# SHUO YANG

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## RESEARCH INTEREST

Formal Methods; Robotics; Learning; Control

## 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*

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

## PUBLICATIONS

(* indicates equal contribution) [Google Scholar]

1. <u>Shuo Yang</u>, et al."Measurement Robust Safe Control using Conformal Prediction." in preparation, 2022.

2. Yu Chen*, <u>Shuo Yang</u>*, Rahul Mangharam, Xiang Yin. "You Don't Know When I Will Arrive: Unpredictable Controller Synthesis for Temporal Logic Tasks." *22nd IFAC World Congress*, submitted, 2022. [pdf]

3. Hongrui Zheng*, Zirui Zang*, <u>Shuo Yang</u>*, Rahul Mangharam. "Towards Explainability in Modular Autonomous Vehicle Software." *IEEE Real-Time Systems Symposium (RTSS) Workshop on Explainability of Real-time Systems*, 2022. (Invited Paper) [pdf]

4. Xiatao Sun, Mingyan Zhou, Zhijun Zhuang, <u>Shuo Yang</u>, Johannes Betz, Rahul Mangharam. "A Benchmark Comparison of Imitation Learning-based Control Policies for Autonomous Racing." *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) Workshop on MiniRobots (Oral)*, 2022. [pdf]

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

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

7. <u>Shuo Yang</u>*, Junyao Hou*, Xiang Yin, Shaoyuan Li. "Opacity of Networked Supervisory Control Systems over Insecure Communication Channels." *IEEE Transactions on Control of Network Systems*, 2021. [pdf]

8. <u>Shuo Yang</u>, 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, Nov 2022
   Title: Opacity in discrete event systems: notions, algorithms, and applications

2. $59^{th}$ IEEE Conference on Decision and Control (CDC), Dec 2020
   Title: Secure-by-construction optimal path planning for linear temporal logic tasks

## SELECTED HONORS AND AWARDS

| | |
|---|---|
| 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

**Reviewer**     American Control Conference, Nonlinear Analysis: Hybrid Systems,
International Journal of System Control and Information Processing, etc.

## RESEARCH AND WORKING EXPERIENCES

**University of Pennsylvania, Dept. Electrical & Systems Engineering** August 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** Mar 2019 - June 2021
*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 2020, SJTU
*Discrete Mathematics MA 238 (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: Dec 2022*