Di Wang

Yanyuan Mansion 520, 151 Zhongguancun N Ave, Haidian District, Beijing 100084
✉ wangdi95@pku.edu.cn • 🌐 https://stonebuddha.github.io/
Peking University – School of Computer Science – Assistant Professor

Bio

My main interest is in programming languages, and formal verification, program analysis, and probabilistic programming in particular. My mission is to develop *universal and easy-to-use abstractions and paradigms* for programming safe and efficient software, and *programming-language-level integrations* to automatically analyze, optimize, and synthesize programs.
Currently, I am working on resource-safe system programming, programmable Bayesian inference, quantitative program analysis, and proof-oriented programming languages.

Education

Carnegie Mellon University **Pittsburgh, PA, USA**
Ph.D. in Computer Science *Aug 2017 – May 2022*
Advisor: Prof. Jan Hoffmann
Thesis: *Static Analysis of Probabilistic Programs: An Algebraic Approach*

Peking University **Beijing, China**
Bachelor of Science (with Honors) in Computer Science & Technology *Sep 2013 – Jun 2017*
Advisor: Prof. Yingfei Xiong
Thesis: *Accelerating Program Analyses by Conditional Summarization with Datalog*

Research Experiences

Facebook **Seattle, WA, USA**
Research intern, supervised by Dr. Herman Venter *May 2020 – Aug 2020*
Topics: Formal Verification of Rust Code, Side Channel Analysis of Blockchain Code

Massachusetts Institute of Technology **Boston, MA, USA**
Research intern, supervised by Prof. Adam Chlipala *Sep 2016 – Jan 2017*
Topics: Type System for Complexity Analysis, Complexity Preserved Compiler

University of Wisconsin–Madison **Madison, WI, USA**
Research intern, supervised by Prof. Thomas Reps *Jun 2016 – Aug 2016*
Topics:Probabilistic Reasoning about Side Channel Attacks, Expectation Invariant Analysis of Probabilistic Programs

Peking University **Beijing, China**
Research assistant, supervised by Prof. Lu Zhang and Prof. Yingfei Xiong *Sep 2015 – Jun 2017*
Topics: Complete Library Summarization for Program Analyses, Pointer Analysis for Java

Professional Activities

- **Program/Review Committee Member** – APLAS (2024 SRC), ASE (2023), ChinaSoft (2023, 2024), ECOOP (2025), ECOOP/ISSTA (2024 Tool Demos), ICALP (2025), OOPSLA (2024, 2026), PLDI (2024), POPL (2026), SLE (2024)
- **Artifact Evaluation Committee Member** – CAV (2020), POPL (2019, 2020)
- **External Reviewer** – ESOP (2020, 2021, 2023), FoSSaCS (2022, 2023), ICALP (2018), ICFP (2023), LICS (2019, 2020, 2021, 2022), POPL (2022)
- **Reviewer** – ASE (2023), ChinaSoft (2023, 2024), MSCS (2020), STVR (2024)

Publications

Refereed Conference Papers

[1] Qihao Lian and **Di Wang***. Automatic Linear Resource Bound Analysis for Rust via Prophecy Potentials. In *Object-Oriented Programming, Systems, Languages, and Applications*, OOPSLA'25, 2025.

[2] Long Pham, **Di Wang***, Feras A. Saad, and Jan Hoffmann. Programmable MCMC with Soundly Composed Guide Programs. In *Object-Oriented Programming, Systems, Languages, and Applications*, OOPSLA'24, 2024.

[3] Zhichao Guan, Yiyuan Cao, Tailai Yu, Ziheng Wang, **Di Wang***, and Zhenjiang Hu. Semantics Lifting for Syntactic Sugar. In *Object-Oriented Programming, Systems, Languages, and Applications*, OOPSLA'24, 2024.

[4] Ke Sun, **Di Wang***, Sheng Chen, Meng Wang, and Dan Hao. Formalizing, Mechanizing, and Verifying Class-based Refinement Types. In *European Conference on Object-Oriented Programming*, ECOOP'24, 2024.

[5] **Di Wang** and Thomas Reps. Newtonian Program Analysis of Probabilistic Programs. In *Object-Oriented Programming, Systems, Languages, and Applications*, OOPSLA'24, 2024.

[6] Ankush Das, **Di Wang**, and Jan Hoffmann. Probabilistic Resource-Aware Session Types. In *Principles of Programming Languages*, POPL'23, 2023.

[7] **Di Wang**, Jan Hoffmann, and Thomas Reps. Sound Probabilistic Inference via Guide Types. In *Programming Language Design and Implementation*, PLDI'21, 2021.

[8] **Di Wang**, Jan Hoffmann, and Thomas Reps. Central Moment Analysis for Cost Accumulators in Probabilistic Programs. In *Programming Language Design and Implementation*, PLDI'21, 2021.

[9] Tristan Knoth, **Di Wang**, Adam Reynolds, Jan Hoffmann, and Nadia Polikarpova. Liquid Resource Types. In *International Conference on Functional Programming*, ICFP'20, 2020.

[10] **Di Wang**, David M. Kahn, and Jan Hoffmann. Raising Expectations: Automating Expected Cost Analysis with Types. In *International Conference on Functional Programming*, ICFP'20, 2020.

[11] Tristan Knoth, **Di Wang**, Nadia Polikarpova, and Jan Hoffmann. Resource-Guided Program Synthesis. In *Programming Language Design and Implementation*, PLDI'19, 2019.

[12] **Di Wang**, Jan Hoffmann, and Thomas Reps. A Denotational Semantics for Low-Level Probabilistic Programs with Nondeterminism. In *Mathematical Foundations of Programming Semantics*, MFPS'19, 2019.

[13] **Di Wang** and Jan Hoffmann. Type-Guided Worst-Case Input Generation. In *Principles of Programming Languages*, POPL'19, 2019.

[14] **Di Wang**, Jan Hoffmann, and Thomas Reps. PMAF: An Algebraic Framework for Static Analysis of Probabilistic Programs. In *Programming Language Design and Implementation*, PLDI'18, 2018.

[15] Peng Wang, **Di Wang**, and Adam Chlipala. TiML: A Functional Language for Practical Complexity Analysis with Invariants. In *Object-Oriented Programming, Systems, Languages, and Applications*, OOPSLA'17, 2017.

[16] Hao Tang, **Di Wang**, Yingfei Xiong*, Lingming Zhang, Xiaoyin Wang, and Lu Zhang. Conditional Dyck-CFL Reachability Analysis for Complete and Efficient Library Summarizatio. In *European Symposium on Programming*, ESOP'17, 2017.

Refereed Journal Papers

[17] Ruyi Ji, Yuwei Zhao, Yingfei Xiong*, **Di Wang**, Lu Zhang, and Zhenjiang Hu. Decomposition-Based Synthesis for Applying Divide-and-Conquer-Like Algorithmic Paradigms. *Transactions on Programming Languages and Systems*, 46(8):8:1–8:59, June 2024.

Other Publications

[18] Zhang Cheng, Jiyang Wu, **Di Wang**, and Qinxiang Cao*. Denotation-based Compositional Compiler Verification, 2024.

[19] Changze Huang and **Di Wang***. Incremental Structure Discovery of Classification via Sequential Monte Carlo, 2024.

[20] Hongjun Wu and **Di Wang***. Worst-Case Analysis is Maximum-A-Posteriori Estimation: Resource Analysis with Sequential-Monte-Carlo-Based Fuzzing, 2023.

[21] **Di Wang**, Jan Hoffmann, and Thomas Reps. Expected-Cost Analysis for Probabilistic Programs and Semantics-Level Adaption of Optional Stopping Theorems, 2021.

Teaching and Mentoring Experience

- **Lecturer** – *Compiler Principles*, Peking University — 2023, 2024, 2025
- **Lecturer** – *Design Principles of Programming Languages*, Peking University — 2023, 2024, 2025
- **Lecturer** – *Seminar on Introduction to Computer Systems*, Peking University — 2023, 2024

- **PhD Advisor** – Zimu Chen — 2024–pres.
- **PhD Advisor** – Siyuan Zhu — 2024–pres.
- **PhD Advisor** – Changze Huang — 2023–pres.
- **PhD Advisor** – Qihao Lian — 2023–pres.

- **Mentor** – Zimu Chen, *Worst case analysis by fuzzing symbolic-execution paths* — 2024
- **Mentor** – Tianxiang Gao, *A preliminary exploration of intuitionistic probability linear logic* — 2024
- **Mentor** – Jiaqi Si, *Constructive proof based on contextual structure* — 2024
- **Mentor** – Hongjun Wu, *Worst-case analysis is maximum-a-posteriori estimation* — 2024
- **Mentor** – Xuanyu Peng, *Rust resource analysis by functional translation* — 2023
- **Mentor** – Vanshika Chowdhary, *Programmable Gibbs sampling with linear types* — 2021
- **Mentor** – Mohamed Lotfi, *Synthesis of probabilistic programs that generate handwritten digits* — 2021
- **Mentor** – Charles Yuan, *Exact Bayesian inference with distribution transformers* — 2019

- **Teaching Assistant** – *Bug Catching: Automated Program Verification*, Carnegie Mellon University — 2020
- **Teaching Assistant** – *Programming Language Semantics*, Carnegie Mellon University — 2019
- **Teaching Assistant** – *Introduction to Computer Systems*, Peking University — 2015

Talks

Conference Presentations

- Newtonian Program Analysis of Probabilistic Programs, *OOPSLA'24*. — Oct 2024
- Sound Probabilistic Inference via Guide Types, *PLDI'21*. — Jun 2021
- Central Moment Analysis for Cost Accumulators in Probabilistic Programs, *PLDI'21*. — Jun 2021
- Raising Expectations: Automating Expected Cost Analysis with Types, *ICFP'20*. — Aug 2020
- Liquid Resource Types, *ICFP'20*. — Aug 2020
- A Denotational Semantics for Low-Level Probabilistic Programs with Nondeterminism, *MFPS'19*. — Jun 2019
- Type-Guided Worst-Case Input Generation, *POPL'19*. — Jan 2019
- PMAF: An Algebraic Framework for Static Analysis of Probabilistic Programs, *PLDI'18*. — Jun 2018

Seminar Presentations

- Program Resource Analysis and Verification, *Xijiao Hotel Beijing*, SAVE 2024. — Nov 2024
- Programmable MCMC with Soundly Composed Guide Programs, *ChinaSoft*, Top Conference Seminar. — Nov 2024
- A Paradigm that Unifies Programming and Verification, *Shanghai Jiao Tong University*, TPChina Seminar. — Sep 2024
- A Proof-Oriented Programming Language, *CCF*, Beautiful Lake Seminar. — Aug 2024

- Newtonian Program Analysis of Probabilistic Programs, *Peking University*, Programming Language Seminar. Jul 2024
- Exploration of New Designs for Programming Languages, *Shanghai Jiao Tong University*, Turing Forum of 3 Institutes. Jun 2024
- Towards Next-Gen Programming Languages, *Compiler Competition*, Seminar. Jun 2024
- Algebraic Program Analysis of Probabilistic Programs, *PROBPROG*. Spring 2024 Seminar Series. Apr 2024
- Exploration of New Designs for Programming Languages, *Nanjing University*, Seminar. Dec 2023
- Algebraic Program Analysis of Probabilistic Programs, *ChinaSoft*, Young Scholar Seminar. Dec 2023
- Algebraic Program Analysis of Probabilistic Programs, *CCF*, Formal Methods Seminar. Jun 2023
- Type-Driven Programming Language Design, *Compiler Competition*, Seminar. Jun 2023
- Resource-Safe System Programming Language, *PL Lab*, Seminar. May 2023
- Intuitionistic Logics and Programing Languages, *Peking University*, Logic Seminar. Mar 2023
- Quantitative Program Analysis and Verification, *ZTE*, Seminar. Dec 2022
- Semantics of Probabilistic Programs: An Algebraic Approach, *Tsinghua University*, Seminar. Mar 2022
- Type-Based Resource-Guided Search, *Imperial College London*, Functional Programming Seminar. Nov 2021
- Type-Based Resource-Guided Search, *Peking University*, Programming Language Seminar. Oct 2020
- Taint Analysis for Blockchain Code, *Facebook*, Novice Seminar. Aug 2020
- Automating Expected Cost Analysis with Types, *Facebook*, Novice Seminar. Jun 2020

Awards

- OOPSLA Distinguished Reviewer 2024
- ECOOP Distinguished Paper 2024
- Peking University Boya Fellowship 2024
- China National Scholarship 2014, 2016
- Huawei Scholarship 2015
- Silver Medal (5th place) in the 39th Annual ACM-ICPC World Finals 2015
- Gold Medal (1st place) in the 39th ACM-ICPC Asia Regionals Anshan site 2014
- Gold Medal (9th place) in the 38th ACM-ICPC Asia Regionals Changchun site 2013

Contribued Software

- RaML: Resource Aware ML https://www.raml.co/
- MIRAI: Rust mid-level IR Abstract Interpreter https://github.com/endorlabs/MIRAI