ZHAOYI GE

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EDUCATION

University of Waterloo September 2025 - August 2030
Ph.D, Computer Science

- Supervisor: Yizhou Zhang, Ondřej Lhoták

University of Waterloo September 2020 - May 2025
Bachelor of Computer Science

- Cumulative average: 91.19%
- Major average: 91.83%

RESEARCH INTERESTS

Type Systems / Algebraic Effects / Functional Programming / Logic in Computer Science.

PUBLICATIONS

Cong Ma, **Zhaoyi Ge**, Edward Lee, Yizhou Zhang. **Lexical Effect Handlers, Directly**. *39th ACM International Conference on Object-Oriented Programming, Systems, Languages, and Applications*. **OOPSLA 2024**.

RESEARCH EXPERIENCE

Lexa: Lexical Effect Handlers Directly. Sep 2023 - Aug 2024
Undergraduate Research Fellow *University of Waterloo*

- Supervised by: Yizhou Zhang.
- Worked on the Lexa language, a language that compiles high-level, modular effect handlers to low-level, efficient stack switching.
- Primary contributor to the Lexa compiler. The compiler translates the high-level, functional Lexa code into C.
- Enhanced Lexa with tail call and closure call optimization, algebraic data types, a standard library, and an import system.
- Rewrote an effect handler benchmark suite using Lexa. Lexa is the fastest system on 8 out of 14 benchmarks and the second fastest in the rest.

Extend Capture Calculus May 2024 - Present
Undergraduate Research Assistant *Univeristy of Waterloo*

- Supervised by: Ondřej Lhoták.
- Worked on extending the semantics and type system of Odersky's capture calculus with heaps, in an effort to relate capture tracking with the runtime reachability of closures via pointers in the heap.
- Refactored the Coq soundness proof and proved progress and preservation, greatly simplified the proof and allowed for extensibility by using a lattice-based capture set definition instead of a set-based definition.

Zero-Cost Lexical Effect Handlers November 2024
Undergraduate Research Assistant *Univeristy of Waterloo*

- Supervised by: Yizhou Zhang.
- Worked on a language with type-directed compilation that eliminates the runtime overhead for having lexical effect handlers in context.
- Implemented a procedure that uses DWARF information in the ELF binary to traverse the stack and locate effect handlers.
- Designed case studies to demonstrate the performance edge of zero-cost effect handlers.

WORK EXPERIENCE

Replicant September 2024 - December 2024
Software Developer Intern, Machine Learning Platform *Toronto, Ontario*

- Refactored codebase to allow integration with external LLM frameworks.

Genesys May 2023 - August 2023
Software Developer Intern, Security Development *Remote*

- Led the development of a security automation service in Python for cloud native applications.
- Designed DynamoDB schemas for efficient data lookup.

MeshAI May 2022 - August 2022
Software Developer Intern *Remote*

- Built healthcare services using Java, GraphQL and Vue.js. Improved response time by caching using Redis.

TECHNICAL SKILLS

Languages	OCaml, Coq, Scala, Agda, Racket, C.
Tools and Technologies	x86 Assembly, Nix.

AWARDS AND HONORS

2020	University of Waterloo President's Scholarship ($2000)
2023	University of Waterloo Undergraduate Research Fellowship ($7500)
2023	University of Waterloo Mathematics Undergraduate Research Award ($4500)
2024	University of Waterloo Undergraduate Research Fellowship ($7500)
2024	University of Waterloo Mathematics Undergraduate Research Award ($4500)
2025	David R. Cheriton Graduate Scholarship ($20000)