

Xin Zhang

ASSISTANT PROFESSOR, DEPARTMENT OF COMPUTER SCIENCE AND TECHNOLOGY, PEKING UNIVERSITY

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Research Interests

I am broadly interested in topics related to programming languages and software engineering, with an emphasis on program analysis. My current research emphasis is Bayesian program analysis, a new paradigm that combines logic and probabilities in program analysis to quantify uncertainties, and therefore enable analyses to learn and adapt. I have built algorithms and theories to support this paradigm, and applied it not only to program analysis, but also testing and fault localization. My other research interests include artificial intelligence explainability and automatic domain-specific language design for program synthesis.

Education

Ph.D. in Computer Science

GEORGIA INSTITUTE OF TECHNOLOGY, GPA: 3.85/4.0

- Thesis: Combining Logical and Probabilistic Reasoning in Program Analysis
- Advisor: Mayur Naik

Atlanta, GA, USA

2011 - 2017

B.E. in Software Engineering

SHANGHAI JIAO TONG UNIVERSITY, GPA: 3.7/4.0 (RANKED 1 OUT OF 120)

Shanghai, China

2007 - 2011

Positions Held

Peking University

ASSISTANT PROFESSOR

Beijing, China

2020 - present

Massachusetts Institute of Technology

POSTDOCTORAL ASSOCIATE

Cambridge, MA, USA

2017 - 2020

University of Pennsylvania

VISITING SCHOLAR

Philadelphia, PA, USA

2016 - 2017

Microsoft Research Cambridge

RESEARCH INTERN

Cambridge, UK

2013

Georgia Institute of Technology

RESEARCH ASSISTANT

Georgia, GA, USA

2011-2017

Honors & Awards

2014	ACM SIGPLAN Distinguished Paper Award , ACM SIGPLAN conference on Programming Language Design and Implementation (PLDI)
2015	ACM SIGSOFT Distinguished Paper Award , joint meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE)
2015	Facebook Fellowship
2017	Outstanding Graduate Research Award , College of Computing, Georgia Tech
2021	Boya Young Scholar , Peking University

Service

OOPSLA Program Committee	2026
ASE, SAS Program Committee	2025
OOPSLA Program Committee	2024
AAAI, SAS Program Committee	2023
PLDI Program Committee, CNCC Software and Hardware System Safety Verification Forum Co-Chair	2022
APLAS, PLDI, IJCAI Program Committee	2021
PLDI External Review Committee, NeurIPS, TOSEM Reviewer	2020
SAS Program Committee	2019
PLDI, APLAS, SATE Program Committee	2018
APLAS Program Committee, PLDI External Review Committee, TOSEM Reviewer	2017

Publication List (Past Five Years)

- Junhao Liu, Haonan Yu, Zhenyu Yan, **Xin Zhang**¹. Revitalizing Black-Box Interpretability: Actionable Interpretability for LLMs via Proxy Models. Annual Meeting of the Association for Computational Linguistics (ACL), 2026. (To Appear)
- Tianchi Li, Zhenyu Yan, Junhao Liu, Peng Di, **Xin Zhang**^{*}. Guiding LLM-based Loop Invariant Synthesis via Feedback on Local Reasoning Errors. ACM Transactions on Programming Languages and Systems (TOPLAS), 2026. (To Appear)
- Yuanfeng Shi, Ziyue Jin, **Xin Zhang**^{*}. Abstract Interpretation with Confidence. ACM Conference on Programming Language Design and Implementation (PLDI), 2026. (To Appear)
- Haoran Lin, Zhenyu Yan, **Xin Zhang**^{*}. Beer: Interactive Alarm Resolution in Bayesian Program Analysis via Exploration-Exploitation. ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), 2026. (To Appear)
- Yifan Zhang, **Xin Zhang**^{*}. Fuzzing Guided by Bayesian Program Analysis. ACM SIGPLAN Symposium on Principles of Programming Languages (POPL), 2026.
- Zhentao Ye, Ruyi Ji, Yingfei Xiong, **Xin Zhang**^{*}. Accelerating Syntax-Guided Program Synthesis by Optimizing Domain-Specific Languages. ACM SIGPLAN Symposium on Principles of Programming Languages (POPL), 2026.
- Yiqian Wu, Yifan Chen, Yingfei Xiong, **Xin Zhang**^{*}. Belief Propagation with Local Structure and Its Applications in Program Analysis. IEEE/ACM International Conference on Automated Software Engineering (ASE), 2025.
- Yuanfeng Shi, Yifan Zhang, **Xin Zhang**^{*}. On Abstraction Refinement for Bayesian Program Analysis. ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), 2025.
- Tianchi Li, **Xin Zhang**^{*}. Combining Formal and Informal Information in Bayesian Program Analysis via Soft Evidences. ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), 2025.

¹Here, * denotes the corresponding author, which indicates the principal investigator or lead senior researcher on the project within the Chinese academic system.

10. Yiqian Wu, Yujie Liu, Yi Yin, Muhan Zeng, Zhentao Ye, **Xin Zhang***, Yingfei Xiong, Lu Zhang. SmartFL: Semantics Based Probabilistic Fault Localization. Transactions on Software Engineering (TSE), 2025.
11. Junhao Liu, **Xin Zhang***. ReX: A Framework for Incorporating Temporal Information in Model-Agnostic Local Explanation Techniques. Annual AAAI Conference on Artificial Intelligence (AAAI), 2025. (Oral, 4.68%)
12. Zhenyu Yan, **Xin Zhang***, Peng Di. Scaling Abstraction Refinement for Program Analyses in Datalog Using Graph Neural Networks. ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), 2024.
13. Yifan Zhang, Yuanfeng Shi, **Xin Zhang***. Learning Abstraction Selection for Bayesian Program Analysis. ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), 2024.
14. **Xin Zhang**, Guancheng Wang, Yiqian Wu, Yifan Chen, Tianchi Li, Yifan Zhang, Yingfei Xiong*. Bayesian Program Analysis (In Chinese). Chinese Journal of Electronics, 2024.
15. Guancheng Wang, Yiqian Wu, Qihao Zhu, Yingfei Xiong*, **Xin Zhang**, Lu Zhang. A Probabilistic Delta Debugging Approach for Abstract Syntax Trees. International Symposium on Software Reliability Engineering (ISSRE), 2023.
16. Muhan Zeng, Yiqian Wu, Zhentao Ye, Yingfei Xiong*, **Xin Zhang**, Lu Zhang. Fault Localization via Efficient Probabilistic Modeling of Program Semantics. International Conference on Software Engineering (ICSE), 2022.
17. Yifan Chen, Chenyang Yang, **Xin Zhang***, Yingfei Xiong, Hao Tang, Xiaoyin Wang, Lu Zhang. Accelerating Program Analyses in Datalog by Merging Library Facts. Static Analysis Symposium (SAS), 2021.
18. Zenna Tavares, James Koppel, **Xin Zhang**, Ria Das, Armando Solar-Lezama. A Language for Counterfactual Generative Models. International Conference on Machine Learning (ICML), 2021.

Publication List (Before Joining Peking University) _____

Conference Papers

1. Osbert Bastani, **Xin Zhang**, Armando Solar-Lezama. Verifying Fairness Properties via Concentration. ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), 2019.
2. **Xin Zhang**, Armando Solar-Lezama, Rishabh Singh. Interpreting Neural Network Judgments via Minimal, Stable, and Symbolic Corrections. Conference on Neural Information Processing Systems (NeurIPS), 2018.
3. **Xin Zhang**, Radu Grigore, Xujie Si, Mayur Naik. Effective Interactive Resolution of Static Analysis Alarms. ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), 2017.
4. Sulekha Kulkarni, Ravi Mangal, **Xin Zhang**, Mayur Naik. Accelerating Program Analyses by Cross-Program Training. ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), 2016.
5. Xujie Si, **Xin Zhang**, Vasco Manquinho, Mikolas Janota, Alexey Ignatiev, Mayur Naik. On Incremental Core-Guided MaxSAT Solving. International Conference on Principles and Practice of Constraint Programming (CP), 2016.
6. Ravi Mangal, **Xin Zhang**, Aditya Kamath, Aditya Nori, and Mayur Naik. Scaling Relational Inference Using Proofs and Refutations. Conference on Artificial Intelligence (AAAI), 2016.
7. **Xin Zhang**, Ravi Mangal, Mayur Naik, and Aditya Nori. Query-Guided Maximum Satisfiability. ACM Symposium on Principles of Programming Languages (POPL), 2016.
8. Ravi Mangal, **Xin Zhang**, Aditya Nori and Mayur Naik. Volt: A Lazy Grounding Framework for Solving Very Large MaxSAT Instances. International Conference on Theory and Applications of Satisfiability Testing (SAT), 2015.
9. Jongse Park, Hadi Esmaeilzadeh, **Xin Zhang**, Mayur Naik, and Bill Harris. FlexJava: Language Support for Safe and Modular Approximate Programming. ACM Symposium on Foundations of Software Engineering (FSE), 2015.
10. Ravi Mangal, **Xin Zhang**, Mayur Naik, and Aditya Nori. A User-Guided Approach to Program Analysis. ACM Symposium on Foundations of Software Engineering (FSE), 2015. **Distinguished Paper Award.**
11. **Xin Zhang**, Ravi Mangal, Radu Grigore, Mayur Naik, Hongseok Yang. On Abstraction Refinement for Program Analyses in Datalog. ACM Conference on Programming Language Design and Implementation (PLDI), 2014. **Distinguished Paper Award.**

12. **Xin Zhang**, Ravi Mangal, Mayur Naik, Hongseok Yang. Hybrid Top-down and Bottom-up Interprocedural Analysis. ACM Conference on Programming Language Design and Implementation (PLDI), 2014.
13. **Xin Zhang**, Mayur Naik, Hongseok Yang. Finding Optimum Abstractions in Parametric Dataflow Analysis. ACM Conference on Programming Language Design and Implementation (PLDI), 2013.
14. Cheng Zhang, Juyuan Yang, Yi Zhang, Jing Fan, **Xin Zhang**, Jianjun Zhao, Peizhao Ou. Automatic Parameter Recommendation for Practical API Usage. International Conference on Software Engineering (ICSE), 2012.

Workshop Papers

1. Daniel Jackson, Jonathan DeCastro, Soonho Kong, Dimitrios Koutentakis, Angela Leong Feng Ping, Armando Solar-Lezama, Mike Wang, and **Xin Zhang**. Certified Control for Self-Driving Cars. Workshop on the Design and Analysis of Robust Systems (DARS), 2019.
2. **Xin Zhang**, Xujie Si, and Mayur Naik. Combining the Logical and the Probabilistic in Program Analysis. ACM SIGPLAN Workshop on Machine Learning and Programming Languages (MAPL), 2017.
3. Jongse Park, Kangqi Ni, **Xin Zhang**, Hadi Esmaeilzadeh, Mayur Naik. Expectation-Oriented Framework for Automating Approximate Programming. Workshop on Approximate Computing Across the System Stack (WACAS) in conjunction with ASPLOS, 2014.

Invited Tutorials

1. Mayur Naik, Xujie Si, **Xin Zhang**, Radu Grigore. Maximum Satisfiability in Program Analysis: Applications and Techniques. International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI), 2018.
2. Xujie Si, **Xin Zhang**, Radu Grigore, Mayur Naik. Maximum Satisfiability in Software Analysis: Applications and Techniques. International Conference on Computer Aided Verification (CAV), 2017.

Students

PH.D. STUDENTS

1. Zhenyu Yan (2021 - present) [OOPSLA'24][OOPSLA'26]
2. Yuanfeng Shi (2022 - present) [OOPSLA'24][OOPSLA'25][PLDI'26]
3. Junhao Liu (2022 - present) [AAAI'25]
4. Yifan Zhang (2023 - present) [POPL'26][OOPSLA'25][OOPSLA'24]
5. Tianchi Li (2023 - present) [OOPSLA'25]
6. Haoran Lin (2024 - present) [OOPSLA'26]
7. Haonan Yu (2024 - present)
8. Haoyu Feng (2025 - present)
9. Yiqian Wu (2021 - present, co-advised with Lu Zhang, Yingfei Xiong) [ASE'25][TSE'25]

MASTER'S STUDENTS

1. Yifan Chen (co-advised with Yingfei Xiong, 2020 - 2024) [SAS'21]
2. Zhentao Ye (co-advised with Yingfei Xiong, 2021 - 2025) [POPL'26]

Teaching Experience

Introduction to Discrete Mathematics

LECTURER, AVERAGE CLASS SIZE: 86

Peking University
Fall 2023, Fall 2024, Fall 2025

Algebraic Structure and Combinatorial Mathematics

LECTURER, AVERAGE CLASS SIZE: 85

Peking University
Spring 2022, Spring 2023

Introduction to Probabilistic Programming

LECTURER, FIRST COURSE ON PROBABILISTIC PROGRAMMING IN CHINA

Peking University
Fall 2021, Fall 2022, Spring
2024

6.820: Foundations of Program Analysis

GUEST LECTURER

MIT
Fall 2017, Fall 2019

CS6340: Software Analysis and Testing

TEACHING ASSISTANT

Georgia Tech
Fall 2014

CS4400: Introduction to Database Systems

TEACHING ASSISTANT

Georgia Tech
Spring 2013

Funding

I have raised funding from both the Chinese government (e.g., National Natural Science Foundation of China) and industry (e.g., Huawei, Ants Group, ZTE). Upto Feb, 2026, the total raised funding amount has reached approximately **15.9 million CNY (2.3 million USD)**.