



Zhan Shi

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Education

Kyoto University

Master of Informatics in Communication and Computer Engineering

Advisor: Atsushi Igarashi

Apr, 2022 - Mar, 2024

Kyoto, Japan

Kumamoto University

B.Eng. in Computer Science

Oct, 2019 - March, 2022

Kumamoto, Japan

Shandong University

B.Eng. in IoT Engineering

Sep, 2017 - June, 2021

Qingdao, Shandong, China

Research Interests

Dependent Type Theory:

- Implementation of dependently typed programming languages, focusing on dependent elaboration and dependent pattern matching.
- Exploring semantic models and methods for dependent type theories, including categorical semantics, normalization-by-evaluation, and logical relations.
- Improving the usability of dependently typed programming languages to extend the power of dependent types into general programming.
- Investigating the integration of dependent types with other type systems, such as gradual typing and effect systems.

Research Experience

A Cast Calculus for Implementing Gradual Dependent Types, Master's Thesis

Jan, 2023 - Feb, 2024


Kyoto University, advised by Prof. Atsushi Igarashi and Prof. Taro Sekiyama

Kyoto, Japan

- Proposed a novel approach to implementing gradual dependent types soundly and efficiently for introducing dependent types into general-purpose programming languages.
- Introduced a cast calculus as the core language base on dependent pattern matching and pattern unification.
- Implemented a prototype of the cast calculus in Haskell.
- Presented a short paper[1] at SRC@SPLASH 2023, giving a talk and a poster presentation.

OpenSource Contributions


Aya Prover, Practical implementation of a dependent type system

 [aya-dev](#)

- Overhauled records to support dependent types.
- Helped with some bugs and refactorings in primitive definitions.


Personal Projects

yukino, A type-driven and high-performance ORM framework in Rust


 [yukino-dev](#)

- Derives SQL operations from simple Rust code based on a monadic structure.
- Provides a functional query builder that delegates its type-checking to the type system of Rust (makes heavy use of type-level computation).
- The abstraction is type-safe but zero-cost, ensures both efficiency and type safety.

toy-dt-cpp, A toy dependently typed language implementation in C++

 [top-dt-cpp](#)

derivation-resolver, Derivation tree resolver for STLC and System F in Rust

 [derivation-resolver](#)

Skills

- **Programming Languages:** Agda, C/C++, Coq, Java, JavaScript, Haskell, OCaml, PHP, Python, TypeScript, Rust. Able to work effectively with any programming language.
- **Compiler:** understand variants compiler architectures, familiar with compiler frontend, especially in type checking. Also have experience in parser generator and DSL design.
- **Web Development:** 7 years of experience in full-stack web development, proficient in backend and frontend development, database design, and optimization, and DevOps practices.

- **Languages:** Chinese: native, English: advanced, Japanese: intermediate
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Publications & Talks

- [1] Z. Shi, “Partial Gradual Dependent Type Theory,” in *Companion Proceedings of the 2023 ACM SIGPLAN International Conference on Systems, Programming, Languages, and Applications: Software for Humanity*, in SPLASH 2023. Cascais, Portugal: Association for Computing Machinery, 2023, pp. 22–24. doi: [10.1145/3618305.3623594](https://doi.org/10.1145/3618305.3623594).