

Théo Chengkai Wang

☎ +44 7718 608250 | ✉ theo_ck_wang@hotmail.com | 🌐 github.com/theo-chengkai-wang | 🔗 linkedin.com/in/théo-chengkai-wang-289bb9184/

Research topics

I am interested in exploring the various corners of theoretical computer science and gaining a better understanding via the study of pretty abstractions. This includes understanding classical and quantum computation with programming languages, logics, and categories. I have also developed an interest in related topics, such as theorem proving, formal verification, program transformation, etc. I also have an increasing (side) interest in theoretically understanding the phenomenon of (machine) learning (learning theory, categorical deep learning, interpretability etc.). Finally, I also picked up a side interest in exploring theoretical connections between law and computer science.

Education

Balliol College, University of Oxford

Oxford, United Kingdom

MSc. Advanced Computer Science

Oct 2023 - Present

Specialised in theoretical foundations of computer science. **Courses taken:** Law and Computer Science, Algorithmic Foundations of Collective Decision Making, Computational Game Theory, Computational Learning Theory, Distributed Processes Types and Programming, Categories Proofs and Processes, Quantum Processes and Computation, and Quantum Software.

Churchill College, University of Cambridge

Cambridge, United Kingdom

B.A. Hons in Computer Science

Oct 2020 - July 2023

First class with distinction overall, ranked 8/120 in third year. **First class** in first year, ranked 6/113 and **first class** in second year, ranked 2/115.

Academic Prizes and Awards

2023	CST Department Prize: Highly Commended Dissertation , Prize for my undergraduate dissertation on multi-stage programming at the University of Cambridge.	United Kingdom
2022	The Jon Rabone Prize in Computer Science , Most meritorious performance for an undergraduate at Churchill College in the Computer Sciences Tripos exams.	United Kingdom
2021-23	Churchill College Prize Scholarships (all three years) , First class examination results	United Kingdom
2022	Distinguished talk award , Churchill Computer Science Talks Series – Talk on Viola Jones Algorithm	United Kingdom
2019	Bronze medal , International Earth Science Olympiads – Individual contest	Republic of Korea
2019	Gold Prize , International Earth Science Olympiads – Earth Science (team) Project	Republic of Korea

Research Experience

Completeness for Quantum Relational Hoare Logics (ongoing)

Bochum, Germany

Research under Prof. Gilles Barthe at MPI-SP

September 2024 - the present

Working on developing a quantum relational Hoare logic based on Hermitian predicates, which is complete with respect to a weak notion of completeness. The goal is to then obtain using Strassen's theorem a notion of completeness for projector-based quantum relational Hoare logics.

Algebraic Theories and Quantum Communication

Oxford, United Kingdom

MSc Thesis under Prof. Sam Staton

March 2024 - September 2024

Developed an algebraic notion (in the sense of algebraic effects) of classically controlled quantum communication, leveraging insights from categorical quantum mechanics and universal algebra.

Logics for the verification of probabilistic programs

Bochum, Germany

Research project at the Principles of Security and Privacy group, Max Planck Institute for Security and

Privacy, under Prof. Gilles Barthe

July 2023 - Sep 2023

On-going work on developing Hoare logics and Dijkstra-style weakest precondition calculi for the verification of probabilistic and randomised programs. Experimented with verifying various randomised algorithms and probabilistic programs (e.g. the coupon collector problem).

Type-safe multi-stage programming with Lys

Cambridge, United Kingdom

Third Year Dissertation project under Profs Jeremy Yallop and Alan Mycroft

Oct 2022 - June 2023

I created a multi-stage language, Lys, based on contextual modal type theory (CMTT), and build various extensions from there. I then compared it with various other calculi for metaprogramming to shed light on the limitations of CMTT for writing multi-stage programs. Outcome: Highly commended dissertation and presented my findings at the **POPL 2024 student research competition** (link here).

Talk on Viola Jones Face detection

Cambridge, United Kingdom

Churchill Computer Science Talks

Nov 2021

Researched and made a 30-min comprehensive talk on this classical Computer vision algorithm. **Distinguished talk award**. Link [here](#).

Research Schools

- 2024 **Midlands Graduate School in Theoretical Computer Science 2024**, Courses taken in Categorical Realisability, Proof theory and Type theory with Agda. *Leicester, UK*
- 2023 **The Cornell, Maryland, Max Planck Pre-doctoral Research School in Computer Science (CMMRS 2023)**, Courses taken in performative machine learning, quantum computing, human-centered robotics, etc. *Saarbrücken, Germany*

Work Experience

Citadel LLC

London, United Kingdom

Software Engineering Intern, Commodities engineering

June 2022 - Aug 2022

- Designed and developed a data validation framework from scratch, with thorough requirements analysis with internal stakeholders.
- Integrated with the existing systems, e.g. extended a type-driven object-mapping serialization framework to support dynamic polymorphism and Python type-erased generics.
- **Skills:** Python, Software design, Project management, Finance & Business thinking.

Arm Ltd.

Cambridge, United Kingdom

Part-time Undergraduate (Software)

July 2021 - Feb 2022

- Graphics analyzer team (Tool for mobile graphics optimization). Full time internship during summer, then part time as student ambassador.
- Investigated on the testability of the Qt framework for a GUI technology choice (DevOps/QA).
- Extended the data model of the graphics analyzer and wrote a component which analyzes graphics performance.
- **Skills:** C++, Git, Agile methodology, CI, Project management.

Ensoft, Cisco

Harpenden, United Kingdom

Micro-Intern (One week)

June 2021 - July 2021

- Explored a networking simulation platform and integrated a Cisco proprietary docker with it and demoed my findings as a POC (BGP protocol).
- **Skills:** Computer Networking, Docker, research & communication skills.

Teaching Experience

Magdalene and Murray Edwards colleges, University of Cambridge

Cambridge, United Kingdom

Supervisor (Class tutor), Semantics of Programming Languages

Oct 2023 - Jan 2024

Taught tutorial classes ("supervisions") for the Semantics of Programming languages course for 2nd year computer science students at Cambridge. Set exercises, corrected the work and explained solutions in class.

TechX Academy (Summer programme)

Shanghai, China

Academic Lead (Teaching assistant), Full Stack Development course

July 2020 - Aug 2020

Assisted the syllabus and homework design and helped the students during the lectures

Volunteering Experience

Fully Connected 2023

Cambridge, United Kingdom

Leading organiser

March 2023

Co-led a team of 8 for organising Fully Connected, an ML research event for students in Cambridge, with talks, panels, and roundtable sessions for undergraduate students to talk to researchers individually. We had 10+ leading researchers and 100+ students attending.

Hack Cambridge 2022 (Cambridge's flagship hackathon)

Cambridge, United Kingdom

Head of Development

July 2021 - July 2022

Pre-event: Developed and maintained the website with Laravel & React, deployment with AWS and IaC with Terraform. During the event: responsible for the online portion AND coordination of the judging process and platforms.

Skills & Interests

Programming

Java, Python, JavaScript/TypeScript/Node.js, C, C++, OCaml, Prolog, Rust

Languages

French (native), Chinese (native), English (bilingual), Japanese (elementary), German (elementary).

Miscellaneous

Game of Go (Amateur 1 Dan), Competitive Badminton, Table Tennis