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 (Sapienza U. of Rome), 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.

Employment

Dec.2020 – Present **Postdoctoral Researcher**, *Depart. of Computer, Control and Management Engineering*, Sapienza University of Rome, Rome, Italy.
- **Mentor:** Prof. Giuseppe De Giacomo

Research Experience

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 formal methods (FM) and artificial intelligence (AI), focusing on automated reasoning, planning and synthesis.

Teaching

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

Professional Services

Program Committee.
AAAI: 2021, 2022
IJCAI: 2022
Conference Paper Reviewer.
CSL: 2022
ICALP: 2019
Journal Paper Reviewer.
Formal Methods in System Design
Mathematical Problems in Engineering
IEEE Access
Conference Volunteer.
KR 2021, ATVA 2015 (Head Volunteer)

Research Talks

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

Awards

Rising Star in EECS.
2022

Travel Grant.
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 all 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 maximally permissive controller for finite-trace task specifications.

Publications

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

In Conference Proceedings

[VSTTE 22] * Suguman Bansal, Giuseppe De Giacomo, Antonio Di Stasio, Yong Li, Moshe Y Vardi, **Shufang Zhu**. "Compositional Safety LTL Synthesis." To appear at 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.

[TACM 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

[FMSD] 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] 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).