SHUO YANG

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EXPERTISE SUMMARY

I have strong expertise in robotic, machine learning, algorithmic game theory, and control theory, with a particular application emphasis on safe and performant autonomous vehicles.

EDUCATION

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

Shanghai Jiao Tong University Sept 2017 - June 2021
B.Eng. in Automation *Advisor: Prof. Xiang Yin*
Cyber-Physical Systems Lab

PROFESSIONAL EXPERIENCE

University of Pennsylvania Aug 2021 - present
Research Assistant
Safe Autonomous Systems Lab

Toyota Research Institute of North America May 2023 - Aug 2023
Research Scientist Intern
Future Mobility Research Department

Shanghai Jiao Tong University Mar 2019 - June 2021
Research Assistant
Cyber-Physical Systems Lab

Duke University June 2020 - Oct 2020
Visiting Scholar

SELECTED HONORS AND AWARDS

1. Global Young PhD Fellow of Linear Capital 2024
2. ACC Student Travel Grant 2023, 2024
3. The Dean's Fellowship from University of Pennsylvania 2021
4. Solomon M. Swaab Fellowship from University of Pennsylvania 2021
5. Outstanding Graduate of SJTU (top 1%) 2021
6. Outstanding Bachelor Thesis Award of SJTU (top 1%) 2021
7. Person of the Year of SJTU (highest honor for SJTU students) 2020
8. COMAP Meritorious Winner in Mathematical Contest in Modelling 2020
9. 3rd Prize of National College Student Physics Competition 2020
10. Excellent Academic Scholarship from SJTU 2018, 2019
11. 3rd Prize of National High School Mathematics Competition 2016

SOFTWARES

- Safe Learning-based Certificates for Multi-Frictions Road Driving. [code] [paper]
- Adaptive Safe Reinforcement Learning. [code] [paper]
- Safe Multi-Frictions Road Driving. [code] [paper]
- Nash Equilibrium Solver for Two-Player Zero-Sum Games. [code]

PUBLICATIONS

(* indicates equal contribution) [Google Scholar]

1. Tom Kuipers, Nandan Tumu, Shuo Yang, Milad Kazemi, Rahul Mangharam, Nicola Paoletti. "Conformal Off-Policy Prediction for Multi-Agent Systems." submitted, 2024.
2. Hongrui Zheng, Zhijun Zhuang, Stephanie Wu, Shuo Yang, Rahul Mangharam. "Bridging the Gap between Discrete Agent Strategies in Game Theory and Continuous Motion Planning in Dynamic Environments." submitted, 2024.
3. Shuo Yang, Yu Chen, Xiang Yin, Rahul Mangharam. "Learning Local Control Barrier Functions for Safety Control of Hybrid Systems." submitted, 2024. [pdf] [code]
4. Jiangwei Wang, Shuo Yang, Ziyan An, Songyang Han, Zhili Zhang, Rahul Mangharam, Meiyi Ma, Fei Miao. "Multi-Agent Reinforcement Learning Guided by Signal Temporal Logic Specifications." submitted, 2023. [pdf]
5. Xiatao Sun*, Shuo Yang*, Rahul Mangharam. "MEGA-DAgger: Imitation Learning with Multiple Imperfect Experts." submitted, 2023. [pdf] [code]
6. Shuo Yang, Mitchell Black, Georgios Fainekos, Bardh Hoxha, Hideki Okamoto, Rahul Mangharam. "Safe Control Synthesis for Hybrid Systems through Local Control Barrier Functions." *American Control Conference (**ACC**)*, 2024. [pdf] [code]
7. Luigi Berducci, Shuo Yang, Rahul Mangahram, Radu Grosu. "Learning Adaptive Safety for Multi-Agent Systems." *IEEE International Conference on Robotics and Automation (**ICRA**)*, 2024. [pdf] [code]
8. 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] [code]
9. 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.
10. 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]
11. Hongrui Zheng*, Zirui Zang*, Shuo Yang*, Rahul Mangharam. "Towards Explainability in Modular Autonomous Vehicle Software." *IEEE Intelligent Vehicles Symposium (**IV**)*, 2023. [pdf]
12. 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]
13. 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][code]

14. 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]

15. 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]

16. 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. Carnegie Mellon University (Intelligent Control Lab), Pittsburgh, Jan 2024
   Safe Learning-Based Control for Hybrid Systems (Host: Prof. Changliu Liu)
2. University of Pennsylvania (ASSET Seminar), Philadelphia, Sept 2023
   with Prof. Rahul Mangharam (Host: Prof. Rajeev Alur)
   Safe and Performant Control for Learning-Enabled Autonomous Systems
3. University of Pennsylvania (FM & ML Seminar), Philadelphia, Sept 2023 (Host: Prof. Eric Wong)
   Safe Learning-Enabled Autonomous Systems
4. University of Michigan, Ann Arbor, July 2023 (Host: Prof. Necmiye Ozay)
   Safe Learning-Based Control for Autonomous Systems
5. American Control Conference, San Diego, May 2023
   Differentiable Safe Controller Design through Control Barrier Functions
6. CPS-IoT Week Humans in CPS Workshop, San Antonio, May 2023
   MEGA-DAgger: Imitation Learning with Multiple Imperfect Experts
7. CPS-IoT Week Humans in CPS Workshop, San Antonio, May 2023
   Autonomous Vehicle Education Using a Virtual Reality Driving Simulator
8. RTSS Explainability Workshop, remote, Dec 2022
   Towards Explainability in Modular Autonomous Vehicle Software
9. 59^{th} IEEE Conference on Decision and Control (CDC), remote, Dec 2020
   Secure-by-Construction Optimal Path Planning for Linear Temporal Logic Tasks

TEACHING EXPERIENCES

Teaching Assitant *Fall 2023, UPenn*
ESE 5000: Linear Systems Theory (Instructor: Prof. George J. Pappas)
Responsibilities: teach 5 recitations, design assignments, hold office hours, etc.

Teaching Assitant *Fall 2023, UPenn*
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

ACADEMIC SERVICES

Program Committee	Tiny Papers @ ICLR 2023, 2024 (Area Chair) International Conference on Cyber-Physical Systems (ICCPS) 2023
Reviewer	American Control Conference (ACC) IEEE Conference on Decision and Control (CDC) International Conference on Learning Representations (ICLR) Advances in Neural Information Processing Systems (NeurIPS) AAAI Conference on Artificial Intelligence (AAAI) IEEE Transactions on Automatic Control (TAC) IEEE Transactions on Intelligent Vehicles (TIV) IEEE Robotics and Automation Letters (RA-L) IEEE Control Systems Letters (L-CSS) Nonlinear Analysis: Hybrid Systems (NAHS) International Conference on Robotics and Automation (ICRA) International Conference on Hybrid Systems: Computation and Control (HSCC) IROS 2023 Workshop on Multi-agent Dynamic Games (MAD-Games) NeurIPS 2023 AI for Science Workshop (AI4Science) etc.

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++, R, MATLAB, LaTeX
Optimization	Gurobi, CVX, CVXPY, CasADi
Framework & Toolkit	NumPy, JAX, PyTorch, ROS, Docker, Git
Interests	Basketball, Literature, Music, Board Games, Video Games, etc.

Last update: March 2024