Zhiyu Fan

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Biography and Research Interests

My research goals include exploring the next-generation autonomous software development paradigm and enhance developers' trust in this process, and building intelligent system to ease computer science education with program analysis and AI. My research has been focused on the intersections of automated program repair, automatic programming, and computer science education. My research work on program repair for intelligent tutoring (TOSEM22, ISSTA23, CSEE&T25), program repair of AI programs (ICSE23), explorations on AI (i.e. LLM) programming (ISSTA24a, ISSTA24b) have been published in top-tier software engineering venues. During my PhD, I led the development of Intelligent Tutoring System to boost Computer Science education at scale via SE and LLM techniques, which has been deployed in NUS. In addition, my recent research on autonomous software development has attracted public interest.

Education

- **National University of Singapore**   Singapore
  Ph.D School of Computing   2019.08 – 2024.12
  Thesis: Program Repair for Intelligent Tutoring and Programming Education
  Advisor: Professor Abhik Roychoudhury

- **Southern University of Science and Technology**   ShenZhen, China
  B.E., Computer Science and Engineering   2015.09 – 2019.07
  Advisor: Professor Shin Hwei Tan

Publications(* Co-first author, # Corresponding author)

- **[CSEE&T'25] Software Engineering Educational Experience in Building an Intelligent Tutoring System**
  Zhiyu Fan, Yannic Noller, Ashish Dandekar, Abhik Roychoudhury
  Conference on Software Engineering Education and Training (previously known as ICSE-SEET), 2025

- **[ISSTA'24] AutoCodeRover: Autonomous Program Improvement**
  Yuntong Zhang, Haifeng Ruan, **Zhiyu Fan**, Abhik Roychoudhury
  International Symposium on Software Testing and Analysis (ISSTA), 2024

- **[ISSTA'24] Oracle-guided Program Selection from Large Language Models**
  Zhiyu Fan, Haifeng Ruan, Sergey Mechtaev, Abhik Roychoudhury
  International Symposium on Software Testing and Analysis (ISSTA), 2024

- **[ICSE'23] Automated Repair of Programs from Large Language Models**
  Zhiyu Fan, Xiang Gao, Martin Mirchev, Abhik Roychoudhury, Shin Hwei Tan
  International Conference on Software Engineering (ICSE), 2023

- **[ISSTA'23] Concept-based Automated Grading of CS-1 Programming Assignments**
  Zhiyu Fan, Shin Hwei Tan, Abhik Roychoudhury
  International Symposium on Software Testing and Analysis (ISSTA), 2023

- **[TOSEM'22] Verifix: Verified Repair of Programming Assignments**
  Umair Z. Ahmed*, **Zhiyu Fan***, Jooyong Yi, Omar I. Al-Bataineh, Abhik Roychoudhury
  ACM Transactions on Software Engineering and Methodology (TOSEM), 2022

- **[ICSE'19] A Systematic Evaluation of Problematic Tests Generated by EvoSuite**
  Zhiyu Fan
  Student Research Competition at ICSE, 2019

Services

- **Reviewer for TSE 2023, SIGCSE 2024/2025, TOSEM 2024**

- **PC Member for APR Workshop @ ICSE 2024**

Awards and Honors

- **NUS Dean's Graduate Research Excellence Award** — 2024.12
- **NUS Research Incentive Award** — 2023 - 2024
- **NUS Research Achievement Award** — 2023.01
- **NUS Research Scholarship** — 2019.08 – 2024.12
- **Bronze Medal in ACM SRC@ICSE 2019** — 2019.06
- **Outstanding Graduate Thesis Award of SUSTech** — 2019.06
- **Outstanding Graduate of SUSTech** — 2019.05
- **ACM SIGSOFT CAPS Grants** — 2019.04
- **ACM SIGSOFT SRC Travel Award** — 2019.03
- **First Prize in National Student Contest of Software Testing** — 2018.11

Teaching experience

During my PhD, I significantly devoted my time to teaching. I have mentored 7 undergraduate final-year projects on the topic of intelligent tutoring. I led the development of Intelligent Tutoring System powered by APR and GenAI to provide precise and instant feedback for students' programming assignments in NUS SoC, which has been deployed and adopted by other university. I have also actively served as teaching assistant for various undergraduate-level courses. I have participated in the preparation of CS3213, a new Software Engineering course in NUS, please refer to our CSEE&T 25 paper.

- **CS2040S: Data Structures and Algorithms** — NUS
  Teaching Assistant — 2024.01 – 2024.04

- **CS3213: Foundations of Software Engineering** — NUS
  Head Teaching Assistant — 2023.01 – 2023.04

- **CS3213: Foundations of Software Engineering** — NUS
  Head Teaching Assistant — 2022.01 – 2022.04

- **CS4211: Formal Method for Software Engineering** — NUS
  Teaching Assistant — 2020.08 – 2020.11

- **CS304: Software Engineering** — SUSTech
  Teaching Assistant — 2019.03 – 2019.06

- **CS303A: Introduction to Artificial Intelligence** — SUSTech
  Teaching Assistant — 2019.03 – 2019.06

- **CS102A: Java How to program** — SUSTech
  Teaching Assistant — 2016.09 – 2017.01