# CHAO PENG

chao.peng@acm.org
Principal Research Scientist at ByteDance
ByteDance, Dazhongsi Square, Haidian District, Beijing, China

## EDUCATION

**University of Edinburgh** **Edinburgh, UK**
**PhD in Informatics (Software Engineering)** September 2017 - November 2021
Supervised by Dr. Ajitha Rajan

- Fully funded by the School of Informatics Scholarship
- Research fields:
  - Coverage metrics and test case generation for GPU programs,
  - Program analysis of smart contracts,
  - Android GUI testing.

**University of Edinburgh** **Edinburgh, UK**
**MSc in High Performance Computing with Data Science** September 2016 - August 2017

- Thesis: FEniCS Performance Investigation and Porting miniDFT to GPU Clusters
- Received Achievement Award of the 6th Annual HPCAC Student Cluster Competition

**Xuzhou University of Technology** **Xuzhou, China**
**BSc in Computer Science and Technology** September 2012 - June 2016

- Awarded 2 × National Scholarship by Ministry of Education of China
- Awarded National Encouragement Scholarship by Department of Education of Jiangsu Province
- Awarded Hornored Undergraduate of Xuzhou University of Technology
- President of the Student Union of School of Information & Electrical Engineering

## WORK EXPERIENCE

**ByteDance** 05 Jul 2021 - Present
*Software Engineering Lab* *Beijing, China*

· Position: Principal Research Scientist
· Duties and Achievements:

- Awarded Spot Bonus for outstanding contribution.
- Initiator and core contributor of the TRAE AI IDE, now serving millions of users.
- Built and leading a research team conducting cutting-edge software engineering research with publications in top-tier academic conference such as ICSE, FSE, ASE, ACL, NeurIPS etc.
- Built Trae Agent, a general software development and bug fixing LLM-based agent which ranked the first place at the SWE-bench Lite and Verified benchmark and received 9,800 stars on GitHub.
- Setup collaboration projects totaling a budget of 10 million CNY with leading universities such as Tsinghua University, Peking University, Shanghai Jiaotong University, Fudan University, Tianjin University, Chinese University of Hong Kong (Shenzhen), etc.

## INTERNSHIP EXPERIENCE

**Huawei Edinburgh Research Centre** 23/11/2020 - 22/06/2021
*Programming Languages Lab, 2021 Laboratories* *Edinburgh, UK*

· Mentor: Dan Ghica, Head of PL Lab
· Duties: Compiler backend testing and benchmarking. Compiler implementation and optimisation.

**Huawei London Research Centre** 28/10/2019 - 28/02/2020
*Hisilicon Kirin GPU Team, 2012 Laboratories* *London, UK*

· Mentor: Graham Connor, Chief GPU Scientist
· Duties: Design of the layout of the benchmarking framework, implementation of the build system and cross-platform support, design and implementation of GPU micro-benchmarks.

## RESEARCH PUBLICATIONS

### Pre-print /Technical Report

**5.** Trae Research Team. *Trae Agent: An LLM-based Agent for Software Engineering with Test-time Scaling.* arXiv:2507.23370

**4.** Xinghang Li, Jingzhe Ding, **Chao Peng**, Bing Zhao, Xiang Gao, Hongwan Gao, Xinchen Gu (2025). *SafeGen-Bench: A Benchmark Framework for Security Vulnerability Detection in LLM-Generated Code.* arXiv:2506.05692

**3.** Chen, Jialiang, Kaifa Zhao, Jie Liu, **Chao Peng**, Jierui Liu, Hang Zhu, Pengfei Gao, Ping Yang, Shuiguang Deng (2024). *CoReQA: Uncovering Potentials of Language Models in Code Repository Question Answering.* arXiv:2501.03447

**2.** Guan, Zhanming, Junlin Liu, Jierui Liu, **Chao Peng**, Dexin Liu, Ningyuan Sun, Bo Jiang, Wenchao Li, Jie Liu, and Hang Zhu (2024). *ContextModule: Improving Code Completion via Repository-level Contextual Information.* arXiv:2412.08063

**1.** Liu, Yizhou, Pengfei Gao, Xinchen Wang, Jie Liu, Yexuan Shi, Zhao Zhang, **Chao Peng** (2024). *MarsCode Agent: AI-native Automated Bug Fixing.* arXiv:2409.00899

### Peer-reviewed

**32.** Wei Liu, **Chao Peng**, Pengfei Gao, Aofan Liu, Wei Zhang, Haiyan Zhao, Zhi Jin (2025). *GraphLocator: Graph-guided Causal Reasoning for Issue Localization.* In FSE 2026. To appear.

**31.** Yuan-an Xiao, Pengfei Gao, **Chao Peng**, Yingfei Xiong (2025). *Reducing Cost of LLM Agents with Trajectory Reduction.* In FSE 2026. To appear.

**30.** Zhao Tian, Pengfei Gao, Junjie Chen, **Chao Peng** (2025). *Agent-Based Ensemble Reasoning for Repository-Level Issue Resolution.* In ICSE 2026. To appear.

**29.** Pengfei Gao, **Chao Peng** (2025). *More with Less: An Empirical Study of Turn-Control Strategies for Efficient Coding Agents.* In ICSE 2026. To appear.

**28.** Zexiong Ma, **Chao Peng**, Qunhong Zeng, Pengfei Gao, Yanzhen Zou, Bing Xie (2025). *Enhancing Issue Localization Agent with Tool-Interactive Training.* In ICSE 2026. To appear.

**27.** Meng, Xiangxin, Zexiong Ma, Pengfei Gao, **Chao Peng** (2025). *An Empirical Study on LLM-based Agents for Automated Bug Fixing.* In ICSE 2026. To appear.

**26.** Hu, Ruida, **Chao Peng**, Xinchen Wang, and Cuiyun Gao (2025). *Repo2Run: Automated Building Executable Environment for Code Repository at Scale.* In NeurIPS 2025 **Spotlight Paper**. December 2025.

**25.** Wang, Xinchen and Gao, Pengfei and **Peng, Chao** and Hu, Ruida and Gao, Cuiyun (2025). *CodeVisionary: An Agent-based Framework for Evaluating Large Language Models in Code Generation.* In ASE 2025. November 2025.

**24.** Wu, Qinyun, **Chao Peng**, Pengfei Gao, Ruida Hu, Haoyu Gan, Bo Jiang, Jinhe Tang, Zhiwen Deng, Zhanming Guan, Cuiyun Gao, Xia Liu, Ping Yang (2025). *RepoMasterEval: Evaluating Code Completion via Real-World Repositories.* In ASE 2025 Industry Track. November 2025.

**23.** Tsimpourlas, Foivos, **Chao Peng**, Carlos Rosuero, Ping Yang, Ajitha Rajan (2025). *Go-Oracle: Automated Test Oracle for Go Concurrency Bugs.* In ESEM 2025. October 2025.

**22.** Ma, Zexiong, **Chao Peng**, Pengfei Gao, Xiangxin Meng, Yanzhen Zou, and Bing Xie (2025). *SoRFT: Issue Resolving with Subtask-oriented Reinforced Fine-Tuning.* In ACL 2025. July 2025.

**21.** Ruida Hu, **Chao Peng**, Jingyi Ren, Bo Jiang, Xiangxin Meng, Qinyun Wu, Pengfei Gao, Xinchen Wang and Cuiyun Gao (2025). *Understanding Large Language Model Performance in Software Engineering: A Large-scale Question Answering Benchmark.* In SIGIR 2025 Short Paper Track. July 2025

**20.** Xinchen Wang, Pengfei Gao, Xiangxin Meng, **Chao Peng**, Ruida Hu, Yun Lin, Cuiyun Gao (2025). *AEGIS: An Agent-based Framework for Bug Reproduction from Issue Descriptions.* In FSE 2025 Industry Track. June 2025

**19.** Li, Bowen, Wenhan Wu, Ziwei Tang, Lin Shi, John Yang, Jinyang Li, Shunyu Yao, Chen Qian, Binyuan Hui, Qicheng Zhang, Zhiyin Yu, He Du, Ping Yang, Dahua Lin, **Chao Peng**, Kai Chen (2025). *Prompting Large Language Models to Tackle the Full Software Development Lifecycle: A Case Study.* In COLING 2025 **Oral**

**Paper**.

January 2025

**18.** Liang, Xiaoyun, Jingyi Ren, Jiayi Qi, **Chao Peng**, and Bo Jiang. *DialogAgent: An Auto-engagement Agent for Code Question Answering Data Production.* In ICSE 2025 SEIP Track April 2024

**17. Chao Peng**, Qinyun Wu, Jiangchao Liu, Jierui Liu, Bo Jiang, Mengqian Xu, Yinghao Wang, Xia Liu, Ping Yang (2024). *RepoSim: Evaluating Prompt Strategies for Code Completion via User Behavior Simulation.* In ASE 2024 New Idea and Emerging Results Track October 2024

**16.** Zhu Tao, Yongqiang Gao, Jiayi Qi, **Chao Peng**, Qinyun Wu, Xiang Chen, Ping Yang (2024). *Neat: Mobile App Layout Similarity Comparison based on Graph Convolutional Networks.* In FSE 2024 Industry Track

July 2024

**15. Chao Peng**, Zhengwei Lv, Jiarong Fu, Jiayuan Liang, Zhao Zhang, Ajitha Rajan, Ping Yang(2024). *Hawkeye: Change-targeted Testing for Android Apps based on Deep Reinforcement Learning.* In ICSE 2024 SEIP Track

April 2024

**14.** Xiaoyun Liang, Jiayi Qi, Yongqiang Gao, **Chao Peng**, Ping Yang (2023). *AG3: Automated Game GUI Text Glitch Detection based on Computer Vision.* In ESEC/FSE 2023 Industry Track December 2023

**13.** Zongze Jiang, Ming Wen, Yixin Yang, **Chao Peng**, Ping Yang, Hai Jin, (2023). *Effective Concurrency Testing for Go via Directional Primitive-constrained Interleaving Exploration.* In ASE 2023 September 2023

**12.** Siwei Wang, Xue Mao, Ziguang Gao, Yujun Gao, Qucheng Shen, **Chao Peng** (2023). *NxtUnit: Automated Unit Test Generation for Go.* In EASE 2023 Industry Track. June 2023

**11.** Jingling Sun, Ting Su, Kai Liu, **Chao Peng**, Zhao Zhang, Geguang Pu, Tao Xie, and Zhendong Su (2022). *Characterizing and Finding SystemSetting-Related Defects in Android Apps.* IEEE Transactions on Software Engineering (TSE). April 2023

**10.** Zhengwei Lv, **Chao Peng**, Zhao Zhang, Ting Su, Kai Liu, Ping Yang. *Fastbot2: Reusable Automated Model-based GUI Testing for Android Enhanced by Reinforcement Learning.* In ASE 2022 Industry Showcase Track.

October 2022

**9. Chao Peng**, Zhao Zhang, Zhengwei Lv and Ping Yang. *MUBot: Learning to Test Large-Scale Commercial Android Apps like a Human.* In ICSME 2022 Industry Track October 2022

**8. Chao Peng**, Yujun Gao and Ping Yang. *Automated Server Testing: an Industrial Experience Report.* In ICSME 2022 Industry Track October 2022

**7.** Sefa Akca, **Chao Peng**, Ajitha Rajan. *Testing Smart Contracts: Which Technique Performs Best?* In ESEM 2021 October 2021

**6. Chao Peng**, Ajitha Rajan, Tianqin Cai. *CAT: Change-focused Android GUI Testing.* In ICSME 2021

September 2021

**5. Chao Peng**, Ajitha Rajan. *Automated Test Generation for OpenCL Kernels using Fuzzing and Constraint Solving.* In GPGPU Workshop @ PPoPP 2020) Feburary 2020

**4. Chao Peng**, Sefa Akca, Ajitha Rajan. *SIF: A Framework for Solidity Contract Instrumentation and Analysis.* In APSEC 2019. December 2019

**3.** Sefa Akca, Ajitha Rajan, **Chao Peng**. *SolAnalyser: A Framework for Analysing and Testing Smart Contracts.* In APSEC 2019. December 2019

**2. Chao Peng**. *On the Correctness of GPU Programs.* In ISSTA 2019 Doctoral Symposium. July 2019

**1. Chao Peng**, Ajitha Rajan. *CLTestCheck: Measuring Test Effectiveness for GPU Kernels.* In FASE 2019.

April 2019

## PROFESSIONAL SERVICE

| | |
|---|---|
| **Organising/Steering Committee** | AI-IDE@FSE'25, APR@ICSE'25, AIWare |
| **PC Co-chair** | AIware'26, FORGE'26 Industry Track |
| **PC Member (Research/Technical Track)** | ASE'26, ISSTA'26, LLM4Code'26, FSE'26, ASE'25, LLM4Code'25, FSE'25, MSR'23(Junior PC), A-Mobile'22, PRDC'22 |
| **PC Member (Industry Track)** | SANER'26, ASE'25, ISSRE'24, APSEC'24, MSR'24 |
| **PC Member (Artifact Evaluation)** | OSDI'22, USENIX ATC'22, ISSTA'22, 21, 20 |
| **Student Volunteer** | PLDI'20, ISSTA'19, ETAPS'19 |
| **Reviewer** | ICSE'19 SEIP (Software Engineering in Practice) Track |

## SKILLS

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|---|---|
| **Languages** | Mandarin Chinese - Native<br>English - Proficient<br>German - Basic |
| **Technical Skills** | Programming languages: C/C++, Java, Fortran, Python, Kotlin, Rust, Go<br>Parallel programming: OpenMP, MPI, OpenCL, CUDA, SYCL<br>Program Analysis: Java Soot, Clang LibTooling<br>Computer Graphics: OpenGL (ES), Vulkan |
| **Tools** | LaTeX, Git, SVN, CMake, Gradle |

## TEACHING EXPERIENCE

**MSc Projects** Apr 18 - Aug 18 and Apr 19 - Aug 19
*Sub-supervisor for MSc Projects* *School of Informatics, University of Edinburgh*

Helping supervise the following MSc students for their projects:

- Bowen Du: Code coverage measurement for GPU programs
- Yangning Li: Random test case generation for OpenCL programs

**Software Testing** Jan 18 - Apr 18, Jan 19 - Apr 19 and Jan 21 - Apr 21
*Teaching Assistant, Tutor and Marker* *School of Informatics, University of Edinburgh*

**Computer Programming Skills and Concepts** Nov 17 - Dec 17 and Dec 18 - Jan 19
*Marker* *School of Informatics, University of Edinburgh*

**Introduction to Java Programming** Sep 17 - Dec 17 and Sep 18 - Dec 18
*Demonstrator* *School of Informatics, University of Edinburgh*

Nominated for Teaching Awards by students of this course