

# SHUFANG ZHU

Lecturer (Assistant Professor in US terms)

Department of Computer Science

University of Liverpool

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

Email Address: [shufang.zhu@liverpool.ac.uk](mailto:shufang.zhu@liverpool.ac.uk)

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

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

## EDUCATION

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**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

**BSc** in SOFTWARE ENGINEERING

Sept. 10 - Jun. 14

**East China Normal University**, China

## ACADEMIC APPOINTMENT

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**Senior Research Associate** in DEPARTMENT OF COMPUTER SCIENCE

Feb. 23 - Aug. 24

**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

## RESEARCH INTERESTS

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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.

## TEACHING

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**Guest Lecturer**, One lecture on 'Symbolic Synthesis Techniques'

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

Hilary Term. 24 & 23

University of Oxford, UK

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

Hilary Term. 24 & 23

University of Oxford, UK

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

Jul. 24 & Jul. 23

European Summer School on Artificial Intelligence ESSAI, Ljubljana, Slovenia

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

Jul. 22

Italian PhD program in Artificial Intelligence & Artificial Intelligence Doctoral Academy

Sapienza University of Rome, Italy

**Teaching Assistant**, Tools of Software Analysis and Verification (MS/PhD level)

Fall. 14

East China Normal University, China

## 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) Sept. 21 - Jul. 22  
Thesis: Symbolic best-effort synthesis for specifications in Linear Temporal Logic on finite traces  
**Thesis received 110 (with Honors)/110 points**
4. Yingying Shi (MSc, East China Normal University) Sept. 18 - Nov. 19  
Project: Automata-based  $LTL_f$  reasoning
5. Shengping Xiao (Undergraduate, East China Normal University) Sept. 18 - Nov. 19  
Project: MONA-based  $LTL_f$  to DFA conversion

## AWARDS AND HONORS

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- Invited to **Dagstuhl Seminar** on **AUTOBIZ: Pushing the Boundaries of AI-Driven Process Execution and Adaptation** Sep. 25
- Invited Speaker** at the 7th edition of the International Symposium on AI Verification (SAIV) Jul. 24
- Invited to **Dagstuhl Seminar** on **Automated Synthesis: Functional, Reactive and Beyond** Apr. 24
- Selected Mentee at F+Cube Program** 2023  
TU Delft, The Netherlands
- Future Digileader** 2023  
Digital Futures, Sweden
- Rising Star in Electrical Engineering and Computer Science (EECS)** 2022  
UT Austin, USA
- Invited to **Dagstuhl Seminar** on **The Futures of Reactive Synthesis** Sept. 23
- Chinese Government Scholarship** May. 2016  
Chinese Scholarship Council
- Academic Scholarship** 2015, 2016, 2017, 2018, 2019  
East China Normal University
- Outstanding Student Scholarship** 2012, 2013, 2014  
East China Normal University
- Notable Freshman Mentor** 2011  
East China Normal University
- Travel Grants**  
KR Diversity & Inclusion Travel Grant 2022, IJCAI 2019, FLoC 2018, Travel Award for WiL 2018 & 2023

## OPEN SOURCE TOOLS

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**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 2024 [Results][Paper].

- Extension BeSyft to synthesize best-effort controller for  $LTL_f$  specifications [Paper].

## RESEARCH COMMUNITY SERVICES

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### Organizing Committee

**Co-Chair.** the 14th Synthesis (SYNT) Workshop, co-located with CAV 2025

**Co-Chair.** ECAI 2024 Workshop: Highlights of Reasoning about Actions, Planning and Reactive Synthesis

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

### Program Committee

**2025.** AAI

**2024.** IJCAI, AAI, KR, AAMAS, FM, FMCAD, CAV Artifact Evaluation, SAIV

**2023.** IJCAI, KR, FMCAD, ECAI

**2022.** AAI, IJCAI

**2021.** AAI

### Conference Reviewer

**2023.** CAV

**2022.** CSL

**2021.** ICALP

### Journal Reviewer

**2024.** Logical Methods in Computer Science, Autonomous Agents and Multi-Agent Systems

**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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<b>East China Normal University</b> , Shanghai, China Visiting Postdoctoral Researcher Host: Prof. Jianwen Li	Aug. 24
<b>Institute of Science and Technology Austria</b> , Vienna, Austria Visiting Postdoctoral Researcher Host: Prof. Tom Henzinger	Jun. 24
<b>The CISA Helmholtz Center for Information Security</b> , Saarbrücken, Germany Visiting Postdoctoral Researcher Host: Prof. Bernd Finkbeiner	Sept. 23
<b>Max Planck Institute for Software Systems (MPI-SWS)</b> , Kaiserslautern, Germany. Visiting Postdoctoral Researcher Host: Dr. Anne-Kathrin Schmuck	Sept. 23
<b>Sapienza University of Rome</b> , Rome, Italy. Visiting PhD student Host: Prof. Giuseppe De Giacomo	Apr. 19
<b>Université libre de Bruxelles</b> , Brussels, Belgium. Visiting PhD student Host: Prof. Jean-François Raskin	March. 19

## RESEARCH TALKS

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### Trustworthy-by-Design Autonomous AI Systems

- (Invited) In the 7th International Symposium on AI Verification (SAIV), 23/07/2024, Montreal, Canada.

### Trustworthy-by-Design Autonomous AI Systems

- (Invited) In a seminar series at the Institute of Science and Technology Austria (ISTA), 18/06/2024, Vienna, Austria.

### On the Power of $LTL_f$ in Reactive Synthesis

- Dagstuhl Seminar on "Automated Synthesis: Functional, Reactive and Beyond", April 24

### Trustworthy-by-Design Autonomous AI Systems

- (Invited) Utrecht University, University of Liverpool, University of Birmingham, CISP, ISTA

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

- (Invited) In a seminar series at the CISP Helmholtz Center for Information Security (CISP), 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

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**Research Member of Common Room**

Kellogg College, Oxford, UK

Sept. 23 - Present

**Seminar Series Coordinator**

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

May. 23 - Present

**Taster-session Lecturer**

Women in Sciences Day, Oxford, UK

Jun. 23

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

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\* indicates author list has been sorted alphabetically by last name

24. [\[FM-24\] Misconceptions in Finite-Trace and Infinite-Trace Linear Temporal Logic](#)  
Ben Greenman, Siddhartha Prasad, Antonio Di Stasio, **Shufang Zhu**, Giuseppe De Giacomo, Shriram Krishnamurthi, Marco Montali, Tim Nelson, Milda Zizyte  
In Proc. of the International Symposium on Formal Methods (FM) 2024
23. [\[IJCAI-24\] The Trembling-Hand Problem for  \$LTL\_f\$  Planning](#)  
Pian Yu, **Shufang Zhu**, Giuseppe De Giacomo, Marta Kwiatkowska, Moshe Y. Vardi  
In Proc. of the International Joint Conference on Artificial Intelligence (IJCAI) 2024
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**  
In Proc. of 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

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