# Songyang Yan

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## Research Profile

- Doctoral researcher in ADS testing, simulation-based safety evaluation, scenario generation, and configuration repair.
- Cross-institution experience across CARLA benchmarks, visiting doctoral research, SYNKROTRON platform R&D, and automotive delivery.
- Work spans problem framing, algorithms, closed-loop simulation, benchmark infrastructure, evaluation, and productization.

## Education and Experience

**Visiting Doctoral Student | The University of Tokyo, Graduate School of Information Science and Technology** — Tokyo, 2025.09-2026.11

Momentum Lab: ADS bug analysis and localization. Funded by the China Scholarship Council.

**PhD Candidate | Xi'an Jiaotong University, School of Cyber Science and Engineering** — Xi'an, 2021.09-2027.06

Research: ADS safety testing and simulation-based testing; integrated master's-doctoral track since 2023.

**R&D Engineer | Synkrotron Technologies Inc.** — Xi'an, 2020.01-2021.08, 2022.08-2023.08

Developed industrial ADS simulation testing frameworks, scenario-generation algorithms, commercial platform components, and OEM delivery projects.
Took leave after graduate admission for prototype R&D; later worked full-time during the second graduate year on productization.

**B.S. | Xi'an Jiaotong University, Software Engineering** — Xi'an, 2016.09-2020.06

Campus cybersecurity club president; Google InnoCamp and NUS summer workshop participant; recommended to XJTU graduate school.

## Selected Projects

**CARLA Team / Intel Labs-CVC Collaboration (Remote)** — 2021.03-2024.06

- CARLA Leaderboard 2.0: core developer for new scenarios, new-map testing, and performance optimization.
- Supported four global challenges (2021-2024); merged 15 PRs to the official carla-simulator repository.
- Designed and validated all 10 Town13 challenge routes and developed 9 new testing scenarios.

**IEEE ADWG P3534 Standard** — 2025.11-2026.08 expected

- Standard for Operational and Safety Requirements for Autonomous Vehicles in Port Environments: drafting standard and white paper; under review.

**OASIS SIM / Commercial Simulation Platform** — 2020.01-2021.08/2022.08-2023.08

- Developed simulation-testing framework, test-generation algorithms, and evaluation system with FutureWei; work later evolved into OASIS SIM.

**Changan Intelligent Traffic-Flow and Scenario Generation** — 2022.12-2023.08

- Built scenario-generation algorithms and simulation framework; delivered to Changan Automobile AI Research Institute.

**OpenAtom Carsmos Autonomous Driving Challenge** — 2023 challenge

- Contributed challenge platform development, ADS simulation testing tasks, and technical support.

## Representative Publications

- **FM 2026 (CCF-A, co-first)** ConFixer: Robustness Semantics Based Configuration Bug Fixing for ADS.
Repairs ADS configuration bugs with STL robustness semantics and closed-loop regression checks.
- **FSE 2026 Tool Demonstrations (CCF-A, student first)** CapCo: Carla-Apollo Co-Simulation and Scenario Fuzzing.
Automates Apollo-CARLA co-simulation and fuzzing for scalable, reproducible ADS testing.
- **ICSE 2026 submission (CCF-A, co-first)** ADS bug localization work.
Studies localization of concrete functional-code faults in ADS.
- **TOSEM under review (CCF-A, first)** ADS test-scenario coverage analysis work.
Quantifies static and dynamic scenario elements for coverage-guided exploration.
- **FSE 2025 (CCF-A, first)** On-Demand Scenario Generation for Testing Automated Driving Systems.
Generates natural, safety-critical ADS test scenarios at target risk levels.
- **ICRA 2025 (CCF-B)** Causal Contrastive Learning with Data Augmentations for Imitation-Based Planning.
Reduces causal confusion in imitation-based planning with causal contrastive augmentation.
- **IEEE TIV 2024 (JCR Q1)** Adversarial Safety-Critical Scenario Generation Using Naturalistic Human Driving Priors.
Generates realistic adversarial safety-critical scenarios using naturalistic driving priors.

## Selected Patents (First Inventor)

CN115981179B | Test-metric generation for autonomous driving simulation scenarios
CN115016318B | Scenario-description-language fusion for autonomous driving simulation testing
CN115857373A | NPC vehicle control method and simulation testing system
CN115345771A | Image processing for autonomous driving simulation testing
CN114995186A | Access method and devices for autonomous driving simulation testing platforms