

# Wen Fan

[fan372@purdue.edu](mailto:fan372@purdue.edu) | [Homepage](#) | [Google Scholar](#) | [Github](#) | [Linkedin](#)

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## RESEARCH SUMMARY

Ph.D. researcher in software verification and static analysis. I combine separation-logic-based verification and LLM-assisted specification generation for heap-manipulating programs, aiming to apply formal methods to security-critical and distributed systems.

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## EDUCATION

**Ph.D., Electrical and Computer Engineering, Purdue University**

West Lafayette, Indiana, USA

- Advisor: Prof. Jenna DiVincenzo

*Aug. 2022 – Aug. 2028 (Expected)*

**B.S., Computer Science, University of Science and Technology of China (USTC)**

Hefei, Anhui, China

- GPA: 3.75/4.3

*Sept. 2018 – Jun. 2022*

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## PUBLICATIONS

- **Wen Fan**, Minh Tran, Sanya Dod, Xin Hu, Marilyn Rego, Danning Xie, Jenna DiVincenzo, Lin Tan  
An Empirical Study of LLM-Generated Specifications for VeriFast  
Under submission to **ISSTA 2026**
- Marilyn Rego\*, **Wen Fan\***, Xin Hu, Sanya Dod, Zhaorui Ni, Danning Xie, Jenna DiVincenzo, Lin Tan  
Evaluating the Ability of Large Language Models to Generate Verifiable Specifications in VeriFast  
**FORGE @ ICSE 2025** [[paper](#)][[code](#)]

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## RESEARCH PROJECTS

**Evaluating and Enhancing LLMs on Generating Specifications for Verifying Heap-manipulating programs**

Purdue University

Advisor: Prof. Jenna DiVincenzo

*Sept. 2024 – Now*

- Built a benchmark based on 60 programs specified in VeriFast verifier
- Developed automated Python pipeline to evaluate 10 LLMs on 2700+ outputs
- Led our team of 4 to inspect and categorize 1648 VeriFast errors from 450 sampled output functions
- Identified only 31.7% verification success; Over 87% functional behavior preserved; 71% of errors caused by tool-specific knowledge gaps; 47% of errors can be fixed by modifying simple auxiliary specifications
- Building the tool to improve the performance based on the empirical findings

**Optimizing Gradual Program Verifier with Parallel Symbolic Execution**

Purdue University

Advisor: Prof. Jenna DiVincenzo

*Jun. – Aug. 2024*

- Discovered the performance bottleneck in sequential execution by analyzing a program of 571 branches
- Designed and implemented parallel execution of branches, reducing static verification time by 41%

**Consensus Protocol Performance Optimization under Different Fault Models**

Purdue University

Advisor: Prof. Yongle Zhang

*May. 2023 – Mar. 2024*

- Investigated 40+ consensus protocols in different fault models (e.g., ordered network, reduced node failures)
- Conducted a survey about 5+ synthesis techniques on distributed systems/protocols with 3 other team members
- Identified 8+ examples of improving the performance of Paxos under different fault models

**Static Analysis For Failure Detection in Distributed Systems**

Purdue University

Advisor: Prof. Yongle Zhang

*Jun. 2022 – Apr. 2023*

- Examined 100+ failure cases on Apache Jira to characterize cascading failures
- Implemented a static analyzer using the Soot framework to recognize 7 cases of retry in HBase

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## AWARDS

Huawei Scholarship

*Nov. 2020*

Huaxia Talent Program, USTC

*Jun. 2022*

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## SKILLS

**Programming Languages:** C, C++, Python, Java, Scala, Go, Rust, OCaml, Verilog, SQL, MATLAB

**Verification/Analysis:** VeriFast, Dafny, Soot, LLVM

**Systems/Tools:** Linux, Git, Docker, Makefile, LaTeX, Django, Wireshark

**Languages:** English (fluent), Chinese (native)