

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

RESEARCH EXPERIENCE

- Automated Reasoning Group, Amazon Web Services 06/2024-Present
Applied Scientist
- 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.
- **ScviK: 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 Neih, 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

- 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.