Xuanrui Qi

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Education

Oct 2021 —
Ph.D. in Mathematical Science, *Graduate School of Mathematics, Nagoya University*, Nagoya, Aichi, Japan.
Research area: category theory
Advisor: Jacques Garrigue

Oct 2019 —
Sept 2021)
M.S. in Mathematical Science 修士 (数理科学), *Graduate School of Mathematics, Nagoya University*, Nagoya, Aichi, Japan.
Thesis: "Type theory and the logic of toposes"
Advisor: Jacques Garrigue

May 2019
M.S. in Computer Science, *Tufts University*, Medford, MA, USA.
Advisors: Samuel Z. Guyer, Cyrus Omar (University of Michigan, unofficial)

May 2018
B.S. in Computer Science, *Tufts University*, Medford, MA, USA.
Second major: international relations. **Minor**: mathematics.
Advisor: Samuel Z. Guyer

Research Interests

in computer science
applied category theory, logic in computer science, type theory, functional programming languages, program verification

in mathematics
tensor categories, topos theory, categorical logic, ∞-categories, algebraic geometry

Research Positions

July 2020 –
Research Assistant, *Graduate School of Mathematics, Nagoya University*, Nagoya, Japan.
Research assistant position funded under the COCTI (Certifiable OCaml Type Inference) project of the Tezos Foundation, and supervised by Professor Jacques Garrigue.

June 2018 –
August 2018
Research Visitor, *Graduate School of Mathematics, Nagoya University*, Nagoya, Japan.
Hosted by and worked with Professor Jacques Garrigue.

March 2017 – May 2018
Research Assistant, *Department of Computer Science, Tufts University*, Medford, MA, USA.
Research assistant under Professor Samuel Z. Guyer, working in the RedLine Systems Research Group.

Other Positions

2019 – 2020
Intern/Contractor, *SiFive*, San Mateo, CA, USA.
An intern engineer at, then a contractor with SiFive, working with Murali Vijayaraghavan on verifying RISC-V processors in Coq.

2016
Intern, *Institute of Automation, Chinese Academy of Sciences*, Beijing, China.
Interned at the State Key Laboratory of Control and Management of Complex Systems, working on computer vision.

Research Publications

Research Papers

1. Reynald Affeldt, Jacques Garrigue, **Xuanrui Qi**, and Kazunari Tanaka. Proving Tree Algorithms for Succinct Data Structures. The 10$^{\text{th}}$ International Conference on Interactive Theorem Proving (ITP 2019).

Theses

1. **Xuanrui Qi**. Type Theory and the Logic of Toposes. Master's thesis, Nagoya University, 2021. Thesis advisor: Jacques Garrigue.
2. **Xuanrui (Ray) Qi**. Elephant Tracks II: Practical, Extensible Memory Tracing. Senior Honors Thesis, Tufts University, 2018. Thesis committee: Sam Guyer (chair), Kathleen Fisher.

Refereed Talks & Presentations

1. Jacques Garrigue, **Xuanrui Qi**. Formalizing OCaml GADT Typing in Coq. ML Family Workshop 2021 (ML 2021).
2. **Xuanrui Qi**, Jacques Garrigue. Towards a Coq Specification for Generalized Algebraic Datatypes in OCaml. The 7$^{\text{th}}$ International Workshop on Coq for Programming Languages (CoqPL 2021).
3. Reynald Affeldt, Jacques Garrigue, **Xuanrui Qi**, and Kazunari Tanaka. Experience Report: Type-Driven Development of Certified Tree Algorithms in Coq. The Coq Workshop 2019.
4. **Xuanrui (Ray) Qi**. From Tactics to Structure Editors for Proofs. Off the Beaten Track 2019 (OBT 2019).
5. **Xuanrui (Ray) Qi**. A Practical and Extensible Framework for Garbage Collection Tracing. SPLASH 2018 Student Research Competition.

Teaching Experience

Teaching Assistant

- Mathematics of Machine Learning, Global 30 Program Special Mathematics Lecture, Fall 2020, Nagoya University (Instructor: Prof. Henrik Bachmann)
- Calculus II, Global 30 Program, Spring 2020, Nagoya University (Instructor: Prof. Serge Richard)
- Calculus I, Global 30 Program, Fall 2019, Nagoya University (Instructor: Prof. Serge Richard)
- Concurrent Programming (COMP 50CP), Fall 2017 & 2018, Tufts University (Instructor: Prof. Mark Sheldon)

Other Courses

- Peer instructor (instructor of record), Spring 2018, Experimental College, Tufts University