

SHUFANG ZHU

Senior Research Associate

Department of Computer Science

University of Oxford

Website: <https://shufang-zhu.github.io/>

Email Address: shufang.zhu@cs.ox.ac.uk

DBLP: <https://dblp.org/pid/141/7718-1.html>

Google Scholar: <https://scholar.google.com/citations?user=nk0Kc3MAAAAJ&hl=en>

EDUCATION

PhD in SOFTWARE ENGINEERING

Sept. 14 - Mar. 20

East China Normal University, China

Advisor: Prof. Geguang Pu, Co-advisor: Prof. Moshe Y. Vardi

Thesis: Program Synthesis of Linear Temporal Logic over Finite Traces

Committee: Prof. Moshe Y. Vardi – Chair (Rice U.), Prof. Giuseppe De Giacomo (U. Oxford), Prof. Meng Sun (Peking U.), Prof. Naijun Zhan (Chinese Academy of Sci.), and Prof. Yuxin Deng (ECNU)

BSc in SOFTWARE ENGINEERING

Sept. 10 - Jun. 14

East China Normal University, China

ACADEMIC APPOINTMENT

Senior Research Associate in DEPARTMENT OF COMPUTER SCIENCE

Feb. 23 - Present

University of Oxford, UK

Mentor: Prof. Giuseppe De Giacomo

Research Associate in DEPT. OF COMP., CONTROL & MANAGEMENT ENGINEERING

Dec. 20 - Nov. 22

Sapienza University of Rome, Italy

Mentor: Prof. Giuseppe De Giacomo

Junior Researcher

May. 20 - Oct. 20

Shanghai Industrial Control Safety Innovation Technology Co. LTD, China

RESEARCH INTERESTS

My expertise lies in the interdisciplinary research area of artificial intelligence (AI) and formal methods (FM), with a focus on **automated planning and synthesis**. My research vision is to advance the development of **trustworthy** autonomous AI systems through trustworthy-by-design techniques.

My work has led to **22** publications at premier conferences and journals in AI (IJCAI \times 4, KR \times 3, AAAI \times 2, EUMAS \times 2, ECAI \times 1, JAIR \times 1) and FM (FMSD \times 2, HVC \times 2, ICCAD \times 1, VSTTE \times 1, GandALF \times 1, FAC \times 1, TAMC \times 1).

TEACHING

Co-lecturer, Game-Theoretic Approach to Planning and Synthesis (MS/PhD level)

Jul. 23

European Summer School on Artificial Intelligence ESSAI, Ljubljana, Slovenia

Class Tutoring, Foundations of Self-Programming Agents (MS/PhD level)

Hilary Term. 23

University of Oxford, UK

Guest Lecturer, One lecture on ‘Symbolic Synthesis Techniques’

In the course “Foundations of Self-Programming Agents” (MS/PhD level)

Hilary Term. 23

University of Oxford, UK

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| Lecturer , Game-Theoretic Approach to Planning and Synthesis (MS/PhD level) Italian PhD program in Artificial Intelligence & Artificial Intelligence Doctoral Academy Sapienza University of Rome, Italy | Jul. 22 |
| Teaching Assistant , Tools of Software Analysis and Verification (MS/PhD level) East China Normal University, China | Fall. 14 |

RESEARCH MENTORING

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| 1. Gianmarco Parretti (PhD, Sapienza University of Rome) | Nov. 22 - Present |
| 2. Maria Farberov (MSc, The Open University of Israel) | Sept. 22 - Present |
| 3. Gianmarco Parretti (MSc, Sapienza University of Rome) Thesis: Symbolic best-effort synthesis for specifications in Linear Temporal Logic on finite traces Thesis received 110 (with Honors)/110 points | Sept. 21 - Jul. 22 |
| 4. Yingying Shi (MSc, East China Normal University) Project: Automata-based LTL_f reasoning | Sept. 18 - Nov. 19 |
| 5. Shengping Xiao (Undergraduate, East China Normal University) Project: MONA-based LTL_f to DFA conversion | Sept. 18 - Nov. 19 |

AWARDS AND HONORS

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|-----------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Selected Mentee at F+Cube Program TU Delft, The Netherlands | 2023 |
| Future Digileader Digital Futures, Sweden | 2023 |
| Rising Star in Electrical Engineering and Computer Science (EECS) UT Austin, USA | 2022 |
| Invited to Dagstuhl Seminar on The Futures of Reactive Synthesis | Sept. 23 |
| Invited to Lorentz workshop on Contract Languages: Expressiveness, Abstraction, Interoperability, and Applications | Mar. 24 |
| Invited to Dagstuhl Seminar on Automated Synthesis: Functional, Reactive and Beyond | Apr. 24 |
| Chinese Government Scholarship Chinese Scholarship Council | May. 2016 |
| Academic Scholarship East China Normal University | 2015, 2016, 2017, 2018, 2019 |
| Outstanding Student Scholarship East China Normal University | 2012, 2013, 2014 |
| Notable Freshman Mentor East China Normal University | 2011 |
| Travel Grants KR Diversity & Inclusion Travel Grant 2022, IJCAI 2019, FLoC 2018, Travel Award for WiL 2018 & 2023 | |

GRANT APPLICATION EXPERIENCE

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| Royal Society University Research Fellowship [Under Review] PI: Dr. Shufang Zhu | 2023 |
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| ERC Starting Grant [In Preparation, EOI approved by departmental evaluation] PI: Dr. Shufang Zhu | 2023 |
| Marie Skłodowska-Curie Research Fellowship [Not Granted] PI: Prof. Giuseppe De Giacomo | 2022 |

OPEN SOURCE TOOLS

Syft | Github Link

- The first symbolic reactive synthesis tool for LTL_f objectives [Paper]. It has also been integrated into **state-of-the-art LTL_f synthesizers** and extended to robotics motion and planning.
- Extension SyftMax to synthesize the maximally permissive controller for LTL_f objectives [Paper].
- Extension GFSynth to synthesize LTL_f objectives with LTL environment specifications [Paper].
- The latest version LydiaSyft got the **2nd place** in LTL_f track of SYNTCOMP 2023 [Results][Paper].
- Extension BeSyft to synthesize best-effort controller for LTL_f specifications [Paper].

RESEARCH COMMUNITY SERVICES

Organizing Committee

Co-Chair. AAI Spring Symposium Series 2023: On the Effectiveness of Temporal Logics on Finite Traces

Program Committee

2024. AAI, AAMAS

2023. IJCAI, KR, FMCAD, ECAI

2022. AAI, IJCAI

2021. AAI

Conference Reviewer

2023. CAV

2022. CSL

2021. ICALP

Journal Reviewer

2023. Artificial Intelligence Journal

2020. Mathematical Problems in Engineering, IEEE Access

2017. Formal Methods in System Design

Conference Volunteer

KR 2021, ATVA 2015 (Head Volunteer)

RESEARCH VISITS

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| The CISA Helmholtz Center for Information Security , Saarbrücken, Germany Visiting Postdoctoral Researcher Host: Prof. Bernd Finkbeiner | Sept. 23 |
| Max Planck Institute for Software Systems (MPI-SWS) , Kaiserslautern, Germany. Visiting Postdoctoral Researcher Host: Dr. Anne-Kathrin Schmuck | Sept. 23 |
| Sapienza University of Rome , Rome, Italy. Visiting PhD student Host: Prof. Giuseppe De Giacomo | Apr. 19 |

Université libre de Bruxelles, Brussels, Belgium.

March. 19

Visiting PhD student

Host: Prof. Jean-François Raskin

Huawei OS Kernel Lab, Shanghai, China.

Jun. 18 - Aug. 18

Research Intern

Mentors: Dr. Ming Fu, Dr. Xin Gao

Rice University, Houston, USA.

Aug. 16 - Feb. 18

Visiting PhD student

Host: Prof. Moshe Y. Vardi

RESEARCH TALKS

Reactive Synthesis of Linear Temporal Logic on Finite Traces: An Evolving Journey

- (Invited) In a seminar series at the CISPA Helmholtz Center for Information Security (CISPA), 22/09/2023, Saarbrücken, Germany.
- (Invited) In a seminar series at Max Planck Institute for Software Systems (MPI-SWS), 18/09/2023, Kaiserslautern, Germany.

On the Power of LTL_f in Assured Autonomy

- (Invited) In the Automata Group seminar, EPITA Research Laboratory (LRE), 07/07/2023, Online
- (Invited) In the OxCAV seminar, University of Oxford, 24/05/2023, Oxford, UK.
- (Invited) In the KRR seminar, University of Oxford, 15/05/2023, Oxford, UK.
- (Invited) In the Autonomous Systems Group seminar, University of Texas at Austin, 04/11/2022, Online.
- (Invited) In a seminar series, Sapienza University of Rome, 10/11/2022, Rome, Italy.

Program Synthesis of Linear Temporal Logic over Finite Traces

- (Invited) In a seminar held at Sapienza University of Rome, 11/06/2020, Online.

Temporal Synthesis with Reachability and Safety Goals

- (Invited) In a seminar series, Sapienza University of Rome, 01/04/2019, Rome, Italy.
- (Invited) In the Formal Methods and Verification group seminar, Université libre de Bruxelles, 28/03/2019, Brussels, Belgium.

Conference and Workshop Presentations

LAMAS&SR 2023, SYNTH 2023, WiL 2023, Oxbridge 2023, KR 2022, IJCAI 2022, VardiFest 2022, GenPlan 2022, IJCAI 2021, GenPlan 2021, Highlights of Logic, Games and Automata 2021, KR 2021, GandALF 2021, TAMC 2019, WiL 2018, IJCAI 2017, "ExCAPE: Expeditions in Computer Augmented Program Engineering" Annual Meeting 2017, IDEA4CPS 2015, YR-SETTA 2015

OUTREACH ACTIVITIES

Research Member of Common Room

Sept. 23 - Present

Kellogg College, Oxford, UK

Seminar Series Coordinator

May. 23 - Present

Oxford Women in Computer Science Society (OxWoCS), Oxford, UK

Women in Sciences Day, Oxford, UK

A 45-min lecture on "Logic in Computer Science" to a group of young female and non-binary students aged 16-17 from the UK

PUBLICATIONS

* indicates author list has been sorted alphabetically by last name

22. **[JAIR-23]*** [Mimicking Behaviors in Separated Domains](#)
Giuseppe De Giacomo, Dror Fried, Fabio Patrizi, **Shufang Zhu**
Journal of Artificial Intelligence Research 77 (2023):1087-1112
21. **[FMSD-23]*** [Finite-trace and generalized-reactivity specifications in temporal synthesis](#)
Giuseppe De Giacomo, Antonio Di Stasio, Lucas M. Tabajara, Moshe Y. Vardi, **Shufang Zhu**
Formal Methods System Design [\[Invited submission\]](#)
20. **[ECAI-23]*** [LTL_f Best-Effort Synthesis in Nondeterministic Planning Domains](#)
Giuseppe De Giacomo, Gianmarco Parretti, **Shufang Zhu**
To appear at the European Conference on Artificial Intelligence (ECAI) 2023
19. **[EUMAS-23]*** [LTL_f Synthesis Under Environment Specifications for Reachability and Safety Properties](#)
Benjamin Aminof, Giuseppe De Giacomo, Antonio Di Stasio, Hugo Francon, Sasha Rubin, **Shufang Zhu**
In Proc. of the European Conference on Multi-Agent Systems (EUMAS) 2023
18. **[EUMAS-23]*** [Symbolic LTL_f Best-Effort Synthesis](#)
Giuseppe De Giacomo, Gianmarco Parretti, **Shufang Zhu**
In Proc. of the European Conference on Multi-Agent Systems (EUMAS) 2023
17. **[VSTTE-22]*** [Compositional Safety LTL Synthesis](#)
Suguman Bansal, Giuseppe De Giacomo, Antonio Di Stasio, Yong Li, Moshe Y Vardi, **Shufang Zhu**
In Proc. of International Conference on Verified Software: Theories, Tools, and Experiments (VSTTE) 2022
16. **[IJCAI-22]*** [LTL_f Synthesis as AND-OR Graph Search: Knowledge Compilation at Work](#)
Giuseppe De Giacomo, Marco Favorito, Jianwen Li, Moshe Y Vardi, Shengping Xiao, **Shufang Zhu**
In Proc. of International Joint Conference on Artificial Intelligence (IJCAI) 2022
15. **[IJCAI-22]** [Synthesis of Maximally Permissive Strategies for LTL_f Specifications](#)
Shufang Zhu, Giuseppe De Giacomo
In Proc. of International Joint Conference on Artificial Intelligence (IJCAI) 2022
14. **[KR-22]** [Act for Your Duties but Maintain Your Rights](#)
Shufang Zhu, Giuseppe De Giacomo
In Proc. of International Conference on Principles of Knowledge Representation and Reasoning (KR) 2022
13. **[IJCAI-21]*** [Finite-Trace and Generalized-Reactivity Specifications in Temporal Synthesis](#)
Giuseppe De Giacomo, Antonio Di Stasio, Lucas M Tabajara, Moshe Y. Vardi, **Shufang Zhu**
In Proc. of International Joint Conference on Artificial Intelligence (IJCAI) 2021
12. **[AAAI-21]** [On-the-fly Synthesis for LTL over Finite Traces](#)
Shengping Xiao, Jianwen Li, **Shufang Zhu**, Yingying Shi, Geguang Pu, Moshe Y. Vardi
In Proc. of AAAI Conference on Artificial Intelligence (AAAI) 2021

11. **[KR-21]*** [Synthesis with Mandatory Stop Actions](#)
Giuseppe De Giacomo, Antonio Di Stasio, Giuseppe Perelli, **Shufang Zhu**
In Proc. of International Conference on Principles of Knowledge Representation and Reasoning (KR) 2021
10. **[GandALF-21]** [On the Power of Automata Minimization in Temporal Synthesis](#)
Shufang Zhu, Lucas M Tabajara, Geguang Pu, Moshe Y Vardi
In Proc. of International Symposium on Games, Automata, Logics, and Formal Verification (GandALF) 2021
9. **[KR-20]*** [Two-Stage Technique for \$LTL_f\$ Synthesis Under LTL Assumptions](#)
Giuseppe De Giacomo, Antonio Di Stasio, Moshe Y. Vardi, **Shufang Zhu**
In Proc. of International Conference on Principles of Knowledge Representation and Reasoning (KR) 2020
8. **[AAAI-20]** [\$LTL_f\$ Synthesis with Fairness and Stability Assumptions](#)
Shufang Zhu, Giuseppe De Giacomo, Geguang Pu, Moshe Y Vardi
In Proc. of AAAI Conference on Artificial Intelligence (AAAI) 2020
7. **[TAMC-19]** [First-Order vs. Second-Order Encodings for \$LTL_f\$ -to-Automata Translation](#)
Shufang Zhu, Geguang Pu, Moshe Y. Vardi
In Proc. of Annual Conference of Theory and Applications of Models of Computation (TAMC) 2019
6. **[FMSD-19]** [SAT-based explicit LTL reasoning and its application to satisfiability checking](#)
Jianwen Li, **Shufang Zhu**, Geguang Pu, Lijun Zhang, Moshe Y. Vardi
Formal Methods System Design 54(2): 164-190
5. **[FAC-18]** [An explicit transition system construction approach to LTL satisfiability checking](#)
Jianwen Li, **Shufang Zhu**, Geguang Pu, Moshe Y. Vardi, Jifeng He
Formal Aspects of Computing 30(2): 193-217
4. **[IJCAI-17]** [Symbolic \$LTL_f\$ Synthesis](#)
Shufang Zhu, Lucas M. Tabajara, Jianwen Li, Geguang Pu, Moshe Y. Vardi
In Proc. of International Joint Conference on Artificial Intelligence (IJCAI) 2017
3. **[HVC-17]** [A Symbolic Approach to Safety LTL Synthesis](#)
Shufang Zhu, Lucas M. Tabajara, Jianwen Li, Geguang Pu, Moshe Y. Vardi
In Proc. of International Haifa Verification Conference (HVC) 2017
2. **[ICCAD-17]** [Safety model checking with complementary approximations](#)
Jianwen Li, **Shufang Zhu**, Yueling Zhang, Geguang Pu, Moshe Y. Vardi
In Proc. of IEEE/ACM International Conference on Computer-Aided Design (ICCAD) 2017
1. **[HVC-15]** [SAT-Based Explicit LTL Reasoning](#)
Jianwen Li, **Shufang Zhu**, Geguang Pu, Moshe Y. Vardi
In Proc. of International Haifa Verification Conference (HVC) 2015