Yuntianyi Chen

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EDUCATION

Ph.D. Candidate of Software Engineering 2021.09—Present
University of California, Irvine, USA
Bachelor of Computer Science and Technology 2016.09—2020.06
Wuhan University, China

WORK EXPERIENCES

- **Graduate Student Researcher** in University of California, Irvine 2021.09—Present
  - Conducting research in areas of Autonomous Driving System, Software Configuration, and Automated Software Testing
- **Teaching Assistant** in University of California, Irvine 2021.09—Present
  - SWE 241P - Applied Data Structures and Algorithms
  - SWE 243P - Database Programming
  - SWE 247P - Applied Information Retrieval
  - SWE 249P - Applied Data Analytics
  - SWE 266P - Software Security and Dependability
  - ICS 32 - Programming with Software Libraries
  - ICS 45J - Programming in Java
  - INF 122 - Software Design: Structure and Implementation
  - CS 113 / INF 125 - Computer Game Development
- **Research Assistant** in Wuhan University 2020.07—2021.07
  - Working at the Centre of Software Testing, Analysis and Reliability (CSTAR Lab)
- **Undergraduate Student Researcher** in Wuhan University 2017.11—2020.06
  - Conducting research in areas of Performance Ranking, Software Configuration, and Transfer Learning
- **Teaching Assistant** in Wuhan University 2017.09—2017.12
  - Advanced Software Engineering

PUBLICATIONS

[1] Yuntianyi Chen, Yuqi Huai, Shilong Li, Changnam Hong, Joshua Garcia. “Misconfiguration Software Testing for Failure Emergence in Autonomous Driving Systems”. Proc. ACM Softw. Eng. 1, FSE (2024), 1913–1936. (**FSE 2024**)

[2] Yuqi Huai, Sumaya Almanee, Yuntianyi Chen, Xiafa Wu, Qi Alfred Chen, Joshua Garcia. “scenoRITA: Generating Diverse, Fully Mutable, Test Scenarios for Autonomous Vehicle Planning”. IEEE Trans. Software Eng. 49, 10 (2023), 4656–4676. (**TSE 2023**)

[3] Yuqi Huai, Yuntianyi Chen, Sumaya Almanee, Tuan Ngo, Xiang Liao, Ziwen Wan, Qi Alfred Chen, Joshua Garcia. “Doppelgänger Test Generation for Revealing Bugs in Autonomous Driving Software”. In 45th IEEE/ACM International Conference on Software Engineering, ICSE 2023, Melbourne, Australia, May 14-20, 2023. IEEE, 2591–2603. (**ICSE 2023**)

[4] Yongfeng Gu, Yuntianyi Chen, Xiangyang Jia, Jifeng Xuan. “Multi-Objective Configuration Sampling for Performance Ranking in Configurable Systems”. In 26th Asia-Pacific Software Engineering Conference, APSEC 2019, Putrajaya, Malaysia, December 2-5, 2019. IEEE, 150–157. (**APSEC 2019**)

[5] Yuntianyi Chen, Yongfeng Gu, Lulu He, and Jifeng Xuan. “Regression Models for Performance Ranking of Configurable Systems: A Comparative Study”. In Structured Object-Oriented Formal Language and Method - 9th International Workshop, SOFL+MSVL 2019, Shenzhen, China, November 5, 2019. Springer, 243–258. (**SOFL+MSVL 2019**)

SERVICES

Committee

- **Web & Publicity Chair and Program Committee Member**, 47th IEEE/ACM International Conference on Software Engineering (ICSE 2025), 1st International Workshop on Software Engineering for Autonomous Driving Systems (SE4ADS 2025) 2024.09
- **Program Committee Member**, 47th IEEE/ACM International Conference on Software Engineering (ICSE 2025), Artifacts Evaluation Track 2024.09
- **Program Committee Member**, ACM Conference on Computer and Communications Security (CCS 2024), Artifacts Evaluation Track 2024.05
- **Program Committee Member**, 21st International Conference on Software Architecture (ICSA 2024), Artifacts Evaluation Track 2024.03

Reviewer

- **Reviewer**, IEEE Transactions on Software Engineering (TSE), Full Length Journal Paper 2024.11
- **Reviewer**, ACM Transactions on Software Engineering and Methodology (TOSEM), Full Length Technical Journal Paper 2024.07
- **External Reviewer**, 33rd ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2024), Technical Papers 2024.05
- **Reviewer**, ACM Conference on Computer and Communications Security (CCS 2024), Artifacts Evaluation Track 2024.05
- **External Reviewer**, 47th IEEE/ACM International Conference on Software Engineering (ICSE 2025), Research Track 2024.04
- **Reviewer**, 21st International Conference on Software Architecture (ICSA 2024), Artifacts Evaluation Track 2024.03
- **Reviewer**, IEEE Robotics and Automation Letters (IEEE RA-L), Journal Paper 2024.01
- **Delegate Reviewer**, 41st IEEE Conference on Robotics and Automation (ICRA 2024), Contributed papers 2023.11
- **External Reviewer**, 32nd ACM Symposium on the Foundations of Software Engineering (FSE 2024), Research Papers 2023.11
- **Sub-reviewer**, 20th IEEE International Conference on Software Architecture (ICSA 2023), Technical Track 2022.12
- **Sub-reviewer**, 27th IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER 2020), Research Track 2019.11

Volunteer

- **Student Volunteer**, 31st ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE 2023) 2023.12

- **Student Volunteer**, Southern California Software Engineering Symposium (SuCSES 2023) 2023.05
- **Organizer and Volunteer**, The Workshop of Intelligent Real-time Methods and Technologies of Quality Improvement based on Co-programming 2021.04

TALKS

- Paper Presentation, "Regression Models for Performance Ranking of Configurable Systems: A Comparative Study" at the Annual Conference on Software Analysis, Testing and Evolution (SATE 2019), Hangzhou, China 2019.11.22

RESEARCH EXPERIENCES

Misconfiguration Software Testing for Failure Emergence in Autonomous Driving Systems

- Proposed ConfVE, the first configuration testing approach in the autonomous driving system (ADS) domain, which serves as a testing framework that utilizes scenarios from ADS scenario-generation techniques and a genetic algorithm to produce alternative configurations to identify emerged failures.
- Evaluated ConfVE on two open-source versions of production-grade ADSes using 9 violation oracles. Designed 3 novel module-level oracles that detect bug-revealing violations in ADS scenarios.
- Introduced a duplicate elimination process to minimize duplicate failure generation and identify emerged failures, which works by checking the similarity of traffic violations using an unsupervised clustering technique and representing those violations as the key features of driving scenarios with respect to each different violation type.

scenoRITA: Generating Diverse, Fully Mutable, Test Scenarios for Autonomous Vehicle Planning

- Introduced scenoRITA, a search-based testing framework, with a novel gene representation and domain-specific constraints, that automatically generates valid and effective driving scenarios.
- Employed an unsupervised clustering technique to group driving scenarios with similar violations according to extracted features, to automate the process of identifying and eliminating duplicate violations.
- Implemented 5 test oracles and corresponding fitness functions for the autonomous vehicle (AV), introducing the first search-based testing technique for AV software that uses multiple test oracles simultaneously and considers both comfort and safety violations as part of those oracles.

Doppelgänger Test Generation for Revealing Bugs in Autonomous Driving Software

- Presented DoppelTest, a framework that generates bug-revealing scenarios by making every vehicle an autonomous vehicle (AV) and models traffic control (e.g., traffic signals and stop signs), which automatically addresses the key challenge of determining responsibility after an AV is involved in a violation (e.g., collision).

Multi-Objective Configuration Sampling in Configurable Systems

- Proposed a multi-objective sampling method, MoConfig, which uses Pareto optimization to minimize the number of samples we need to measure and maximize the ability to rank good configurations to the front. The research aims to balance the trade-off between the measurement cost and the ranking ability in the performance ranking problem.

Regression Models for Performance Ranking of Configurable Systems: A Comparative Study

- Conducted a comparative study on 4 different regression methods for the problem of performance ranking of configurable systems on 21 evaluation scenarios of 16 real world systems.

- Empirically studied the saved cost of sampling configurations and the correlation between evaluation measurements. Served as the first study that compares the regression models in terms of their ability to find good configurations and the measurement cost of sampling.

HONORS & SCHOLARSHIPS

- ACM SIGSOFT CAPS Award in 2024
- NSF Student Travel Award in 2023
- Chair's Award, University of California, Irvine in 2021
- Scholarship for Outstanding Students (Top 10%) in 2017-2018, 2016-2017, and 2018-2019
- Chinese Undergraduate Computer Design Contest (Regional Level, Second Prize) in 2018

SKILLS & INTERESTS

- **Research Interests**: Autonomous Driving System, Software Configuration, Automated Software Testing, Performance Ranking
- **Programming Language Skills**: Python, Java, C++/C