# ZIKANG XIONG

+1 765-409-2274 | xiong84@purdue.edu | 305 N University St, West Lafayette, IN 47907

## EDUCATION

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| *Aug. 2018 – Aug. 2024 (Expected)* | **PhD in Computer Science** |
| | Purdue University |
| | Advisor: Suresh Jagannathan |
| *Sep. 2014 – June 2018* | **B.Eng. in Software Engineering** |
| | University of Electronic Science and Technology of China |

## RESEARCH INTERESTES

Primarily focusing on the application of **program verification and synthesis** principle to develop robust and reliable **autonomous agent** in real-world. Leveraging **reinforcement learning, LLM**, **end-to-end planning**, underpinned by rigorous **formal specifications**, to ensure the reliability and performance of autonomous agents' decision-making processes.

## PUBLICATIONS

**Reliable RL Agent Planning and Control**

**Zikang Xiong,** Joe Eappen, Ahmed H Qureshi, and Suresh Jagannathan. Model-free Neural Lyapunov Control for Safe Robot Navigation.  (**IROS '22**).

**Zikang Xiong,** Ishika Agarwal, and Suresh Jagannathan. HiSaRL: A Hierarchical Framework for Safe Reinforcement Learning. (**SafeAI at AAAI '22**).

**Zikang Xiong,** and Suresh Jagannathan. Scalable synthesis of verified controllers in deep reinforcement learning. (**FoMLAS '21**).

He Zhu, **Zikang Xiong,** Stephen Magill, and Suresh Jagannathan. An inductive synthesis framework for verifiable reinforcement learning. (**PLDI '19**). *Distinguished Paper*

**Formal Logic Specifications for Agent Planning and Control**

**Zikang Xiong**, Daniel Lawson, Joe Eappen, Ahmed H Qureshi, and Suresh Jagannathan. Co-learning Planning and Control Policies Constrained by Differentiable Logic Specifications. (**ICRA '24**).

**Zikang Xiong,** and Suresh Jagannathan. Manipulating Neural Path Planners via Slight Perturbations. (**RA-L**).

**Robust RL Agent Planning and Control**

**Zikang Xiong,** Joe Eappen, He Zhu, and Suresh Jagannathan. Defending Observation Attacks in Deep Reinforcement Learning via Detection and Denoising. (**ECML PKDD '22**).

**Zikang Xiong**, Joe Eappen, He Zhu, and Suresh Jagannathan. Robustness to adversarial attacks in learning-enabled controllers. AAMAS (**ALA at AAMAS '21**).

## PATENTS

Shu Jiang, Yu Cao, Weiman Lin, Qi Luo, **Zikang Xiong**, Jinghao Miao, and Jiangtao Hu. Simulated obstacle vehicles with driving styles. US Patent App. 17/645,860.

Shu Jiang, **Zikang Xiong**, Weiman Lin, Yu Cao, Qi Luo, Jiangtao Hu, and Jinghao Miao. Learning-based critic for tuning a motion planner of autonomous driving vehicle. US Patent App. 17/456,545.

## SKILLS

**Reinforcement Learning**: Proficient in both online and offline RL paradigms, adept with on-policy and off-policy algorithms, and skilled in Q-learning, policy gradient techniques and reward modeling.

**Robotics**: Hands-on experience on sim2real, MPC, Lyapunov control, and classical planning algorithms such as RRT, RRT*, A*, PRM, etc. Skilled in robotic simulator such as MuJoCo and PyBullet.

**Program Verification**: Experienced in the application of linear and computational temporal logic, including TLA and Büchi automata, as well as proficient in bounded model checking, synthesizing loop invariants, and conducting reachability analyses.

**Large Language Model:** Skilled in fine-tuning (SFT, RLHF) and applying LLMs for advanced coding and language tasks, with practical experience using Llama, T5, Star Coder for generating logical specifications and agent planning.

## INDUSTRY EXPERIENCE

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| *Jan. 2024 – May 2024* | **Machine Learning Engineer Intern** |
| | *Deeproute.ai* |
| | Hybrid rule-learning evaluation/benchmarking for planning and control |
| *June 2021 – Sep. 2021* | **Research Intern** |
| | *Baidu Apollo* |
| | AutoML and learning-based evaluation for planning and control |

## ACADAMIC SERVICES

**Conference Reviewer**: ICRA 2024, IROS 2023, ITSC 2022, ECML 2022

**AEC Member**: HSCC 2024, HSCC 2023, ADHS 2021, CAV 2020, PLDI 2020

**Journal Reviewer:** Artificial Intelligence Journal (AIJ)