

SIYUAN HE

Software Engineer Intern Summer 2024

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EDUCATION

- **Purdue University, West Lafayette, IN**, Ph.D. candidate in Computer Science Aug. 2021 - Dec. 2026
- **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

- Contributed to the Coq mechanization and examples of the λ^* system.
- Expanded the calculus of reachability types to incorporate destructive effects, enabling safe deallocation, uniqueness, and move semantics (to appear).
- Lead the development of call-dependent reachability, introducing a lightweight polymorphic approach to perform precise reachability tracking.

Formal verification of a pathway finding algorithm

Advised by Prof. Jean-Baptiste Jeannin, Related tools: Coq

Oct. 2019 - Oct. 2020

- First proposed the formal implementation and specification of an error-free taxiway path-finding algorithm, subsequently conducting formal correctness proofs.
- Proposed a formally proved framework for a domain-specific mapping between undirected graphs and directed graphs integrating Air Traffic Control (ATC) constraints.
- Authored a comprehensive technical report addressed to the project sponsor, Collins Aerospace, providing in-depth insights into project progress, methodologies, and outcomes.

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

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.
- Enhanced a previously complex client identity verification pattern through strategic labeling and prioritization based on time-sensitive factors.

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 the modules into a face recognition system and deployed it within the experimental self-service convenience store setting.
- Collected test data, delivered weekly reports with solutions for challenges, and shared progress through team presentations.

TEACHING EXPERIENCE

- CS354 Operating Systems, Purdue University. Related tools: C++, XINU, Assembly 2022 Fall - 2023 Fall
- VE370 Computer Organization, Shanghai Jiaotong University. Related tools: Verilog, Assembly, C 2019 Summer

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.

CDMA Visualization

SI649 Information Visualization, University of Michigan. Related tools: HTML/CSS/Javascript

Nov. 2019

- Developed and deployed a website introducing computer network terminology.
- Incorporated mathematical formulas into the website using the MathJax library.
- Crafted two interactive figures with the Jsxgraph library for enhanced visualization.