

# Ningning Xie

## Research Interests

My research interests are in programming languages, focusing on language design and implementation, functional programming, and type theory. I design and formalize languages offering strong static guarantees about soundness (ICFP'19, POPL'20), extensibility (ICFP'20, ICFP'21), and efficiency (PLDI'21, POPL'22). I am also interested in applying programming language techniques to broader areas. In particular, I have worked on domain-specific language design and applied program synthesis for accelerating deep learning on hardware platforms (MLSys'22).

## Education

- Oct 2021- **Research Associate, Computer Science and Technology.**  
University of Cambridge, Cambridge, UK  
Advisor: Jeremy Yallop and Neel Krishnaswami
- Aug 2021 **Ph.D., Computer Science.**  
University of Hong Kong, Hong Kong  
Advisor: Bruno. C. d. S. Oliveira.
- April 2017 **M.Phil., Computer Science.**  
University of Hong Kong, Hong Kong
- July 2015 **B.S. (with Honors), Computer Science and Technology.**  
Zhejiang University, Hangzhou, China  
GPA 3.9/4.0, Rank 2% (4/204).

## Selected Honors and Awards

- 2021 **ACM SIGPLAN Distinguished Paper Award (PLDI 2021)**
- 2020 Rising Stars 2020, UC Berkeley
- 2020 **ACM SIGPLAN Distinguished Paper Award (POPL 2020)**
- 2020 Special issue of ACM Transactions on Programming Languages and Systems (TOPLAS)
- 2018 Women Techmakers Scholar finalist (former Google Anita Borg Scholarship)
- 2017-2020 Travel Awards: ICFP PLMW 17, ETAPS 18, 19, ACM SIGPLAN PAC (ICFP 19, POPL 20)
- 2015 Outstanding Graduate, Zhejiang University

## Experience

- May-Sept 2021 **Research Intern, DeepMind**, London, UK.  
Mentor: Dimitrios Vytiniotis.
- Jan-Aug 2020 **Research Intern, Microsoft Research**, Redmond, WA.  
Mentor: Daan Leijen.  
**Visiting Researcher**
- Jan-April 2021 University of Bristol, Bristol, UK. Host: Meng Wang.
- Jan-May 2018 KU Leuven, Leuven, Belgium. Host: Tom Schrijvers.
- Aug-Nov 2019 **Software Engineer Intern, Google**, *Google Search*, New York City, NY.
- May-Aug 2018 **Software Engineer Intern, Google Summer of Code (Haskell)**, Philadelphia, PA.  
Mentor: Richard Eisenberg.

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## Publications

- MLSys'22 **Ningning Xie**, Tamara Norman, Diminik Grewe, Dimitrios Vytiniotis. [Synthesizing Optimal Parallelism Placement and Reduction Strategies on Hierarchical Systems for Deep Learning](#). *5th Conference on Machine Learning and Systems*, MLSys 2022.
- POPL'22 **Ningning Xie**, Matthew Pickering, Andres Löb, Nicolas Wu, Jeremy Yallop, Meng Wang. [Staging with Class: A Specification for Typed Template Haskell](#). *49th Symposium on Principles of Programming Languages*, POPL 2022.
- ICFP'21 **Ningning Xie**, Daan Leijen. [Generalized Evidence Passing for Effect Handlers: Efficient Compilation of Effect Handlers to C](#). *26th International Conference on Functional Programming*, ICFP 2021.
- PLDI'21 **Ningning Xie\***, Alex Reinking\*, Leonardo de Moura, Daan Leijen. [Perceus: Garbage Free Reference Counting with Reuse](#). *42rd Conference on Programming Language Design and Implementation*, PLDI 2021.  
[🏆 ACM SIGPLAN Distinguished Paper Award](#)
- Haskell'20 **Ningning Xie**, Daan Leijen. [Effect Handlers in Haskell, Evidently](#). *13th Haskell Symposium*, Haskell 2020.
- ICFP'20 **Ningning Xie**, Jonathan Brachthäuser, Daniel Hillerström, Philipp Schuster, Daan Leijen. [Effect Handlers, Evidently](#). *25th International Conference on Functional Programming*, ICFP 2020.
- POPL'20 **Ningning Xie**, Richard A. Eisenberg, Bruno C. d. S. Oliveira. [Kind Inference for Datatypes](#). *47th Symposium on Principles of Programming Languages*, POPL 2020.  
[🏆 ACM SIGPLAN Distinguished Paper Award](#)
- ECOOP'20 **Ningning Xie**, Bruno C. d. S. Oliveira, Xuan Bi, Tom Schrijvers. [Row and Bounded Polymorphism via Disjoint Polymorphism](#). *34th European Conference on Object Oriented Programming*, ECOOP 2020.
- TOPLAS'20 **Ningning Xie**, Xuan Bi, Bruno C. d. S. Oliveira, Tom Schrijvers. [Consistent Subtyping for All](#). *ACM Transaction on Programming Languages and Systems*, TOPLAS 2020.
- ICFP'19 Gert-Jan Bottu, **Ningning Xie**, Koar Marntirosian, Tom Schrijvers. [Coherence of Type Class Resolution](#). *24th International Conference on Functional Programming*, ICFP 2019.
- ESOP'19 Xuan Bi, **Ningning Xie**, Bruno C. d. S. Oliveira, Tom Schrijvers. [Distributive Disjoint Polymorphism for Compositional Programming](#). *28th European Symposium on Programming*, ESOP 2019.
- ESOP'18 **Ningning Xie**, Xuan Bi, Bruno C. d. S. Oliveira. [Consistent Subtyping for All](#). *27th European Symposium on Programming*, ESOP 2018.  
[🏆 Selected for Special Issue of ACM Transaction on Programming Languages and Systems](#)
- ESOP'18 **Ningning Xie**, Bruno C. d. S. Oliveira. [Let Arguments Go First](#). *27th European Symposium on Programming*, ESOP 2018.
- Workshops
- PEPM'22 **Ningning Xie\***, Daniel D. Johnson\*, Dougal Maclaurin, Adam Paszke. [Parallel Algebraic Effect Handlers](#). *ACM SIGPLAN Workshop on Partial Evaluation and Program Manipulation*, PEPM 2022, co-located with POPL 2022.
- HOPE'21 **Ningning Xie**, Youyou Cong, Daan Leijen. [First-class Names for Effect Handlers](#). *ACM SIGPLAN Workshop on Higher-Order Programming with Effects*, HOPE 2021, co-located with ICFP 2021.
- HIW'18 **Ningning Xie**, Richard A. Eisenberg. [Coercion Quantification](#). *10th Haskell Implementors' Workshop*, HIW 2018, co-located with ICFP 2018.

- TFP'17 **Ningning Xie**, Bruno C. d. S. Oliveira. *Towards Unification for Dependent Types*. *18th Symposium on Trends in Functional Programming*, TFP  
Tutorial
- ICFP'21 Daan Leijen, **Ningning Xie**. *Programming with Effect Handlers and FBIP in Koka*. *Tutorial at 26th International Conference on Functional Programming*. ICFP 2021.  
Preprint
- Draft **Ningning Xie**, Youyou Cong, Daan Leijen. *First-class Names for Effect Handlers*. *submitted to OOPSLA 2022*.
- Draft Baber Rehman, **Ningning Xie**, Xuejing Huang, Bruno C. d. S. Oliveira. *Union Types with Disjoint Switches*. *submitted to OOPSLA 2022*.
- Draft Neel Krishnaswami, **Ningning Xie**, Jeremy Yallop. *Fusing Lexing and Parsing*. *submitted to PLDI 2022*.

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## Professional Activities

### Steering Committee

2020-2023 Haskell Symposium Steering Committee

### Program Chair

HIW 2021 13th Haskell Implementors' Workshop

### Program Committee

Scala 2022 13th Scala Symposium

ICFP 2022 27th International Conference on Functional Programming

TFP 2022 23rd Symposium on Trends in Functional Programming

FLOPS 2022 16th International Symposium on Functional and Logic Programming

PADL 2021 23rd International Symposium on Practical Aspects of Declarative Languages

Haskell 2019 12th Haskell Symposium

HIW 2019 11th Haskell Implementor's Workshop

### Artifact Evaluation Committee

PLDI 2020 41st Conference on Programming Language Design and Implementation

ICFP 2019 24th International Conference on Functional Programming

### External Reviewer

ICFP 2019, ECOOP 2019, FLOPS 2018, ESOP 2017, APLAS 2017, APLAS 2016

### Student Volunteer

ESOP 2019, ICFP 2018, PLDI 2018, APSys 2016

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## Talks

### Invited Talks

#### Staging with Class: A Specification of Typed Template Haskell

Dec 2021 Programming Languages Seminar. EPFL.

#### Efficient Compilation of Algebraic Effect Handlers.

Dec 2021 International Symposium on High Confidence Software. Peking University.

Oct 2021 8th International Workshop on Dependable and Secure Software Systems. ETH Zurich.

#### Perceus: Garbage Free Reference Counting with Reuse.

Mar 2021 Laboratory for Foundations of Computer Science. The University of Edinburgh.

#### Type-based Language Design.

Dec 2020 Programming Languages Seminar. Peking University.

- Dec 2020 John Hopcroft Center for Computer Science. Shanghai Jiao Tong University.  
**Dependent Types in Haskell.**
- Dec 2018 Hong Kong Functional Programming Meetup. Hong Kong.  
**Consistent Subtyping for All.**
- May 2018 Penn PLClub. University of Pennsylvania. PA, US.  
Conference Presentations
- Jan 2022 Staging with Class: A Specification for Typed Template Haskell. POPL 2022.
- Aug 2021 First-class Names for Effect Handlers. HOPE 2021.
- Aug 2021 Generalized Evidence Passing for Effect Handlers. ICFP 2021.
- Nov 2020 Row and Bounded Polymorphism via Disjoint Polymorphism. ECOOP 2020.
- Aug 2020 Effect Handlers in Haskell, Evidently. Haskell 2020.
- Aug 2020 Effect Handlers, Evidently. ICFP 2020.
- Jan 2020 Kind Inference for Datatypes. POPL 2020.
- April 2019 Distributive Disjoint Polymorphism for Compositional Programming. ESOP 2019.
- April 2018 Let Arguments Go First. ESOP 2018.

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## Teaching and Mentoring

- Oct 2021- [Mentoring] SIGPLAN Long-Term Mentoring Program (SIGPLAN-M)
- Jan 2021 [Mentoring] Programming Language Mentoring Workshop (PLMW) @ POPL 2021
- Nov 2020 [Mentoring] Programming Language Mentoring Workshop (PLMW) @ SPLASH 2020
- since 2020 [Mentoring] Xu Xue (first-year PhD)  
Topic: Type inference for intersection types.
- since 2020 [Mentoring] Baber Rehman (PhD), Xuejing Huang (PhD, female)  
Topic: Union Types with Disjoint Switches. Paper submitted to OOPSLA 2022.
- Nov 2019 [Instructor] Haskell 101, *Google, New York City*
- Spring 2019 [Teaching Assistant] Principles of Programming Languages, *University of Hong Kong*
- Fall 2017 [Teaching Assistant] Functional Programming, *University of Hong Kong*

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## References

### Daan Leijen

Principal Researcher  
Microsoft Research Redmond  
✉ daan@microsoft.com

### Dimitrios Vytiniotis

Research Scientist  
DeepMind  
✉ dvytin@google.com

### Simon Peyton Jones

Senior Principal Researcher  
Microsoft Research Cambridge  
Engineering Fellow  
Epic Games  
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### Bruno C. d. S. Oliveira

Associate Professor  
University of Hong Kong  
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### Jeremy Yallop

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University of Cambridge  
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