SHUFANG ZHU

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Google Scholar: https://scholar.google.com/citations?user=nkOKc3MAAAAJ&hl=en

EDUCATION

PhD in SOFTWARE ENGINEERING   Sept. 14 - Mar. 20
East China Normal University, China
Advisor: Prof. Geguang Pu, Co-advisor: 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, JAIR) and FM (FMSD$\times 2$, HVC$\times 2$, ICCAD, VSTTE, GandALF, FAC, TAMC).

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

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

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

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

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   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

GRANT APPLICATION EXPERIENCE

Royal Society University Research Fellowship [Under Review]   2023
PI: Dr. Shufang Zhu

ERC Starting Grant [In Preparation, EOI approved by departmental evaluation]   2023
PI: Dr. Shufang Zhu

Marie Skłodowska-Curie Research Fellowship [Not Granted]   2022
PI: Prof. Giuseppe De Giacomo

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. AAAI Spring Symposium Series 2023: On the Effectiveness of Temporal Logics on Finite Traces

Program Committee
2024. AAAI, AAMAS
2023. IJCAI, KR, FMCAD, ECAI
2022. AAAI, IJCAI
2021. AAAI

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

The CISPA Helmholtz Center for Information Security, Saarbrücken, Germany   Sept. 23
Visiting Postdoctoral Researcher
Host: Prof. Bernd Finkbeiner

Max Planck Institute for Software Systems (MPI-SWS), Kaiserslautern, Germany.   Sept. 23
Visiting Postdoctoral Researcher
Host: Dr. Anne-Kathrin Schmuck

Sapienza University of Rome, Rome, Italy.   Apr. 19
Visiting PhD student
Host: Prof. Giuseppe De Giacomo

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, Univeristy 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, Gen-Plan 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

Taster-session Lecturer Jun. 23

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