Yuntianyi Chen

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EDUCATION

Bachelor of Computer Science and Technology   2016.09—2020.06
Wuhan University, China

Ph.D. Student of Software Engineering   2021.09—2027.06
University of California, Irvine, USA   (Expected)

WORK EXPERIENCE

- **Graduate Student Researcher** in University of California, Irvine   2021.09—Present
  Conducting research in areas of Software Testing, Autonomous Driving
  System, and Software Configuration

- **Teaching Assistant** in University of California, Irvine   2021.09—Present
  ICS 45J - Programming in Java
  SWE 249P - Applied Data Analytics
  SWE 247P - Applied Information Retrieval
  SWE 266P - Software Security and Dependability
  ICS 32 - Programming with Software Libraries
  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)

- **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" in The ACM International Conference on the Foundations of Software Engineering (**FSE 2024**), 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" in IEEE Transactions on Software Engineering (**TSE 2023**), pp. 1–21, 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**), May 14-20, 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

[5] <u>Yuntianyi Chen</u>, Yongfeng Gu, Lulu He, and Jifeng Xuan. "Regression Models for Performance Ranking of Configurable Systems: A Comparative Study" in the Annual Conference on Software Analysis, Testing and Evolution (SATE 2019), Hangzhou, China. November 22-24, 2019

SERVICE

- **Program Committee Member** of the ACM Conference on Computer and Communications Security (CCS 2024), Artifacts Evaluation Track — 2024.04
- **External Reviewer** of the 47th the IEEE/ACM International Conference on Software Engineering (ICSE 2025), Research Track — 2024.04
- **Program Committee Member** of the 21st International Conference on Software Architecture (ICSA 2024), Artifacts Evaluation Track — 2024.03
- **Reviewer** of the IEEE Robotics and Automation Letters (RA-L 2024) — 2024.01
- **Reviewer** of the 41st IEEE Conference on Robotics and Automation (ICRA 2024), Contributed papers — 2023.11
- **External Reviewer** of the 32nd ACM Symposium on the Foundations of Software Engineering (FSE 2024), Research Papers — 2023.11
- **Sub-reviewer** of the 20th IEEE International Conference on Software Architecture (ICSA 2023), Technical Track — 2022.12
- **Sub-reviewer** of the 27th IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER 2020), Research Track — 2019.11

TALKS

- Lecture on the paper "Regression Models for Performance Ranking of Configurable Systems: A Comparative Study" at the conference SATE 2019, Hangzhou, China — 2019.11.22

RESEARCH EXPERIENCE

Misconfiguration Software Testing for Failure Emergence in Autonomous Driving Systems

- Proposed ConfVE, the first configuration testing approach in the ADS domain, which serves as a testing framework that utilizes scenarios from pre-existing ADS scenario-generation techniques and a genetic algorithm to produce alternative configurations to identify emerged failures in an ADS by preventing the masking of failures and maximizing the possibility of producing bug-revealing violations.
- Designed 3 novel module-level oracles that detect bug-revealing violations in ADS scenarios that occur frequently in our ADS configuration-testing experiments.
- 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 obstacle 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).

Regression Models for Performance Ranking of Configurable Systems: A Comparative Study
- Conducted a comparative study on the common regression models used in performance ranking of software configuration research. The research is the first one that compares the regression models in terms of their ability to find good configurations and the measurement cost of sampling.

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

HONORS & SCHOLARSHIPS

- NSF Student Travel Award in 2023.11
- Chair's Award, University of California, Irvine in 2021.10
- 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**: Automated Testing, Autonomous Driving Systems, Software Configuration, Transfer Learning, Artificial Intelligence
- **Programming Language Skills**: Python, Java, C++/C