Fu Song

Curriculum Vitae

Current Research Interests

formal verification, automata theory and logic, automated testing, safety/security of programs and Al-enabled systems

Education Experiences

2009.11 - 2013.4 Ph.D. in Computer Science

Université Paris Cité (previous known as University Paris-Diderot, Paris 7), Paris, France

Thesis: On Pushdown Systems Model Checking:

Application to Malware Detection and Software Model-Checking

Advisor: Dr. Tayssir Touili

2007.3 – 2009.6 MSc in Software Engineering

East China Normal University, Shanghai, China

2002.9 – 2006.6 BSc in Electronic Information and Technology

Ningbo University, Ningbo, China

Work Experiences

Since 2023.8 Research Professor, Ph.D supervisor

State Key Laboratory of Computer Science

Institute of Software Chinese Academy of Sciences, Beijing, China

2021.8 - 2023.9 Associate Professor (Tenured) and Research Professor, Ph.D supervisor

Co-Director of Systems and Security Center (SSC) School of Information Science and Technology ShanghaiTech University, Shanghai, China

2016.8 - 2021.7 Assistant Professor (Tenure-track) and Research Professor, Ph.D supervisor

Co-Director of Systems and Security Center (SSC) School of Information Science and Technology ShanghaiTech University, Shanghai, China

2016.1 – 2016.7 Research Associate Professor

School of Computer Science and Software Engineering

East China Normal University, Shanghai, China

2013.8 - 2015.12 Lecturer

School of Computer Science and Software Engineering

East China Normal University, Shanghai, China

2014.7 – 2014.9 Invited Researcher (Collaborator: Prof. Yang Liu)

School of Computer Science and Engineering

Nanyang Technological University, Singapore

Honors and Awards

- 2023 Distinguished Paper Award
 The CIE Conference on Cyber Security
- 2022 Amazon Research Awards Fall 2021, \$40,000 in cash and \$20,000 in AWS credits
- 2020 Excellent Faculty Award, ShanghaiTech University
- 2020 Outstanding Research Award, School of Information Science and Technology at ShanghaiTech
- 2020 Outstanding Instructor Award, 2019 Baidu PaddlePaddle Al Adversarial Attack Contest The team won the First-Place Award
- 2019 Excellent Faculty Award, ShanghaiTech University
- 2019 Outstanding Research Award, School of Information Science and Technology at ShanghaiTech
- 2019 Outstanding Instructor Award, 2019 National College Student Network Security Contest The CTF team won the Second-Prize Award
- 2018 Excellent Course Award, Education Commission of Shanghai Municipality SI100: Introduction to Information Science and Technology with Sören Schwertfeger, Jingyi Yu, Xuming He, Xiliang Luo, Haoyu Wang
- 2018 Excellent Faculty Award, ShanghaiTech University
- 2018 Outstanding Research Award, School of Information Science and Technology at ShanghaiTech
- 2018 Outstanding Instructor Award, 2018 National College Student Network Security Contest The CTF team won the First-Prize Award
- 2017 Outstanding Instructor Award, 2017 National College Student Network Security Contest The CTF team won the First-Prize Award
- 2012 EASST Best Paper Award
 The 18th International Conference on Tools and Algorithms for the Construction and Analysis
 of Systems (TACAS'12)

Student Advising

Shi Pu 2021 – Now, MS student

Weijie Shao 2021 - Now, MS student

Yangbiao Ji 2021 - Now, MS student

Hongyi Xie 2021 - Now, MS student

Huiyu Tan 2020 - Now, MS student

Guangke Chen 2019 - Now, Ph.D. student

2020 Merit Student at Shanghai Tech University

2020 National Scholarship for Master Graduates

2022 Merit Student at ShanghaiTech University

2023 National Scholarship for Ph.D. Graduates

Pu Sun 2018 - Now, Ph.D. student

Awards: 2021 Excellent Student at ShanghaiTech University

Luwei Cai 2018 - Now, Ph.D. student

Qi Qin 2020 - 2023, MS student, Sec3

, 2022 National Scholarship for Master Graduates

Awards: 2023 Excellent Graduates in Shanghai

Yuxin Fan 2020 - 2023, MS student

Awards: 2022 National Scholarship for Master Graduates

Mingyang Liu 2020 – 2023, MS student, ARM Zhe Zhao 2018 - 2023, Ph.D. student. RealAl

First Place of 2019 Baidu PaddlePaddle Al Adversarial Attack Contest

2021 Merit Student at ShanghaiTech University Awards: 2021 National Scholarship for Ph.D. Graduates

2023 Excellent Graduates in Shanghai

Yedi Zhang 2017 - 2023, Ph.D. student, PostdoctorNUS

2019 AAAI Travel Grant

2019 Merit Student at ShanghaiTech University

2019 CSC-IBM Excellent Chinese Student Scholarship

Awards: 2020 Excellent Student at ShanghaiTech University

2021 Excellent Student at Shanghai Tech University

2022 National Scholarship for Ph.D. Graduates

2023 Excellent Graduates in Shanghai

Pengfei Gao 2017 – 2023, Ph.D. student, ByteDance

2018 FLoC Travel Grant

2019 Excellent Student at ShanghaiTech University

2019 ETAPS Scholarship

2019 CSC-IBM Excellent Chinese Student Scholarship Awards:

2020 National Scholarship for Ph.D. Graduates 2020 Merit Student at ShanghaiTech University 2021 Merit Student at Shanghai Tech University

2021 Baosteel Scholarship 2023 Excellent Graduates in Shanghai

Yongjie Xu 2019 – 2022, MS student, Hikvision Jun Zhang 2016 - 2020, MS student, Ant Group

Yusi Lei 2017 – 2019, MS student, first employment: Google, Singapore

Feng Wang 2016 - 2019, MS student, Ant Group

Yu Tang 2015 - 2018, MS student, first employment: China Financial Futures Exchange Co. Ltd.

Yao Zeng 2015 - 2018, MS student, first employment: Shenwan Hongyuan Securities Co. Ltd.

Curriculum Development

2019 Spring CS244: Theory of Computation (Graduate)

2017 Spring CS131: Programming Languages and Compilers (Undergraduate) 2016 Fall CS100: Introduction of Programming Languages (Undergraduate)

Teaching Experiences

Course	Credit	Course Level	Semester	#Students	#Class Hours	Course Evaluation	Teacher Evaluation
Introduction to Programming	 4	Undergraduate	Fall'16	201	32	4.50	4.46
			Fall'18	319	21	4.05	4.61

Programming Languages and Compilers	 4 	 Undergraduate 	Spring'17	18	64	4.16	4.49
			Spring'18	16	64	4.85	4.92
			Fall'18	33	64	4.66	4.77
			Fall'19	35	64	4.87	4.95
			Spring'21	39	64	4.33	4.60
			Spring'22	24	64	4.65	4.88
			Spring'23	7	64	-	-
Introduction to Information Science and Technology	4	Undergraduate	Spring'17	211	16	3.96	4.32
Theory of Computation	 4 	Undergraduate	Spring'19	15	64	4.72	4.85
		Graduate		6	64	4.92	4.97
		Undergraduate	Fall'20	21	64	4.6	4.62
		Graduate		29	64	4.44	4.69
		Undergraduate	Fall'21	5	64	4.71	4.67
		Graduate		15	64	4.87	4.88
		Undergraduate	Fall'22	7	64	4.96	4.96
		Graduate		8	64		

Grants

2023 - 2027 Formal Verification for Cybersecurity (PI)

Science Fund for Distinguished Young Scholars Institute of Software, Chinese Academy of Sciences

Award amount: CNY 800,000.00

2021 – 2024 Key Problem Study for Secure Implementation of Masked Programs (PI)

National Natural Science Foundation of China, No. 62072309

Award amount: CNY 560,000.00

2018 - 2020 Detecting Anomalies in Reactive Systems (co-PI, with Lijun Zhang & Andreas Zeller)

NSFC-DFG International Joint Project, No. 61761136011

Award amount: CNY 1,800,000.00

2017 - 2018 Learning based Phishing Websites: Detection, Classification and Adversary (PI)

CCF-NSFOCUS "Kunpeng" Program Project,

Award amount: CNY 80,000.00

2016 – 2020 Model Checking Large Scale Probabilistic and Concurrent Timed Systems (co-PI, with Lijun

Zhang)

National Natural Science Foundation of China, No. 61532019

Award amount: CNY 2,850,000.00

2016 – 2019 Research on Key Technologies of Information Security and Privacy Preservation for Vehicular

Ad Hoc Networks and Vehicular Cloud

National Natural Science Foundation of China, No. 61572198

Award amount: CNY 660,000.00

2015 – 2017 Research on Static Analysis and Detection of Malware (PI)

National Natural Science Foundation of China, No. 61402179

Award amount: CNY 270,000.00

2015 – 2016 Key Problem Study for Construction of Trustworthy China Subway Control System (iCMTCt)

in Uncertain Environment

National Natural Science Foundation of China, No. 91418203

Award amount: CNY 1,500,000.00

2015 - 2018 Research on modelling and model checking of CPS stochastic behaviors

National Natural Science Foundation of China, No. 61472140

Award amount: CNY 830,000.00

2014 - 2016 Static Analysis Techniques for Complex Binary Program (PI)

Shanghai Pujiang Talent Program, No. 14PJ1403200

Award amount: CNY 200,000.00

2014 - 2015 Model-Checking Binary Program (PI)

Shanghai ChenGuang Scholar Program, No. 13CG21

Award amount: CNY 60,000.00

Publications

My research spans theory and practice, and as a consequence, the cultural norms in different sub-communities has led to the author lists ordered by "contribution/tradition" or alphabetically by last name. I have marked where authors are sorted alphabetically by last name. \star denotes corresponding author.

Total: 3 prefaces, 4 book chapters, 35 journal papers, 56 conference papers, 8 patents, including 46 CCF-A/CAS-JCR-Q1 papers and 20 CCF-B/CAS-JCR-Q2 papers

Edited Volumes

- [1] Preface to Special Issue on Formal Methods and Applications (Chinese) Qinxiang Cao, **Fu Song** and Naijun Zhan Journal of Software, 2023, 35(9)
- [2] Preface to Special Issue on System Software Security (Chinese) Min Yang, Chao Zhang, Fu Song and Yuan Zhang Journal of Software, 2022, 33(6): 1959–1960
- [3] Preface to Special Issue on System Software Security Min Yang, Chao Zhang, **Fu Song** and Yuan Zhang International Journal of Software and Informatics, 2022, 12(3): 259–261

Book Chapters

[1] Research Progress and Trends on Domain-Specific Modeling and Formal Verification of Safety Critical Systems (Chinese)

Dianfu Ma, Wensheng Niu, Sheng Cheng, Zhong Ma, **Fu Song**, Jie Luo, Ning Ge, Ping Lu, Ming Mu, Chuang Wang, Huaqiang Qiu, Yibin Tang and Xinfa Dai

CCF 2020–2021 Progress Report on Chinese Computer Science and Technolgy, China Machine Press, 141–189, 2021

[2] Research Progress and Trends on Formal Methods (Chinese)

Lei Bu, Liqian Chen, Zhe Chen, Zhenbang Chen, Xinyu Feng, Yuan Feng, Fei He, Guoqiang Li, Wanwei Liu, Fefei Ma, **Fu Song**, Youcheng Sun, Jingyi Wang, Min Wu, Zhiwu Xu, Bai Xie, Pengfei Yang, Xinping Yi,

Lijun Zhang and Min Zhang (Alphabetical Ordering) CCF 2019–2020 Progress Report on Chinese Computer Science and Technolgy, China Machine Press, 491–539, 2020

- [3] Research Progress and Trends on Formal Verification of Artificial Intelligence Systems (Chinese) Lei Bu, Liqian Chen, Yunwei Dong, Xiaowei Huang, Jianlin Li, Qin Li, Wanwei Liu, Wenjie Ruan, Fu Song, Cong Tian, Shuling Wang, Zhilin Wu, Bai Xie, Pengfei Yang, Liangzhe Yin, Bohua Zhan, Min Zhang, Lijun Zhang, Xingyuan Zhang and Yongwang Zhao (Alphabetical Ordering) CCF 2017–2018 Progress Report on Chinese Computer Science and Technolgy, China Machine Press, 1–68, 2018
- [4] Formal Reasoning About Infinite Data Values: An Ongoing Quest (Invited survey)
 Taolue Chen, Fu Song and Zhilin Wu (Alphabetical Ordering)
 Engineering Trustworthy Software Systems (SETTS). Lecture Notes in Computer Science, Springer, 10215:195–257, 2016

Refereed Journal Articles

- [1] Don't Complete It! Preventing Unhelpful Code Completion for Productive and Sustainable Neural Code Completion Systems Zhensu Sun, Xiaoning Du, Fu Song, Shangwen Wang, Mingze Ni, Li Li and David Lo ACM Transactions on Software Engineering and Methodology, 2024, CCF-A, CAS-JCR-Q1
- [2] SAT-based Formal Verification of Fault Injection Countermeasures for Cryptographic Circuits Huiyu Tan, Pengfei Gao, **Fu Song***, Taolue Chen and Zhilin Wu IACR Transactions on Cryptographic Hardware and Embedded Systems, 2024(4), CCF-B
- [3] Abstraction and Refinement: Towards Scalable and Exact Verification of Neural Networks Jiaxiang Liu, Yunhan Xing, Xiaomu Shi, **Fu Song**, Zhiwu Xu and Zhong Ming ACM Transactions on Software Engineering and Methodology, 2024, CCF-A, CAS-JCR-Q1
- [4] Towards Efficient Verification of Constant-Time Cryptographic Implementations Luwei Cai, **Fu Song*** and Taolue Chen Proceedings of the ACM on Software Engineering, Number FSE, 2024, CCF-A
- [5] EasyBC: A Cryptography-Specific Language for Security Analysis of Block Ciphers against Differential Cryptanalysis Pu Sun, Fu Song*, Yuqi Chen and Taolue Chen Proceedings of the ACM on Programming Languages, 8(POPL): 29:848-29:881, 2024, CCF-A
- [6] Compositional Verification of First-Order Masking Countermeasures against Power Side-Channel Attacks Pengfei Gao, Fu Song* and Taolue Chen ACM Transactions on Software Engineering and Methodology, 33(3): 79:1-79:38, 2024, CCF-A, CAS-JCR-Q1
- [7] Attack as Detection: Using Adversarial Attack Methods to Detect Abnormal Examples Zhe Zhao, Guangke Chen, Tong Liu, Taishan Li, **Fu Song***, Jingyi Wang and Jun Sun ACM Transactions on Software Engineering and Methodology, 33(3): 69:1-68:45, 2024, CCF-A, CAS-JCR-Q1
- [8] Status and Prospects of Formal Verification for Security of Cryptographic Implementations Fu Song Science and Technology Foresight, 2(1): 90-105, 2023

- [9] Compositional Verification of Efficient Masking Countermeasures against Side-Channel Attacks Pengfei Gao, Yedi Zhang, Fu Song*, Taolue Chen and Francois-Xavier Standaert Proceedings of the ACM on Programming Languages, 7(OOPSLA2): 286:1817–286:1847, 2023, CCF-A
- [10] Qualitative and Quantitative Model Checking against Recurrent Neural Networks Zhen Liang, Wanwei Liu, Fu Song, Bai Xue, Wenjing Yang, Ji Wang and Zhengbin Pang Journal of Computer Science and Technology, 2023, CCF-B, CAS-JCR-Q2
- [11] VenomAttack: Automated and Adaptive Activity Hijacking in Android Pu Sun, Sen Chen, Lingling Fan, Pengfei Gao, **Fu Song*** and Min Yang Frontiers of Computer Science, 17(1): 171801, 2023, CCF-B, CAS-JCR-Q2
- [12] Towards Understanding and Mitigating Audio Adversarial Examples for Speaker Recognition Guangke Chen, Zhe Zhao, **Fu Song***, Sen Chen, Lingling Fan, Feng Wang and Jiashui Wang IEEE Transactions on Dependable and Secure Computing, 20(5): 3970–3987, 2023, CCF-A, CAS-JCR-Q1
- [13] AS2T: Arbitrary Source-To-Target Adversarial Attack on Speaker Recognition Systems Guangke Chen, Zhe Zhao, **Fu Song***, Sen Chen, Lingling Fan and Yang Liu IEEE Transactions on Dependable and Secure Computing, 2023, CCF-A, CAS-JCR-Q1
- [14] Precise Quantitative Analysis of Binarized Neural Networks: A BDD-based Approach Yedi Zhang, Zhe Zhao, Guangke Chen, Fu Song* and Taolue Chen ACM Transactions on Software Engineering and Methodology, 32(3), 62:1–62:51, 2023, CCF-A, CAS-JCR-Q1
- [15] ESampler: Boosting Sampling of Satisfying Assignments for Boolean Formulas via Derivation Yongjie Xu, Fu Song* and Taolue Chen Journal of Systems Architecture, 129:102615, 2022, CCF-B, CAS-JCR-Q2
- [16] Taking Care of the Discretization Problem: A Comprehensive Study of the Discretization Problem and A Black-Box Adversarial Attack in Discrete Integer Domain Bu Lei, Zhe Zhao, Yuchao Duan and Fu Song* IEEE Transactions on Dependable and Secure Computing, 19(5):3200–3217, 2022, CCF-A, CAS-JCR-Q1
- [17] Advanced Evasion Attacks and Mitigations on Practical ML-Based Phishing Website Classifiers Fu Song*, Yusi Lei, Sen Chen, Lingling Fan and Yang Liu International Journal of Intelligent Systems, 36(9):5210–5240, 2021, CAS-JCR-Q1.
- [18] Formal Verification of Masking Countermeasures for Arithmetic Programs
 Pengfei Gao, Hongyi Xie, Pu Sun, Jun Zhang, **Fu Song*** and Taolue Chen
 IEEE Transactions on Software Engineering, 48(3):973–1000, 2022, CCF-A, CAS-JCR-Q1
- [19] A Hybrid Approach to Formal Verification of Higher-Order Masked Arithmetic Programs Pengfei Gao, Yongyi Xie, Fu Song* and Taolue Chen ACM Transactions on Software Engineering and Methodology, 30(3):26:1–26:42, 2021, CCF-A, CAS-JCR-Q1
- [20] Model-based Automated Testing of JavaScript Web Applications via Longer Test Sequences Pengfei Gao, Yongjie Xu, Fu Song* and Taolue Chen Frontiers of Computer Science, 16(3):163204, 2021, CCF-B, CAS-JCR-Q2
- [21] Verifying ReLU Neural Networks from a Model Checking Perspective Wanwei Liu, Fu Song, Tanghaoran Zhang and Ji Wang Journal of Computer Science and Technology, 35(6):1365–1381,2020, CCF-B, CAS-JCR-Q2

[22] Making Agents' Abilities Explicit
Yedi Zhang, **Fu Song*** and Taolue Chen
IEEE Access 7: 101804–101819, 2019, CAS-JCR-Q3

[23] Verifying and Quantifying Side-Channel Resistance of Masked Software Implementations
Pengfei Gao, Jun Zhang, **Fu Song*** and Chao Wang
ACM Transactions on Software Engineering and Methodology, 28(3):16:1–16:32, 2019, CCF-A, CAS-JCR-Q1

[24] Fuzzy Pushdown Termination Games Haiyu Pan, Fu Song, Yongzhi Cao and Junyan Qian IEEE Transactions on Fuzzy Systems, 27(4): 760–774, 2019, CAS-JCR-Q1

[25] Towards Backbone Computing: A Greedy-Whitening Based Approach Yueling Zhang, Min Zhang, Geguang Pu, **Fu Song** and Jianwen Li Al Communications, 31(3): 267–280, 2018

[26] Analyzing Pushdown Systems with Stack Manipulation Fu Song Information and Computation, 259(1): 41–71, 2018, CCF-A

[27] Model-Checking for Heterogeneous Multi-agent Systems (Chinese) Yedi Zhang and Fu Song* Journal of Software, 29(6):1–13, 2018, CCF-A

[28] On the Complexity of ω -Pushdown Automata Yusi Lei, Wanwei Liu, Min Zhang and **Fu Song*** SCIENCE CHINA Information Sciences, 60:112102:1–112102:15, 2017, CCF-A, CAS-JCR-Q2

[29] On Temporal Logics with Data Variable Quantifications: Decidability and Complexity Fu Song and Zhilin Wu (Alphabetical Ordering) Information and Computation, 251:104–139, 2016, CCF-A, CAS-JCR-Q2

[30] Survey on Formal Models to Reason about Infinite Data Values (Chinese) Fu Song and Zhilin Wu (Alphabetical Ordering) Journal of Software (JOS), 27(3):a14, 2016, CCF-A

[31] An Improved Online/Offline Identity-Based Signature Scheme for WSNs Ya Gao, Peng Zeng, Kim-Kwang Raymond Choo and Fu Song Journal of Network Security (IJNS), 18(6):1143–1151, 2016

[32] Model-checking Software Library API Usage Rules Fu Song and Tayssir Touili Software and Systems Modeling, 15(4):961–985, 2016, CCF-B, CAS-JCR-Q2

[33] Model Checking Dynamic Pushdown Networks Fu Song and Tayssir Touili Formal Aspects of Computing, 27(2):397–421, 2015, CCF-B

[34] Efficient CTL Model-Checking for Pushdown Systems Fu Song and Tayssir Touili Theoretical Computer Science, 549:127–145, 2014, CCF-B

[35] Pushdown Model Checking for Malware Detection **Fu Song** and Tayssir Touili

International Journal on Software Tools for Technology Transfer, 16(2):147–173, 2014, CCF-C

Refereed Conference Papers

- [1] FDI: Attack Neural Code Generation Systems through User Feedback Channel Zhensu Sun, Xiaoning Du, Xiapu Luo, Fu Song, David Lo and Li Li In Proceedings of the 33rd ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA), 2024, CCF-A
- [2] Compositional Verification of Cryptographic Circuits against Fault Injection Attacks Huiyu Tan, Xi Yang, Fu Song*, Taolue Chen and Zhilin Wu In Proceedings of the 26th International Symposium on Formal Methods (FM), 2024, CCF-A
- [3] Certified Quantization Strategy Synthesis for Neural Networks
 Yedi Zhang, Guangke Chen, **Fu Song**, Jun Sun and Jin Song Dong
 In Proceedings of the 26th International Symposium on Formal Methods (FM), 2024, CCF-A
- [4] K-RAPID: A Formal Executable Semantics of the RAPID Robot Programming Language Zichen Wang, Jingyi Wang, **Fu Song**, Kun Wang, Hongyi Pu and Peng Cheng In Proceedings of the 10th ACM Cyber-Physical System Security Workshop (CPSS), 2024
- [5] When Neural Code Completion Models Size up the Situation: Attaining Cheaper and Faster Completion through Dynamic Model Inference Zhensu Sun, Xiaoning Du, Fu Song, Shangwen Wang and Li Li In Proceedings of the 45th IEEE/ACM International Conference on Software Engineering (ICSE), 2024, CCF-A
- [6] SLMIA-SR: Speaker-Level Membership Inference Attacks against Speaker Recognition Systems Guangke Chen, Yedi Zhang and Fu Song* In Proceedings of the 31st Annual Network and Distributed System Security Symposium (NDSS), 2024, CCF-A
- [7] An Automata-Theoretic Approach to Synthesizing Binarized Neural Networks Ye Tao, Wanwei Liu, Fu Song, Zhen Liang, Ji Wang and Hongxu Zhu In Proceedings of the 21st International Symposium on Automated Technology for Verification and Analysis (ATVA), 380-400, 2023, CCF-C
- [8] QFA2SR: Query-Free Adversarial Transfer Attacks to Speaker Recognition Systems Guangke Chen, Yedi Zhang, Zhe Zhao and Fu Song* In Proceedings of the 32nd USENIX Security Symposium (Security), 2437–2454, 2023, CCF-A
- [9] CodeMark: Imperceptible Watermarking for Code Datasets against Neural Code Completion Models Zhensu Sun, Xiaoning Du, Fu Song* and Li Li* In Proceedings of the 31th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE), 1561-1572, 2023, CCF-A
- [10] QEBVerif: Quantization Error Bound Verification of Neural Networks Yedi Zhang, Fu Song* and Jun Sun In Proceedings of the 35th International Conference on Computer Aided Verification (CAV), 413–437, 2023 , CCF-A
- [11] Automated Verification of Correctness for Masked Arithmetic Programs Mingyang Liu, Fu Song* and Taolue Chen In Proceedings of the 35th International Conference on Computer Aided Verification (CAV), 225–280, 2023 , CCF-A

- [12] SCAGuard: Detection and Classification of Cache Side-Channel Attacks via Attack Behavior Modeling and Similarity Comparison
 - Limin Wang, Lei Bu and Fu Song
 - In Proceedings of the 60th ACM/IEEE Design Automation Conference (DAC), 1-6, 2023, CCF-A
- [13] Don't Complete It! Preventing Unhelpful Code Completion for Productive and Sustainable Neural Code Completion Systems Zhensu Sun, Xiaoning Du, Fu Song, Shangwen Wang, Mingze Ni and Li Li In Proceedings of the 44th IEEE/ACM International Conference on Software Engineering (ICSE), 324–325, 2023
- [14] QVIP: An ILP-based Formal Verification Approach for Quantized Neural Networks Yedi Zhang, Zhe Zhao, Guangke Chen, **Fu Song***, Min Zhang and Taolue Chen In Proceedings of the 37th IEEE/ACM International Conference on Automated Software Engineering (ASE), 82:1–82:13, 2022, CCF-A
- [15] CLEVEREST: Accelerating CEGAR-based Neural Network Verification via Adversarial Attacks Zhe Zhao, Yedi Zhang, Guangke Chen, Fu Song*, Taolue Chen and Jiaxiang Liu In Proceedings of the 29th Static Analysis Symposium (SAS), 449–473, 2022, CCF-B
- [16] DeJITLeak: Eliminating JIT-Induced Timing Side-Channel Leaks
 Qi Qin, JulianAndres JiYang, **Fu Song***, Taolue Chen and Xinyu Xing
 In Proceedings of the 21st ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE), 872–884, 2022, CCF-A
- [17] PoS4MPC: Automated Security Policy Synthesis for Secure Multi-Party Computation Yuxin Fan, **Fu Song***, Taolue Chen, Liangfeng Zhang and Wanwei Liu In Proceedings of the 34rd International Conference on Computer Aided Verification (CAV), 385–406, 2022, CCF-A
- [18] CoProtector: Protect Open-Source Code against Unauthorized Training Usage with Data Poisoning Zhensu Sun, Xiaoning Du, Fu Song, Mingze Ni and Li Li In Proceedings of The Web Conference (WWW), 652–660, 2022, CCF-A
- [19] Locality based Cache Side Channel Attack Detection Limin Wang, Lei Bu and Fu Song In Proceedings of the 10th International Workshop on Security Proofs for Embedded Systems (PROOFS), 87:49–65, 2022
- [20] ESAMPLER: Efficient Sampling of Satisfying Assignments for Boolean Formulas Yongjie Xu, Fu Song* and Taolue Chen In Proceedings of the 7th Symposium on Dependable Software Engineering Theories, Tools and Applications (SETTA), 279–298, 2021, CCF-C
- [21] Peeking into the Gray Area of Mobile World: Empirical Investigation of Unlabeled Android Apps in Industry Sen Chen, Lingling Fan, Cuiyun Gao, **Fu Song** and Yang Liu
 In Proceedings of the 32th International Symposium on Software Reliability Engineering (ISSRE), 579–590, 2021, CCF-B
- [22] Eager Falsification For Accelerating Robustness Verification of Deep Neural Networks Min Zhang, Wenjie Wan, Zhaodi Zhang, Fu Song, Xuejun Wen and Xingwu Guo In Proceedings of the 32th International Symposium on Software Reliability Engineering (ISSRE), 345–356, 2021, CCF-B

- [23] Attack as Defense: Characterizing Adversarial Examples using Robustness Zhe Zhao, Guangke Chen, Jingyi Wang, Yiwei Yang, **Fu Song*** and Jun Sun In Proceedings of the 30th ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA), 42–55, 2021, CCF-A
- [24] BDD4BNN: A BDD-based Quantitative Analysis Framework for Binarized Neural Networks Yedi Zhang, Zhe Zhao, Guangke Chen, Fu Song* and Taolue Chen In Proceedings of the 33rd International Conference on Computer Aided Verification (CAV), 175–200, 2021 , CCF-A
- [25] Inferring Loop Invariants for Multi-Path Loops
 Yingwen Liu, Yao Zhang, Sen Chen, **Fu Song**, Xiaofei Xie, Xiaohong Li and Lintan Sun
 In Proceedings of the 15th International Symposium on Theoretical Aspects of Software Engineering (TASE),
 63–70, 2021, CCF-C
- [26] Who is Real Bob? Adversarial Attacks on Speaker Recognition Systems
 Guangke Chen, Sen Chen, Lingling Fan, Xiaoning Du, Zhe Zhao, **Fu Song*** and Yang Liu
 In Proceedings of the 42st IEEE Symposium on Security and Privacy (Oakland, S&P), 694–711, 2021,
 CCF-A
- [27] Patch Based Vulnerability Matching for Binary Programs Yifei Xu, Zhengzi Xu, Bihuan Chen, Fu Song, Yang Liu and Ting Liu In Proceedings of the 29th ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA), 376–387, 2020, CCF-A
- [28] Quantitative Verification of Masked Arithmetic Programs Against Side-Channel Attacks Pengfei Gao, Hongyi Xie, Jun Zhang, Fu Song* and Taolue Chen In Proceedings of the 25th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), 155–173, 2019, CCF-B
- [29] SMT-Based Bounded Schedulability Analysis of the Clock Constraint Specification Language Min Zhang, Fu Song*, Fei Gao, Frederic Mallet and Xiaohong Chen In Proceedings of the 22nd International Conference on Fundamental Approaches to Software Engineering (FASE), 61–78, 2019, CCF-B
- [30] Probabilistic Alternating-Time Mu-Calculus Fu Song, Yedi Zhang, Yu Tang, Taolue Chen and Zhiwu Xu In Proceedings of the Thirty-Third AAAI Conference on Artificial Intelligence (AAAI), 6179–6186, 2019, CCF-A
- [31] Android Malware Family Classification and Characterization Using CFG and DFG Zhiwu Xu, Kerong Ren and Fu Song In Proceedings of the 13th International Symposium on Theoretical Aspects of Software Engineering (TASE), 49–56, 2019, CCF-C
- [32] SCInfer: Refinement-based Verification of Software Countermeasures against Side-Channel Attacks
 Jun Zhang, Pengfei Gao, **Fu Song*** and Chao Wang
 In Proceedings of the 30th International Conference on Computer Aided Verification (CAV), 157–177, 2018
 , CCF-A
- [33] Android Stack Machine
 Taolue Chen, Jinlong He, **Fu Song**, Guozhen Wang, Zhilin Wu and Jun Yan (Alphabetical Ordering)

In Proceedings The 30th International Conference on Computer Aided Verification (CAV), 487–504, 2018, CCF-A

[34] KRust: A Formal Executable Semantics of Rust

Feng Wang, Fu Song*, Min Zhang, Xiaoran Zhu and Jun Zhang

In Proceedings of the 12th International Symposium on Theoretical Aspects of Software Engineering (TASE), 44–51, 2018, CCF-C

[35] Model Checking Pushdown Epistemic Game Structures

Taolue Chen, Fu Song* and Zhilin Wu (Alphabetical Ordering)

In Proceedings of the 19th International Conference on Formal Engineering Methods (ICFEM), 36–53, 2017 , CCF-C

[36] Tractability of separation logic with inductive definitions: Beyond lists

Taolue Chen, Fu Song and Zhilin Wu (Alphabetical Ordering)

In Proceedings of the 28th International Conference on Concurrency Theory (CONCUR), 37:1–37:17, 2017, CCF-B

[37] SPAIN: Security Patch Analysis for Binaries - Towards Understanding the Pain and Pills Zhengzi Xu, Bihuan Chen, Mahinthan Chandramohan, Yang Liu and Fu Song In Proceedings of the 39th ACM/IEEE International Conference on Software Engineering (ICSE),462–472,2017, CCF-A

[38] Reasoning about Periodicity on Infinite Words

Wanwei Liu, Fu Song and Ge Zhou

In Proceedings of the 3rd Symposium on Dependable Software Engineering (SETTA), 200-215, 2017, CCF-C

[39] Optimizing Backbone Filtering

Yueling Zhang, Jianwen Li, Min Zhang, Geguang Pu and Fu Song

In Proceedings of the 11th International Symposium on Theoretical Aspects of Software Engineering (TASE), 1–8, 2017, CCF-C

[40] Verifying Pushdown Multi-Agent Systems against Strategy Logics

Taolue Chen, **Fu Song** and Zhilin Wu (Alphabetical Ordering)

In Proceedings of the 25th International Joint Conference on Artificial Intelligence (IJCAI), 180–186, 2016, CCF-A

[41] Global Model Checking On Pushdown Multi-Agent Systems

Taolue Chen, Fu Song and Zhilin Wu (Alphabetical Ordering)

In Proceedings of the 30th AAAI Conference on Artificial Intelligence (AAAI), 2459-2465, 2016, CCF-A

[42] On Reachability Analysis of Pushdown Systems with Transductions: Application to Boolean Programs with Call-By-Reference

Fu Song, Weikai Miao, Geguang Pu and Min Zhang

In Proceedings of the 26th International Conference on Concurrency Theory (CONCUR), 383–397, 2015, CCF-B

[43] On the Satisfiability of Indexed Linear Temporal Logics

Taolue Chen, Fu Song and Zhilin Wu (Alphabetical Ordering)

In Proceedings of the 26th International Conference on Concurrency Theory (CONCUR), 254–267, 2015, CCF-B

[44] Modeling and Verifying Google File System

Bo Li, Mengdi Wang, Yongxin Zhao, Geguang Pu, Huibiao Zhu and Fu Song

In Proceedings of the 16th IEEE International Symposium on High Assurance Systems Engineering (HASE), 207–214, 2015

[45] Model-checking for Android Malware Detection

Fu Song and Tayssir Touili

In Proceedings of the 12th Asian Symposium on Programming Languages and Systems (APLAS), 216–235, 2014, CCF-C

[46] Extending Temporal Logics with Data Variable Quantifications

Fu Song and Zhilin Wu (Alphabetical Ordering)

In Proceedings of the 34th International Conference on Foundation of Software Technology and Theoretical Computer Science (FSTTCS), 253–265, 2014, CCF-C

[47] LTL Model-Checking for Malware Detection

Fu Song and Tayssir Touili

In Proceedings of the 19th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), 416–431, 2013, CCF-B

[48] Model Checking Dynamic Pushdown Networks

Fu Song and Tayssir Touili

In Proceedings of the 11th Asian Symposium on Programming Languages and Systems (APLAS),33–49,2013 , CCF-C

[49] Model-checking Software Library API Usage Rules

Fu Song and Tayssir Touili

In Proceedings of the 10th International Conference on Integrated Formal Methods (iFM), 192-207, 2013

[50] Pommade: Pushdown Model-Checking for Malware Detection

Fu Song and Tayssir Touili

In Proceedings of the 9th Joint Meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE), 607–610, 2013

[51] Efficient Malware Detection Using Model-Checking

Fu Song and Tayssir Touili

In Proceedings of the 18th International Symposium on Formal Methods (FM), 418-433, 2012, CCF-A

[52] Pumoc: A CTL Model-Checker for Sequential Programs

Fu Song and Tayssir Touili

In Proceedings of the 27th IEEE/ACM International Conference on Automated Software Engineering (ASE), 346–349, 2012

[53] Pushdown Model Checking For Malware Detection

Fu Song and Tayssir Touili

In Proceedings of the 18th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), 110–125, 2012, CCF-B

[54] Efficient CTL Model-Checking for Pushdown Systems

Fu Song and Tayssir Touili

In Proceedings of the 22nd International Conference on Concurrency Theory (CONCUR), 434–449, 2011, CCF-B

[55] A Distributed Clustering Algorithm for Voronoi Cell-Based Large Scale Wireless Sensor Network Jiehui Chen, Chul soo Ki and **Fu Song** In Proceedings of the International Conference on Communications and Mobile Computing (CMC), 3:209–213, 2010

[56] Integrating the b-method into PVS

Jiaming Zhou, Jian Guo and Fu Song

In Proceedings of the International Conference on Information Engineering and Computer Science (ICIECS), 1–4, 2009

Patents

[1] Side-channel Resistant Superconducting Cryptographic Circuits

Jie Ren, Wei Yan, Fu Song and Xiaoping Gao

Application No.: 202110178609.8, pending

[2] An Acoustic Feature based Appraoch for Adversarial Voices Detection

Fu Song, Guangke Chen and Zhe Zhao

Application No.: 202111060044.X, pending

[3] A BDD-based Quantitative Analysis Framework for Binarized Neural Networks

 $\textbf{Fu Song} \ \text{and Yedi Zhang}$

No.: ZL 2021 1 0619510.7

[4] An Attack Cost based Approach for Adversarial Example Detection

Fu Song, Zhe Zhao and Guangke Chen

No.: ZL 2020 1 1285900.7

[5] A Graph-Isomorphism based Verification Approach for Countermeasures against Power-based Higher-order Side Channel Attacks

Fu Song, Pengfei Gao and Hongyi Xie

No.: ZL 2020 1 0913876.0

[6] A GPU based Solving Approach for Model Counting and their Constraints

Fu Song, Pengfei Gao and Hongyi Xie

No.: ZL 2020 1 0908484.5

[7] A Divide-and-Conquer based Verification Approach for Countermeasures against Power-based Higher-order Side Channel Attacks

Fu Song, Pengfei Gao and Hongyi Xie

No.: ZL 2020 1 0908485.X,

[8] A Formal Verification Approach for Countermeasures against Power-based Side Channel Attacks Fu Song

No.: ZL 2018 1 0626315.5,

Tools

- DeJITLeak: Eliminating JIT-Induced Timing Side-Channel Leaks
- A²D: Attack as defense: characterizing adversarial examples using robustness
- LJS: A Model-based Automated Testing Tool for JavaScript Web Applications
- QMVerif: A Compositional Verification Tool for Masking Countermeasures of Arithmetic Programs
- QMSInfer: A Quantitative Verification Tool for Masking Countermeasures of Boolean Programs
- o BinXray: A Patch Based Vulnerability Matching Tool for Binary Programs

- FakeBob: A Black-box Attack Tool for Speaker Recognition Systems
- o SCInfer: A Refinement-based Verification Tool for Masking Countermeasures of Boolean Programs
- KRust: A Formal Executable Semantics of Rust
- EPMC-PAMC: A Model Checker for Probabilistic Alternating-Time Mu-Calculus
- PAMCSolver: A Satisfiability Solver for Probabilistic Alternating-Time Mu-Calculus
- o YSECURE: A Machine Learning based Phishing Website Detector
- SPAIN: Security Patch Analysis for Binaries
- o PuMoC: A CTL Model-Checker for Sequential Programs
- o POMMADE: A PushdOwn Model-checker for MAlware DEtection

Presentations

Keynote Speeches

- Formal Verification for Side-channel Resistance of Cryptographic Programs
 The 24th International Conference on Engineering of Complex Computer Systems (ICECCS), Guangzhou,
 China, November 13, 2019
- Formal Verification for Side-channel Resistance of Cryptographic Programs
 Chinese Annual Conference on Mathematical Logic, Chongqing, China, November 16, 2019

Presentation of Papers

- Model Checking Pushdown Epistemic Game Structures
 - The 19th International Conference on Formal Engineering Methods (ICFEM) 2017
- Verifying Pushdown Multi-Agent Systems against Strategy Logics
 The 25th International Joint Conference on Artificial Intelligence (IJCAI) 2016
- Global Model Checking on Pushdown Multi-Agent Systems
 The 30th AAAI Conference on Artifficial Intelligence (AAAI) 2016
- On Reachability Analysis of Pushdown Systems with Transductions: Application to Boolean Programs with Call-by-Reference
 - The 26th International Conference on Concurrency Theory (CONCUR) 2015
- Model Checking for Android Malware Detection
 - The 12th Asian Symposium on Programming Languages and Systems (APLAS) 2014
- Model Checking Dynamic Pushdown Networks
 - The 11th Asian Symposium on Programming Languages and Systems (APLAS) 2013
- o Pommade:Pushdown Model-Checking for Malware Detection
 - The 9th joint meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE) 2013
- LTL Model-Checking For Malware Detection
 - The 19th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS) 2013
- o PuMoC: A CTL Model-Checker For Sequential Programs
 - The 27th IEEE/ACM International Conference On Automated Software Engineering (ASE) 2012
- Efficient Malware Detection Using Model-Checking
 - The 18th International Symposium on Formal Methods (FM) 2012
- Pushdown Model-Checking for Malware Detection
 - The 18th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS) 2012
- Efficient CTL Model-Checking for Pushdown Systems
 - The 22nd International Conference on Concurrency Theory (CONCUR) 2011

Professional Services

Organizing Committee

- o Chair: National Conference on Formal Methods and Applications (FMAC 2023)
- o Chair: System Software Security Track of Chinasoft, 2021
- o Finance Chair: Asian Hardware Oriented Security and Trust Symposium (AsianHOST 2021)
- Chair: CCF Dragon-star course on Logic and Formal Methods, 2019
- Program co-chair: Young Researchers Workshop on Concurrency Theory (YR-CONCUR) 2018
- Publicity Chair: Symposium on Dependable Software Engineering: Theories, Tools and Applications (SETTA 2017, 2020, 2021)
- o Program co-chair: Young Researchers Workshop on Formal Methods (YR-SETTA 2016)

Technical Program Committee

- o International Symposium on Formal Methods (FM 2024)
- ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2024)
- Static Analysis Symposium (SAS 2023)
- o Automated Technology for Verification and Analysis (ATVA 2022, 2023)
- o Chinasoft 2022, 2023, 2024
- Asian Hardware Oriented Security and Trust Symposium (AsianHOST 2021, 2022, 2023)
- o IEEE Pacific Rim International Symposium on Dependable Computing (PRDC 2022)
- o International Symposium on Software Reliability Engineering (ISSRE 2021, 2022, 2023, 2024)
- International Workshop On Security Proofs For Embedded Systems (PROOFS 2021)
- International Conference on Computer-Aided Verification (CAV 2020)
- Asia-Pacific Software Engineering Conference (APSEC 2020)
- International Conference on Verification and Evaluation of Computer and Communication Systems (VECoS 2020, 2021)
- National Software Application Conference (NASAC 2019)
- International Conference on Engineering of Complex Computer Systems (ICECCS 2019, 2020, 2021, 2022)
- International Conference on Formal Engineering Methods (ICFEM 2019)
- Symposium on Dependable Software Engineering: Theories, Tools and Applications (SETTA 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024)
- National Conference on Formal Methods and Applications (FMAC 2017, 2018, 2019, 2020, 2023)
- Young Researchers Workshop on Concurrency Theory (YR-CONCUR 2018)
- International Symposium on Theoretical Aspects of Software Engineering (TASE 2018, 2019)
- Young Researchers Workshop on Formal Methods (YR-SETTA 2015, 2016, 2017, 2018, 2019)

Professional Organization

- o 2019 Present: Member of ETAPS e.V.
- 2019 Present: Senior Member of China Computer Federation (CCF)
- o 2018 Present: Member of CCF Technical Committee for Formal Methods
- o 2016 2018: Member of CCF

Reviewer for Journal

- IEEE Transactions on Information Forensics and Security
- o IEEE Transactions on Dependable and Secure Computing
- ACM Transactions on Programming Languages and Systems
- IEEE Transactions on Software Engineering
- IEEE Transactions on Reliability
- International Journal of Intelligent Systems
- Theoretical Computer Science
- Theory of Computing Systems

- Journal of Systems Architecture
- International Journal of Computer Science and Technology
- Formal Aspects of Computing
- Journal of Computer Security
- IEEE Access
- Frontiers of Computer Science
- Journal of Software
- Transactions on Petri Nets and Other Models of Concurrency
- Journal of Computer Research and Development

Reviewer for Conference

- Asia-Pacific Software Engineering Conference (APSEC 2022)
- International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS 2021)
- IEEE/ACM International Conference on Automated Software Engineering (ASE 2019)
- International Conference on Computer-Aided Verification (CAV 2019)
- IEEE Real-Time Systems Symposium (RTSS 2018)
- Automated Technology for Verification and Analysis (ATVA 2016, 2018)
- o International Conference on Logic in Computer Science (LICS 2018)
- o International Colloquium on Automata, Languages, and Programming (ICALP 2018)
- o International Conference on Concurrency Theory (CONCUR 2013, 2016)
- Chinese Conference on Trusted Computing and Information Security (CTCIS 2016)
- International Conference on Information and Communication Systems (ICICS 2016)
- International Colloquium on Theoretical Aspects of Computing (ICTAC 2016)
- International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI 2014, 2015)
- ACM Symposium on Applied Computing: Software Verification and Testing Track (SAC-SVT 2015)
- o ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages (POPL 2014)
- o International SPIN Symposium on Model Checking of Software (SPIN 2012)
- International Workshop on Automated Verification of Critical Systems (AVoCS 2012)

University Services

School Committee

- 2020 Present: Academic Affairs Committee, School of Information Science and Technology
- o 2020 Present: Graduation Affair Committee, School of Information Science and Technology
- 2019 Present: Co-director of Systems and Security Center, School of Information Science and Technology
- o 2019 Present: Executive Committee, School of Information Science and Technology
- 2017 2020: Resource Management Committee, School of Information Science and Technology
- 2016 2018: Recruitment and Admissions (GRA) Committee, School of Information Science and Technology
- 2016 2017: Academic Seminar Committee, School of Information Science and Technology

Student Admission and Advising

- Outreach for class 2021 undergraduate-admission: Ningbo, Zhejiang
- o Outreach for class 2020 graduate-admission: South China University of Technology, Ningbo University
- o Outreach for class 2019 graduate-admission: China University of Mining and Technology, Nanjing University
- Outreach for class 2020 undergraduate-admission: Ningbo, Zhejiang
- Outreach for class 2019 undergraduate-admission: Kunming, Yunnan
- Evaluation of applications for undergraduate-admission (2017, 2019)
- Evaluation of applications for graduate-admission (2017, 2018, 2019, 2020)
- o Interview of applicants for undergraduate-admission (2017, 2018, 2019)

- Interview of applicants for graduate-admission (2017, 2018, 2019, 2020)
 Design and grading of examinations (CS) for graduate-admission (2018, 2019)
- Undergraduate advising: 38 students