SIYUAN HE

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EDUCATION

- **Purdue University, West Lafayette, IN**, Ph.D. candidate in Computer Science *Aug. 2021 - TBD*
- **University of Michigan, Ann Arbor, MI**, Master of Science in Information *Aug. 2019 - Apr. 2021*
- **Shanghai Jiaotong University, Shanghai**, Bachelor of Electr. and Comput. Eng. *Sept. 2016 - Aug. 2020*

SELECTED ACADEMIC RESEARCH

Reachability Types - Tracking Aliasing and Separation in Higher-Order Functional Programs
Advised by Prof. Tiark Rompf, Related tools: Coq *Sept. 2021 - present*

- When Lifetimes Liberate: A Type System for Arenas with Higher-Order Reachability Tracking (OOPSLA 26)
- Complete the Cycle: Reachability Types with Expressive Cyclic References (OOPSLA 25)
- Free to Move: Reachability Types with Flow-Sensitive Effects for Safe Deallocation and Ownership Transfer (in submission)
- Escape with Your Self: Expressive Reachability Types with Sound and Decidable Bidirectional Type Checking (PLDI 2026)
- Typestate via Revocable Capabilities (PLDI 2026)

Domain, Range, and Image Types - Lightweight Type and Effect Polymorphism in Higher-Kind settings
Advised by Prof. Tiark Rompf, Related tools: Coq *Sept. 2024 - present*

- Let Functions Speak: Lightweight Parametric Polymorphism via Domain and Range Types (in submission)

Binary Auditing with LLM
Advised by Prof. Xiangyu Zhang, Partial Participation *Dec. 2025 - Mar. 2026*

- BINAudit: Verifiable Neural-Symbolic Auditing of Firmware Binaries for Exploitable Vulnerabilities (in submission)

Formal verification of a pathway finding algorithm
Advised by Prof. Jean-Baptiste Jeannin, Related tools: Coq *Oct. 2019 - Oct. 2020*

- Verification of an Airport Taxiway Path-Finding Algorithm (DASC 2020)

Extraction from Hazel to OCaml
Advised by Prof. Cyrus Omar, Related tools: ReasonML, OCaml *Sept. 2019 - Dec. 2019*

- Formulated a comprehensive mapping framework, translating the Abstract Syntax Tree (AST) of Hazel into OCaml by constrained local inference techniques.

WORK EXPERIENCE

Arista Networks, CVP Team
Software Engineer Intern. Related tools: Golang *May 2024 - Aug. 2024*

- Develop a SHA512 Digest validation for cloud image downloading.
- Develop a version filter of the old images without guaranteed digest support.
- Design the interaction between front-end and back-end to perform error highlighting and back-track navigation.

Nokia Shanghai-Bell - ION Department, 5G Core Team
Software Engineer Intern. Related tools: C++ *May 2020 - Aug. 2020*

- Adapted a test framework, devising comprehensive test cases to simulate extensive user-to-server random access scenarios.
- Executed laboratory assessments on an experimental network server hardware and Optimized Identity Verification Algorithm.

Lenovo Research - AI Lab, Face Recognition Team
Research Intern. Related tools: Python, C++, Machine learning *Dec. 2017 - Feb. 2018*

- Developed modules for image pre-processing, encompassing blur detection, supervised learning-based similarity detection, and the implementation of filters for over-exposed images.
- Integrated that modules into a face recognition system and deployed them in an experimental self-service convenience store.

TEACHING EXPERIENCE

- Operating Systems. CS 352 (2022 Fall, 2023 Spring, 2023 Fall), CSCI 403 (2026 Spring Indy Campus).
- Architecture. CSCI 402 (2025 Fall Indy Campus). VE 370 (2019 Summer, Shanghai Jiaotong University).
- C Programming. CS 159 (2024 Fall, 2025 Spring). CS 240 (2025 Summer). *Graduate Teaching Award*
- Compilers. CS 352 (2024 Spring).

SELECTED PROJECTS

Discord Bot for Raid Management
Developed in spare time. Related tools: Python *Apr. 2021*

- Conceptualized and executed a comprehensive management system for raid battles within an online game. This encompassed functionalities like member registration, archival of battle logs, real-time reporting, and holistic status inquiries.
- Implemented the management system by deploying it as a Discord bot, featuring interactive commands to streamline user engagement.