

# Xuran Cai

Oxford, UK | Kaiserslautern, German | louiscaixuran@outlook.com | louiscaixuran.github.io/

## Education

<b>Oxford-Max-Plank joint Program</b> , Doctor of Philosophy	Sep 2025 - Present German & UK
<ul style="list-style-type: none"><li>• Joint Program by University of Oxford and Max Plank Institute</li><li>• Major: Computer Science</li><li>• Supervisor: Prof. Amir Goharshady(Oxford) and Prof. Rupak Majumdar(MPI)</li><li>• Funding: Salary from MPI and Department Scholarship from Oxford</li></ul>	
<b>Hong Kong University of Science and Technology</b> , Master of Philosophy	Sept 2023 – June 2025 Hong Kong SAR
<ul style="list-style-type: none"><li>• Major: Computer Science and Engineering</li><li>• Supervisor: Prof. Amir Goharshady and Prof. Jiasi Shen</li><li>• Funding: Postgraduate Scholarship</li></ul>	
<b>University of Wisconsin-Madison</b> , Bachelor of Science	Sept 2019 – May 2023 USA
<ul style="list-style-type: none"><li>• GPA: 3.86/4.0</li><li>• Major: Double Major in Computer Science and Mathematics</li><li>• Graduate with Distinction and Major Distinction in CS</li></ul>	

## Publications

<b>Invariant Generation for Floating-Point Programs via Constraint Solving</b>	October 2026
X. Cai, L. Chen, H. Fu, Submit to Object-Oriented Programming, Systems, Languages, and Applications, OOPSLA'26	
<b>Efficient Algorithms for Partial Constraint Satisfaction Problems over Control-flow Graphs</b>	December 2025
X. Cai, A.K. Goharshady, International Symposium on Software Engineering: Theories, Tools, and Applications, SETTA'25	
<b>Enhancing Compiler Optimization Efficiency through Grammatical Decompositions of Control-Flow Graphs</b>	July 2025
X. Cai, Mphil Final Thesis	
<b>Series-Parallel-Loop Decompositions of Control-flow Graphs</b>	June 2025
X. Cai, A.K. Goharshady, S. Hitarth, C.K. Lam Submit to Journal of Systems Architecture, JSA'25	
<b>Faster Chaitin-like Register Allocation via Grammatical Decompositions of Control-Flow Graphs</b>	March 2025
X. Cai, A.K. Goharshady, S. Hitarth, C.K. Lam International Conference on Architectural Support for Programming Languages and Operating Systems, ASPLOS'25	
<b>Faster Lifetime-optimal Speculative Partial Redundancy Elimination for Goto-free Programs</b>	November 2024
X. Cai, A.K. Goharshady International Symposium on Software Engineering: Theories, Tools, and Applications, SETTA'24	

## Teaching Assistant Experiences

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### Functional Programming

MT Semester 2025-26

- Institute: Oxford

- Instructor: prof. Andrzej Murawski

### Honors Discrete Mathematical Tools for Computer Science

Fall Semester 2024-25

- Institute: HKUST

- Instructor: prof. Amir Goharshady

### Discrete Mathematical Tools for Computer Science

Spring Semester 2023-24

- Institute: HKUST

- Instructor: prof. Sunil Arya and prof. Jiasi Shen

### Introduction to Computer Networks

Spring Semester 2021-22

- Institute: UW-Madison

- Instructor: prof. Suman Banerjee

## Internship

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### Summer Intern Software Developer, Intel – Shanghai, China

June 2021 - Aug 2021

- Worked on designing a service mesh structure with SGX hardware
- Designed and implemented the stereotype of the system

## Conference/Summer Schools

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Setta'24 , Hong Kong SAR

Nov 26 - Nov 28, 2024

FM'24 , Milan, Italy

Sep 9 - Sep 13, 2024

Summer School on Discrete Mathematics, Prague, Czech Republic

July 1- July 5, 2024