with Ranking Functions," New England Systems Verification Day, MIT, April 2024.
- "Inductive Invariant Inference in DuoAI," New England Systems Verification Day, MIT, October 2022.