SHUO YANG

Email: yangs1@seas.upenn.edu Homepage: https://shuoyang2000.github.io Phone: 267-470-9839

RESEARCH INTEREST

I have general interest in formal methods, robotics, learning, control, and statistics. Recently, my research mainly center around building safe and trustworthy learning-enabled autonomous systems.

EDUCATION

University of Pennsylvania Aug. 2021 - present
Ph.D. in Electrical and Systems Engineering *Advisor: Prof. Rahul Mangharam*
xLAB for Safe Autonomous Systems

Shanghai Jiao Tong University Sept. 2017 - June. 2021
B.Eng. in Automation *Advisor: Prof. Xiang Yin*
Thesis: Verification and synthesis of opacity for cyber-physical systems [pdf]
Outstanding Bachelor Thesis Award of SJTU

PROFESSIONAL EXPERIENCE

Toyota Research Institute of North America May 2023 - Aug. 2023
Research Scientist Intern *Mentors: Dr. Bardh Hoxha & Dr. Georgios Fainekos*
Future Mobility Research Department

Duke University June. 2020 - Oct. 2020 (Remote)
Visiting Student *Mentor: Prof. Michael Zavlanos*

PUBLICATIONS

(* indicates equal contribution) [Google Scholar]

1. Jiangwei Wang, Shuo Yang, Ziyan An, Songyang Han, Zhili Zhang, Meiyi Ma, Fei Miao. "Multi-Agent Reinforcement Learning Guided by Signal Temporal Logic Specifications." submitted, 2023. [pdf]
2. Xiatao Sun*, Shuo Yang*, Rahul Mangharam. "MEGA-DAgger: Imitation Learning with Multiple Imperfect Experts." submitted, 2023. [pdf]
3. Shuo Yang, George J. Pappas, Rahul Mangharam, Lars Lindemann. "Safe Perception-Based Control under Stochastic Sensor Uncertainty using Conformal Prediction." *IEEE Conference on Decision and Control (**CDC**)*, 2023. [pdf]
4. Zhijie Qiao, Xiatao Sun, Shuo Yang, Helen Loeb, Rahul Mangharam. "Autonomous Vehicle Education Using a Virtual Reality Driving Simulator." *CPS-IoT Week Humans in Cyber-Physical Systems Workshop*, 2023.
5. Yu Chen*, Shuo Yang*, Rahul Mangharam, Xiang Yin. "You Don't Know When I Will Arrive: Unpredictable Controller Synthesis for Temporal Logic Tasks." *22nd IFAC World Congress (**IFAC WC**)*, 2023. [pdf]
6. Hongrui Zheng*, Zirui Zang*, Shuo Yang*, Rahul Mangharam. "Towards Explainability in Modular Autonomous Vehicle Software." *IEEE Intelligent Vehicles Symposium (**IV**)*, 2023. [pdf]
7. Xiatao Sun, Mingyan Zhou, Zhijun Zhuang, Shuo Yang, Johannes Betz, Rahul Mangharam. "A Benchmark Comparison of Imitation Learning-based Control Policies for Autonomous Racing." *IEEE Intelligent Vehicles Symposium (**IV**)*, 2023. [pdf]

8. Shuo Yang*, Shaoru Chen*, Victor M. Preciado, Rahul Mangharam. "Differentiable Safe Controller Design through Control Barrier Functions." *IEEE Control Systems Letters (**L-CSS**)*, 2022. [pdf]

9. Shuo Yang, Xiang Yin. "Secure Your Intention: On Notions of Pre-Opacity in Discrete-Event Systems." (Full Paper), *IEEE Transactions on Automatic Control (**TAC**)*, 2022. [pdf]

10. Shuo Yang*, Junyao Hou*, Xiang Yin, Shaoyuan Li. "Opacity of Networked Supervisory Control Systems over Insecure Communication Channels." *IEEE Transactions on Control of Network Systems (**TCNS**)*, 2021. [pdf]

11. Shuo Yang, Xiang Yin, Shaoyuan Li, Majid Zamani. "Secure-by-Construction Optimal Path Planning for Linear Temporal Logic Tasks." *IEEE Conference on Decision and Control (**CDC**)*, 2020. [pdf]

TALKS AND PRESENTATIONS

1. University of Michigan, Ann Arbor, July 2023
   Safe Learning-Based Control for Autonomous Systems

2. American Control Conference, San Diego, May 2023
   Differentiable Safe Controller Design through Control Barrier Functions

3. CPS-IoT Week Humans in CPS Workshop, San Antonio, May 2023
   MEGA-DAgger: Imitation Learning with Multiple Imperfect Experts

4. CPS-IoT Week Humans in CPS Workshop, San Antonio, May 2023
   Autonomous Vehicle Education Using a Virtual Reality Driving Simulator

5. RTSS Explainability Workshop, remote, Dec 2022
   Towards Explainability in Modular Autonomous Vehicle Software

6. University of Michigan, remote, Nov 2022
   Opacity in Discrete Event Systems: Notions, Algorithms, and Applications

7. 59^{th} IEEE Conference on Decision and Control (CDC), remote, Dec 2020
   Secure-by-Construction Optimal Path Planning for Linear Temporal Logic Tasks

SELECTED HONORS AND AWARDS

ACC Student Travel Grant 2023
The Dean's Fellowship from University of Pennsylvania 2021
Solomon M. Swaab Fellowship from University of Pennsylvania 2021
Outstanding Graduate of SJTU 2021
Outstanding Bachelor Thesis Award of SJTU (top 1%) 2021
Person of the Year of SJTU (highest honor for SJTU students) 2020
COMAP Meritorious Winner in Mathematical Contest in Modelling (top 7.09%) 2020
3rd Prize of National College Student Physics Competition 2020
Excellent Academic Scholarship from SJTU 2018, 2019
3rd Prize of National High School Mathematics Competition 2016

ACADEMIC SERVICES

Program Committee	International Conference on Cyber-Physical Systems 2023
Reviewer	American Control Conference International Conference on Learning Representations Advances in Neural Information Processing Systems IEEE Conference on Decision and Control IEEE Transactions on Automatic Control IEEE Transactions on Intelligent Vehicles Nonlinear Analysis: Hybrid Systems etc.

RESEARCH AND WORKING EXPERIENCES

University of Pennsylvania, Dept. Electrical & Systems Engineering Aug. 2021 - Present
Research Assistant *Philadelphia, USA*

My research focuses on the intersection of learning, control, and formal methods. I am interested in the following directions:

- Learning-based safe control for autonomous system
- Building formal method guided trustworthy and reliable AI system
- Perception-based robust planning and control
- Formal verification and synthesis for discrete-events systems

Shanghai Jiao Tong University, Dept. Automation Mar. 2019 - June 2021
Research Assistant *Shanghai, China*

- My research focuses on the security properties in cyber-physical systems and robot path planning
- Security property analysis over insecure multiple channel networks
- Optimal robot path planning for high-level tasks under security constraint
- Intention-security property analysis in discrete-event systems

Duke University, Dept. Mechanical Engineering & Materials Science June 2020 - Oct. 2020
Visiting Research Assistant *Durham, USA (remote)*

- Optimal secure trajectory planning for heterogeneous multi-robot using Petri nets model
- Control synthesis for hiding robot's tasks expressed by temporal logic formula

TEACHING EXPERIENCES

Teaching Assitant *Fall 2023, University of Pennsylvania*
ESE 5420: Statistics for Data Science (Instructor: Prof. Hamed Hassani)

Teaching Assitant *Fall 2020, SJTU*
MA 238: Discrete Mathematics (Instructor: Prof. Xiang Yin)

Lecturer *Summer 2018, High School Affiliated to SJTU*
Mathematics Competition

SELECTED ACTIVITY EXPERIENCES

Global Education and Training at University of Illinois at Urbana-Champaign 2019
Volunteer of the Shanghai International Marathon 2018, 2019

LANGUAGE, SKILLS AND INTERESTS

Language	Chinese (native), English (fluent), French (basic)
Programming	Python, C++, MATLAB, Verilog, HTML
Interests	Basketball, Literature, Music, Board Games, Video Games, etc.

Last update: July 2023