

# HANWEN GUO

[GUO@HANWEN.IO](mailto:GUO@HANWEN.IO) [HANWEN.IO](https://hanwen.io) [GITHUB](https://github.com/hanwen) [GOOGLE SCHOLAR](https://scholar.google.com/citations?user=HANWEN)

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## EDUCATION

University of Utah, Ph.D. in Computer Science 08/2024 – 12/2029 (expected)  
Advisor: [Ben Greenman](#) | Research Focus: Programming Languages, Type Systems, Gradual Typing, Program Analysis  
Wuhan University, B.Eng. in Computer Science Fall 2020 – Spring 2024

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## RESEARCH EXPERIENCE

PPG: Automated Auditing for Python TypeGuard Predicates Spring 2025 – Present

- Designed PPG, a hybrid static-analysis and property-based testing approach for auditing the semantic validity of Python TypeGuard predicates by extracting True-returning path constraints and synthesizing acceptance-directed Hypothesis tests.
- Audited 308 TypeGuard predicates across 60 open-source projects (>5M lines of Python), finding 50 reproducible counterexamples across 23 projects and characterizing recurring sources of unsoundness and barriers to automated validation.

If-T: A Benchmark for Type Narrowing Fall 2024 – Spring 2025

- Proposed and implemented a language-agnostic benchmark with 13 scenarios spanning three fundamental dimensions of type-narrowing design.
- Evaluated 10 gradual type checkers (including TypeScript, Flow, mypy, Pyright, ty, Pyrefly, Sorbet, Luau) and analyzed differences in narrowing precision and supported type-narrowing designs.
- The benchmark was later [used and credited by the Elixir team](#) in evaluating Elixir's type system.

STIR: Statistical Type Inference for Incomplete Programs Fall 2023 – Spring 2024

- Contributed to the research artifact by restructuring benchmark workflows into a modular, parameterized architecture and optimizing the evaluation pipeline through profiling, parallelization, and C++ reimplementations of data-processing components.

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## PUBLICATIONS

- [1] Hanwen Guo, Ben Greenman. 2025. If-T: A Benchmark for Type Narrowing. *<Programming> 10.2. Editors' Choice Award*. [\[CODE\]](#) [\[DOI\]](#) [\[PDF\]](#) [\[POSTER\]](#)
- [2] Y. Peng et al. 2023. Statistical Type Inference for Incomplete Programs. *ESEC/FSE 2023. Best Artifact Award*. [\[CODE\]](#) [\[DOI\]](#) [\[PDF\]](#)

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## TECHNICAL SKILLS

- Languages: Python, C++

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## TEACHING & SERVICE

Artifact Evaluation Committee, [<Programming> 11](#) Spring 2026

Teaching Assistant, University of Utah Fall 2025, Spring 2026, Fall 2026  
Programming Language, Operating Systems