Xuran Cai

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

Education

Oxford-Max-Plank joint Program, Doctor of Philosophy — Sep 2025 - Present, German & UK

- Joint Program by University of Oxford and Max Plank Institute
- Major: Computer Science
- Supervisor: Prof. Amir Goharshady(Oxford) and Prof. Rupak Majumdar(MPI)

Hong Kong University of Science and Technology, Master of Philosophy — Sept 2023 – June 2025, Hong Kong SAR

- Major: Computer Science and Engineering
- Supervisor: Prof. Amir Goharshady and Prof. Jiasi Shen

University of Wisconsin-Madison, Bachelor of Science — Sept 2019 – May 2023, USA

- GPA: 3.86/4.0
- Major: Double Major in Computer Science and Mathematics
- Graduate with Distinction and Major Distinction in CS

Publications

Invariant Generation for Floating-Point Programs via Constraint Solving — October 2026

X. Cai, L. Chen, H. Fu,

Submit to Object-Oriented Programming, Systems, Languages, and Applications, OOPSLA'26

Efficient Algorithms for Partial Constraint Satisfaction Problems over Control-flow Graphs — December 2025

X. Cai, A.K. Goharshady,

International Symposium on Software Engineering: Theories, Tools, and Applications, SETTA'25

Enhancing Compiler Optimization Efficiency through Grammatical Decompositions of Control-Flow Graphs — July 2025

X. Cai,

Mphil Final Thesis

Series-Parallel-Loop Decompositions of Control-flow Graphs — June 2025

X. Cai, A.K. Goharshady, S. Hitarth, C.K. Lam

Submit to Journal of Systems Architecture, JSA'25

Faster Chaitin-like Register Allocation via Grammatical Decompositions of Control-Flow Graphs — 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

Faster Lifetime-optimal Speculative Partial Redundancy Elimination for Goto-free Programs — November 2024

X. Cai, A.K. Goharshady

International Symposium on Software Engineering: Theories, Tools, and Applications, SETTA'24

Teaching Assistant Experiences

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

Funding

Researcher Salary – MPI-SWS, Kaiserslautern, German Jan 2026 - present

Department Scholarship – University of Oxford, Oxford, UK Oct 2025 - present

Postgraduate Scholarship – HKUST, Hong Kong SAR Sep 2023 - July 2025

Internship

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

Setta'25 , Oxford, UK Dec 1 - Dec 3, 2025

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