SHUFANG ZHU

Curriculum Vitae

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🖱 *https://shufang-zhu.github.io/*

Education

2014 – 2020 **PhD in Software Engineering**, *East China Normal University*, Shanghai, China.
- **Advisor:** Prof. Geguang Pu
- **Thesis:** Program Synthesis of Linear Temporal Logic over Finite Traces
- **Committee:** Prof. Moshe Y. Vardi (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)

2010 – 2014 **BSc in Software Engineering**, *East China Normal University*, Shanghai, China.

Current Position

Feb.2023 – Present **Senior Research Associate**, *Department of Computer Science*, University of Oxford, UK.
- **Mentor:** Prof. Giuseppe De Giacomo

Previous Positions

Dec.2020 – Nov. 2022 **Research Associate**, *Depart. of Computer, Control and Management Engineering*, Sapienza University of Rome, Rome, Italy.
- **Mentor:** Prof. Giuseppe De Giacomo

May.2020 – Oct.2020 **Junior Researcher**, *Shanghai Industrial Control Safety Innovation Technology Co. LTD*, Shanghai, China.
- **Mentor:** Prof. Geguang Pu

Jun.2018 – Aug.2018 **Researcher Intern**, *OS Kernel Lab of Huawei*, Shanghai, China.
- **Mentors:** Dr. Ming Fu, Dr. Xin Gao

Aug.2016 – Feb.2018 **PhD Researcher**, *Rice University*, Houston, USA.
- **Mentor:** Prof. Moshe Y. Vardi

Research Interests

My research concerns interdisciplinary knowledge across artificial intelligence (AI) and formal methods (FM), focusing on automated reasoning, planning and synthesis.

Teaching

Jul.2023 **Lecturer**, *European Summer School on Artificial Intelligence ESSAI & ACAI*, Ljubljana, Slovenia,
Course: Game-Theoretic Approach to Planning and Synthesis (PhD level).

Feb.2023 **Teaching Assistant**, *University of Oxford*, Oxford, UK,
Course: Foundations of Self-Programming Agents (MS/PhD level).

Jul.2022 **Lecturer**, *Sapienza University of Rome*, Rome, Italy,
Course: Game-Theoretic Approach to Planning and Synthesis (Italian national PhD program in AI).
- Symbolic representation and techniques for program synthesis.
- Solutions for notable cases of LTL_f goals under LTL assumptions.

Nov.2014 **Teaching Assistant**, *East China Normal University*, Shanghai, China,
Course: Tools of Software Analysis and Verification (MS/PhD level).

Research Mentoring

Sep.2021 - July.2022 **Gianmarco Parretti**, *Master Student*, Sapienza University of Rome.
- **Thesis:** Symbolic best-effort synthesis for specifications in Linear Temporal Logic on finite traces
- Paper at the Workshop on Generalization in Planning (GenPlan), 2022

Sep.2018 - Nov.2019 **Yingying Shi**, *Master Student*, East China Normal University.
- *Project:* Automata-based LTL_f reasoning

Sep.2018 - Nov.2019 **Shengping Xiao**, *Undergraduate Student*, East China Normal University.
- *Project:* MONA-based LTL_f to DFA conversion

Services for the Scientific Community

Chair.
2023: AAAI Spring Sympoium "On the Effectiveness of Temporal Logics on Finite Traces in AI"

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

Conference Paper Reviewer.
2023: CAV
2022: CSL
2019: ICALP

Journal Paper Reviewer.
Artificial Intelligence Journal
Formal Methods in System Design
Mathematical Problems in Engineering
IEEE Access

Conference Volunteer.
KR 2021, ATVA 2015 (Head Volunteer)

Outreach Activities

Oxford Women in Computer Science Society (OxWoCS), 18/05/2023 - Present.
Seminar Series Coordinator

Women in Sciences Day, 23/06/2023.
Lectured a 45-min taster session on "Logic in Computer Science" to around 100 young female and non-binary students aged 16-17 from around the country to Oxford.

Awards and Honors

Rising Star in Electrical Engineering and Computer Science (EECS), 2022.

Invited to Dagstuhl Seminar on Automated Synthesis: Functional, Reactive and Beyond, Sep 24 – Sep 29, 2023.

Invited to Dagstuhl Seminar on The Futures of Reactive Synthesis, April 21 - 26, 2024.

Invited to Lorentz workshop on Contract Languages: Expressiveness, Abstraction, Interoperability, and Applications, March 4 - 8, 2024.

Travel Grant.
WiL 2023, KR Diversity&Inclusion Travel Grant 2022, IJCAI 2019, FLoC 2018, SIGLOG/VCLA Travel Award for WiL 2018

Academic Scholarship, *East China Normal University*, 2015, 2016, 2017, 2018, 2019.

Chinese Government Scholarship, *Chinese Scholarship Council*, 2016.

Outstanding Student Scholarship, *East China Normal University*, 2012, 2013, 2014.

Notable Freshman Mentor, *East China Normal University*, 2011.

Open Source Tools

Syft, *Github link: https://github.com/Shufang-Zhu/Syft*.

- The first symbolic reactive synthesis tool for finite-trace task specifications.
- The synthesis core is integrated in state-of-the-art finite-trace task specification synthesizers, and has been successfully extended to support various synthesis scenarios.

GFSynth, *Github link: https://github.com/Shufang-Zhu/GFSynth*.

- Reactive synthesis for finite-trace task specifications under Generalized Reactivity (1) environment assumptions.

SyftMax, *Github link: https://github.com/Shufang-Zhu/SyftMax*.

- Reactive synthesis of the maximally permissive controller for finite-trace task specifications.

LydiaSyft, *Github link: https://github.com/whitemech/LydiaSyft*.

- A compositional symbolic reactive synthesis tool for finite-trace task specifications.
- Got the **2nd place** in the synthesis competition (SYNTCOMP) 2023.

Referees

Prof. Giuseppe De Giacomo, Department of Computer Science, University of Oxford.
giuseppe.degiacomo@cs.ox.ac.uk

Prof. Moshe Y. Vardi, Department of Computer Science, Rice University.
vardi@cs.rice.edu

Prof. Geguang Pu, Software Engineering Institute, East China Normal University.
ggpu@sei.ecnu.edu.cn

Research Talks

Reactive Synthesis of Linear Temporal Logic on Finite Traces.

- In the 12th workshop on Synthesis, 18/07/2023, Paris, France.
- In the 7th International Workshop "Women in Logic", 01/07/2022, Rome, Italy.

On the Power of LTL$_f$ in Assured Autonomy.

- In the OxCAV seminar held in the Univeristy of Oxford, 24/05/2023, Oxford, UK.
- In the KRR seminar held in the Univeristy of Oxford, 15/05/2023, Oxford, UK.
- In the Annual Women In Computer Science Conference, 29/04/2023, Cambridge, UK.
- In a seminar held in the Univeristy of Texas at Austin, 04/11/2022, Online.
- In a seminar held in Sapienza University of Rome, 10/11/2022, Rome, Italy.

Act for Your Duties but Maintain Your Rights.

- In the 19th International Conference on Principles of Knowledge Representation and Reasoning (KR), 03/08/2022, Haifa, Israel.

LTL$_f$ Synthesis as AND-OR Graph Search: Knowledge Compilation at Work.

- In the 31st International Joint Conference on Artificial Intelligence (IJCAI), 29/07/2022, Vienna, Austria.
- In the VardiFest workshop: On the Not So Unusual Effectiveness of Logic, 31/07/2022, Haifa, Israel.

Synthesis of Maximally Permissive Strategies for LTL$_f$ Specifications.

- In the 31st International Joint Conference on Artificial Intelligence (IJCAI), 29/07/2022, Vienna, Austria.

Symbolic Approaches to LTL$_f$ Best-Effort Synthesis.

- In the 6th Workshop on Generalization in Planning (GenPlan), 23/07/2022, Vienna, Austria.

Finite-Trace and Generalized-Reactivity Specifications in Temporal Synthesis.

- In the 31st International Joint Conference on Artificial Intelligence (IJCAI), 25/08/2022, Online
- In the 5th Workshop on Generalization in Planning (GenPlan), 19/08/2021, Online.
- In the 2021 edition of the Conference on Highlights of Logic, Games and Automata, 15/09/2021, Online.

Synthesis with Mandatory Stop Actions.

- In the 18th International Conference on Principles of Knowledge Representation and Reasoning (KR), 11/11/2021, Online + KR local gathering at Sapienza University of Rome, Italy.

On the Power of Automata Minimization in Temporal Synthesis.

- In the 12th International Symposium on Games, Automata, Logics, and Formal Verification (GandALF), 20/09/2021, Online.

Program Synthesis of Linear Temporal Logic over Finite Traces.

- In a seminar held in Sapienza University of Rome, 11/06/2020, Online.

First-Order vs. Second-Order Encodings for LTL$_f$-to-Automata Translation.

- In the 15th Annual Conference of Theory and Applications of Models of Computation (TAMC), 16/04/2019, Kitakyushu, Japan.

Temporal Synthesis with Reachability and Safety Goals.

- In a seminar held in Sapienza University of Rome, 01/04/2019, Italy.
- In a seminar held in Université libre de Bruxelles, 28/03/2019, Belgium.

First-Order vs. Second-Order Encodings for LTL$_f$-to-Automata: An Extended Abstract.

- In the 2nd Women in Logic (WiL) Workshop, 08/07/2018, UK.

Symbolic LTL$_f$ Synthesis.

- In the 26th International Joint Conference on Artificial Intelligence (IJCAI), 22/08/2017, Australia.

Symbolic Synthesis from LTL$_f$ Formulas.

- In the 2017 Expeditions in Computing project "ExCAPE: Expeditions in Computer Augmented Program Engineering" Annual Meeting, 04/05/2017, USA.

SAT-based Explicit LTL Reasoning.

- In the 1st Young Researchers Workshop on Formal Methods (YR-SETTA), 03/11/2015, China.
- In the 2015 annual Sino-Danish Basic Research Center IDEA4CPS Workshop, 30/11/2015, China.

Publications

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

In Conference Proceedings

[ECAI 23] * Giuseppe De Giacomo, Gianmarco Parretti, **Shufang Zhu**. "LTL$_f$ Best-Effort Synthesis in Nondeterministic Planning Domains" To appear at the 26th European Conference on Artificial Intelligence (ECAI), 2023.

[EUMAS 23] * Benjamin Aminof, Giuseppe De Giacomo, Antonio Di Stasio, Hugo Francon, Sasha Rubin, **Shufang Zhu**. "LTL$_f$ Synthesis Under Environment Specifications for Reachability and Safety Properties" To appear at the 20th European Conference on Multi-Agent Systems (EUMAS), 2023.

[EUMAS 23] * Giuseppe De Giacomo, Gianmarco Parretti, **Shufang Zhu**. "Symbolic LTL$_f$ Best-Effort Synthesis." To appear at the 20th European Conference on Multi-Agent Systems (EUMAS), 2023.

[VSTTE 22] * Suguman Bansal, Giuseppe De Giacomo, Antonio Di Stasio, Yong Li, Moshe Y Vardi, **Shufang Zhu**. "Compositional Safety LTL Synthesis." In Proc. of the 14th International Conference on Verified Software: Theories, Tools, and Experiments (VSTTE), 2022.

[IJCAI 22] * Giuseppe De Giacomo, Marco Favorito, Jianwen Li, Moshe Y Vardi, Shengping Xiao, **Shufang Zhu**. "LTL$_f$ Synthesis as AND-OR Graph Search: Knowledge Compilation at Work." In Proc. of International Joint Conference on Artificial Intelligence (IJCAI), 2022.

[IJCAI 22] **Shufang Zhu**, Giuseppe De Giacomo. "Synthesis of Maximally Permissive Strategies for LTL$_f$ Specifications." In Proc. of International Joint Conference on Artificial Intelligence (IJCAI), 2022.

[KR 22] **Shufang Zhu**, Giuseppe De Giacomo. "Act for Your Duties but Maintain Your Rights." In Proc. of International Conference on Principles of Knowledge Representation and Reasoning (KR), 2022.

[IJCAI 21] * Giuseppe De Giacomo, Antonio Di Stasio, Lucas M Tabajara, Moshe Y. Vardi, **Shufang Zhu**. "Finite-Trace and Generalized-Reactivity Specifications in Temporal Synthesis." In Proc. of International Joint Conference on Artificial Intelligence (IJCAI), 2021.

[AAAI 21] Shengping Xiao, Jianwen Li, **Shufang Zhu**, Yingying Shi, Geguang Pu, Moshe Y. Vardi. "On-the-fly Synthesis for LTL over Finite Traces." The 35th AAAI Conference on Artificial Intelligence (AAAI), 2021.

[KR 21] * Giuseppe De Giacomo, Antonio Di Stasio, Giuseppe Perelli, **Shufang Zhu**. "Synthesis with Mandatory Stop Actions." In Proc. of International Conference on Principles of Knowledge Representation and Reasoning (KR), 2021.

[GandALF 21] **Shufang Zhu**, Lucas M Tabajara, Geguang Pu, Moshe Y Vardi. "On the Power of Automata Minimization in Temporal Synthesis." In Proc. of International Symposium on Games, Automata, Logics, and Formal Verification (GandALF), 2021.

[KR 20] * Giuseppe De Giacomo, Antonio Di Stasio, Moshe Y. Vardi, **Shufang Zhu**. "Two-stage technique for LTL$_f$ synthesis under LTL assumptions." In Proc. of International Conference on Principles of Knowledge Representation and Reasoning (KR), 2020.

[AAAI 20] **Shufang Zhu**, Giuseppe De Giacomo, Geguang Pu, Moshe Y Vardi. "LTL$_f$ Synthesis with Fairness and Stability Assumptions." In Proc. of AAAI Conference on Artificial Intelligence (AAAI), 2020.

[TAMC 19] **Shufang Zhu**, Geguang Pu, Moshe Y. Vardi "First-Order vs. Second-Order Encodings for LTL$_f$-to-Automata Translation." In Proc. of Annual Conference of Theory and Applications of Models of Computation (TAMC), 2019.

[IJCAI 17] **Shufang Zhu**, Lucas M. Tabajara, Jianwen Li, Geguang Pu, Moshe Y. Vardi "Symbolic LTL$_f$ Synthesis." In Proc. of International Joint Conference on Artificial Intelligence (IJCAI), 2017.

[HVC 17] **Shufang Zhu**, Lucas M. Tabajara, Jianwen Li, Geguang Pu, Moshe Y. Vardi "A Symbolic Approach to Safety LTL Synthesis." In Proc. of International Haifa Verification Conference (HVC), 2017.

[ICCAD 17] Jianwen Li, **Shufang Zhu**, Yueling Zhang, Geguang Pu, Moshe Y. Vardi "Safety model checking with complementary approximations." In Proc. of IEEE/ACM International Conference on Computer-Aided Design (ICCAD), 2017.

[HVC 15] Jianwen Li, **Shufang Zhu**, Geguang Pu, Moshe Y. Vardi "SAT-Based Explicit LTL Reasoning." In Proc. of International Haifa Verification Conference (HVC), 2015.

Journal Articles

[JAIR 23] * Giuseppe De Giacomo, Dror Fried, Fabio Patrizi, **Shufang Zhu**. "Mimicking Behaviors in Separated Domains." Journal of Artificial Intelligence Research (2023).

[FMSD 23] * Giuseppe De Giacomo, Antonio Di Stasio, Lucas M. Tabajara, Moshe Y. Vardi, **Shufang Zhu**. "Finite-trace and generalized-reactivity specifications in temporal synthesis." Formal Methods Syst. Des. (2023). https://doi.org/10.1007/s10703-023-00413-2

[FMSD 19] Jianwen Li, **Shufang Zhu**, Geguang Pu, Lijun Zhang, Moshe Y. Vardi. "SAT-based explicit LTL reasoning and its application to satisfiability checking." Formal Methods Syst. Des. 54(2): 164-190 (2019).

[FAC 18] Jianwen Li, **Shufang Zhu**, Geguang Pu, Moshe Y. Vardi, Jifeng He "An explicit transition system construction approach to LTL satisfiability checking." Formal Aspects Comput. 30(2): 193-217 (2018).