

YIHAN DAI

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While LLMs and AI agents provide substantial support for programming, they frequently generate plausible code that fails to align with human intent. My research aims to address the oracle problem in AI-generated code through advances in programming languages and software engineering. Specifically, I seek to construct reliable correctness oracles or derive oracle-like signals in settings where no explicit oracle is available.

EDUCATION

Ph.D., Programming Language Lab, School of Computer Science, Peking University Sep 2025 – present
Research topics: oracle problem for AI-generated code, Supervisor: Sergey Mechtaev; Expected graduation: 2030
Bachelor's Degree, College of Cyber Science, Nankai University Sep 2021 – Jun 2025
Double major in Cyber Science and Law, GPA: 3.79/4; Ranked 1st

PUBLICATIONS

- [1] **Validating Autoformalized Specifications via Contrapuntal Languages**
Yihan Dai, Xuanlin Liu, Haoxiang Jia, Tianchi Li, Xin Zhang, Sergey Mechtaev
Preprint, arXiv:2610.30059, 2026. · Under review.
An oracle-free approach that validates LLM-generated formal specifications through synthesized contrapuntal languages—pairs of task-specific formal languages with no structure-preserving translation between them. Such representational diversity helps reduce correlated errors and make cross-language agreement more reliable signal of specification validation.
- [2] **Reducing Hallucinations in LLM-Generated Code via Semantic Triangulation**
Yihan Dai, Sijie Liang, Haotian Xu, Peichu Xie, Sergey Mechtaev
Object-Oriented Programming, Systems, Languages & Applications (OOPSLA), 2026. · Accepted
An oracle-free approach that detects hallucinations in LLM-generated code by checking consistency across transformed programming tasks. Both theoretical analysis and empirical evaluation support its reliability as a plausibility witness.
- [3] **HoarePrompt: Structural Reasoning About Program Correctness in Natural Language**
Dimitrios Stamatios Bouras, Yihan Dai, Tairan Wang, Yingfei Xiong, Sergey Mechtaev
International Conference on Software Engineering (ICSE), 2026. · ACM SIGSOFT Distinguished Paper Award
An oracle-free approach that uses structured natural-language reasoning about program states to assess code correctness.
- [4] **Authority Is Not a String: A Capability-Scoped Harness for Prompt-Injection-Resistant Coding Agents**
Dimitrios Stamatios Bouras, Yihan Dai, Sergey Mechtaev
Workshop on Language Models and Programming Languages (LMPL @ SPLASH), 2026. · Accepted
- [5] **Statistical Independence Aware Caching for LLM Workflows**
Yihan Dai, Dimitrios Stamatios Bouras, Haoxiang Jia, Sergey Mechtaev
International Workshop on Large Language Models for Code (LLM4Code @ ICSE), 2026. · Accepted

AWARDS & HONORS

ACM SIGSOFT Distinguished Paper Award	2026
For “HoarePrompt: Structural Reasoning About Program Correctness in Natural Language”, ICSE 2026.	
National Scholarship	2022, 2024
TCL Huameng Scholarship	2023
Outstanding Graduate Award, Outstanding Student Award	2025
Contemporary Undergraduate Mathematical Contest in Modeling, Provincial First Prize	2023

ACADEMIC SERVICE & TEACHING

Subreviewer , ICSE 2026; ICSE 2027	2025–2026
Teaching Assistant , Peking University 04834580 Software Engineering (Honor Track), taught by Prof. Sergey Mechtaev	Mar – Jun 2026
Teaching Assistant , Nankai University Operating System, taught by Prof. Xiaoli Gong	Sep 2024 - Jan 2025