

Ruyi Ji

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EDUCATION

Peking University

Ph.D. in Computer Science

China

Sept 2020 - July 2025

Advisor: Prof. Zhenjiang Hu and Prof. Yingfei Xiong

Research Interests: Program Synthesis, Program Optimization, Program Verification

Thesis: *Program Synthesis Guided by Algorithmic Paradigms*

Peking University

Bachelor of Science (with Honors) in Computer Science

China

Sept 2016 - July 2020

GPA: 3.88/4.0 (**ranked 1st** out of 233)

Advisor: Prof. Yingfei Xiong

Thesis: *Question Selection in Interactive Program Synthesis*

RESEARCH EXPERIENCE

University of Michigan, Ann Arbor

Postdoc, working with Prof. Xinyu Wang

USA

Sept 2025 - Now

Topics: Program Synthesis

University of California, San Diego

Visiting student, supervised by Prof. Nadia Polikarpova

USA

Nov 2023 - May 2024

Topics: Program Verification with E-Graphs, Program Synthesis, Program Optimization

National University of Singapore

Research intern, supervised by Prof. Abhik Roychoudhury

Singapore

June 2019 - Sept 2019

Topics: Program Repair for Crashes, Symbolic Execution, Program Synthesis

PUBLICATIONS

[OOPSLA'25] Guanlin Chen*, **Ruyi Ji***, Shuhao Zhang*, Yingfei Xiong. **Tunneling Through the Hill: Multi-Way Intersection for Version-Space Algebras in Program Synthesis**. OOPSLA'25: the OOPSLA issue of the Proceedings of the ACM on Programming Languages. **equal contribution*.

[PLDI'24] **Ruyi Ji**, Yuwei Zhao, Nadia Polikarpova, Yingfei Xiong, Zhenjiang Hu. **Superfusion: Eliminating Intermediate Data Structures via Inductive Synthesis**. PLDI'24: ACM SIGPLAN Conference on Programming Language Design and Implementation.

[FM'24] Yican Sun, **Ruyi Ji**, Jian Fang, Xuanlin Jiang, Mingshuai Chen, Yingfei Xiong. **Proving Functional Program Equivalence via Directed Lemma Synthesis**. FM'24: 26th International Symposium on Formal Methods.

[ICFP'24] Cole Kurashige, **Ruyi Ji**, Aditya Giridharan, Mark Barbone, Daniel Noor, Shachar Itzhaky, Ranjit Jhala, Nadia Polikarpova. **CCLemma: E-Graph Guided Lemma Discovery for Inductive Equational Proofs**. ICFP'24: ACM SIGPLAN International Conference on Functional Programming.

[TOPLAS'24] **Ruyi Ji**, Yuwei Zhao, Yingfei Xiong, Di Wang, Lu Zhang, Zhenjiang Hu. **Decomposition-Based Synthesis for Applying Divide-and-Conquer-Like Algorithmic Paradigms**. TOPLAS: ACM Transactions on Programming Languages and Systems.

[OOPSLA'23] **Ruyi Ji**, Chaozhe Kong, Yingfei Xiong, Zhenjiang Hu. **Improving Oracle-Guided Inductive Synthesis by Efficient Question Selection**. OOPSLA'23: Object Oriented Programming Languages, Systems and Applications.

[OOPSLA'21] **Ruyi Ji**, Jintao Xia, Yingfei Xiong, Zhenjiang Hu. **Generalizable Synthesis Through Unification**. OOPSLA'21: Object Oriented Programming Languages, Systems and Applications.

[ICSME'21] Jingjing Liang, **Ruyi Ji**, Jiajun Jiang, Shurui Zhou, Yiling Lou, Yingfei Xiong, Gang Huang. **Interactive Patch Filtering as Debugging Aid**. ICSME'21: 37th International Conference on Software Maintenance and Evolution, September 2021. *IEEE TCSE Distinguished Paper Award*.

[OOPSLA'20] **Ruyi Ji**, Yican Sun, Yingfei Xiong, Zhenjiang Hu. **Guiding Dynamic Programming via Structural Probability for Accelerating Programming by Example**. OOPSLA'20: Object-Oriented Programming, Systems, Languages, and Applications.

[TOSEM'20] Xiang Gao, Bo Wang, Gregory J. Duck, **Ruyi Ji**, Yingfei Xiong, Abhik Roychoudhury. **Beyond Tests: Program Vulnerability Repair via Crash Constraint Extraction**. TOSEM: ACM Transactions on Software Engineering and Methodology.

[PLDI'20] **Ruyi Ji**, Jingjing Liang, Yingfei Xiong, Lu Zhang, Zhenjiang Hu. **Question Selection for Interactive Program Synthesis**. PLDI'20: 41st ACM-SIGPLAN Symposium on Programming Language Design and Implementation.

ACADEMIC SERVICE

- **Reviewer:** Journal of Software, Journal of Functional Programming (JFP)
- **Judge:** SPLASH'23 Student Research Competition
- **External Reviewer:** OOPSLA'24, PLDI'23, POPL'23, ESEC/FSE'21, ICSE'20, ESEC/FSE'20

AWARDS & ACHIEVEMENTS

- **2024 Young Elite Scientists Sponsorship Program by CAST (Doctoral Student Special Program).**
- **2022 Microsoft Research PhD Fellow** (one among the 11 recipients from the Asia Pacific region).
- **IEEE TCSE Distinguished Paper Award** at ICSME'21.
- **2020 Outstanding Undergraduate Graduation Thesis of Beijing Universities.**
- **2018 Peking University's People of the Year** (the **highest honor of students** in PKU).
- **3rd place, Gold medal** in ACM/ICPC World Finals 2018 among 49,935 contestants.
- **China National Scholarships** in 2017, 2018, 2020 (Top 1%).

OTHER EXPERIENCE

PKU Student Algorithm Association

Founder & the first president

China

Dec 2018 - Sept 2021

- Purpose: provide a higher platform for students to communicate, study, and solve problems about advanced algorithms; organize competitions to explore better forms for modern competitive programming.
- Organize the 2020/2021 MeiTuan-Cup Programming Contest, in which 555/271 teams participated online.
- Set problems for the 2020 ICPC China Beijing Xiaomi Invitational Programming Contest.