

HONGPENG CAO

+49 157-7571-7779 ◊ Munich, Germany

Email ◊ [Google Scholar](#) ◊ [Github](#) ◊ [Webpage](#)

ABOUT ME

I am currently a Ph.D. student in the Chair of Cyber-Physical Systems in Production Engineering, School of Engineering and Design at the Technical University of Munich (TUM) under the supervision of [Prof. Dr. Caccamo](#). My research focuses on the intersection of machine learning and control theory, addressing real-world challenges in intelligent decision-making problems for autonomous systems. I am particularly interested in designing algorithms that integrate the strengths of data-driven and control-theoretic approaches to achieve safe and data-efficient learning-based control and planning in real-world robot applications.

EDUCATION

Dr.Eng. in Computer Science , Technical University of Munich	Oct. 2020 - Present
M.Eng. in Mechanical Engineering , Zhejiang University	Sept. 2017 - Mar. 2020
B.Sc. in Mechanical Engineering , Shandong University	Sept. 2013 - July. 2017

PREPRINTS

Cao, Hongpeng, Yanbing Mao, Lui Sha, and Marco Caccamo. “Physics-model-guided Worst-case Sampling for Safe Reinforcement Learning.” *preprint, submitted to ICCPS 2025*, ([Link](#))

Cao, Hongpeng, Yanbing Mao, Yihao Cai, Lui Sha, Marco Caccamo. “Runtime Learning Machine” *preprint, submitted to ICLR 2025* ([Link](#))

Li, Shangzhe, **Hongpeng Cao**, Marco Caccamo. “Data-efficient Offline Domain Adaptation for Model-free Agents using Model-based Trajectory Stitching ” *preprint, submitted to ICRA 2025*

Liqun Zhaoa, Keyan Miao, **Hongpeng Cao**, Konstantinos Gatsisc, Antonis Papachristodoulou. “NLBAC: A Neural ODE-based Algorithm for State-Wise Stable and Safe Reinforcement Learning” *preprint, submitted to Neuralcomputing, Journal*

CONFERENCE PUBLICATIONS

Cao, Hongpeng, Yanbing Mao, Lui Sha, and Marco Caccamo. “Physics-Regulated Deep Reinforcement Learning: Invariant Embeddings.” In The Twelfth International Conference on Learning Representations (2024). (**ICLR Spotlight**) ([Link](#))

Cao, Hongpeng, Yanbing Mao, Lui Sha, and Marco Caccamo. “Physics-Model-Regulated Deep Reinforcement Learning Towards Safety and Stability Guarantees.” In 2023 62nd IEEE Conference on Decision and Control (**CDC**), pp. 8306-8311. IEEE, 2023 ([Link](#))

Cao, Hongpeng, Mirco Theile, Federico G. Wyrwal, and Marco Caccamo. “Cloud-edge training architecture for sim-to-real deep reinforcement learning.” In 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), pp. 9363-9370. IEEE, 2022. ([Link](#))

Theile, Mirco, **Hongpeng Cao**, Marco Caccamo, and Alberto L. Sangiovanni-Vincentelli. “Equivariant Ensembles and Regularization for Reinforcement Learning in Map-based Path Planning,” 2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), Abu Dhabi, United Arab Emirates, 2024, pp. 14164-14171,” ([Link](#))

Zhong, Bingzhuo*, **Hongpeng Cao***, Majid Zamani, and Marco Caccamo. “Towards safe ai: Sandboxing dnns-based controllers in stochastic games.” In Proceedings of the AAAI Conference on Artificial Intelligence (**AAAI**), vol. 37, no. 12, pp. 15340-15349. 2023. ([Link](#))

Ming, Junjie, Daniel Bargmann, **Hongpeng Cao***, and Marco Caccamo. ”Flexible Gear Assembly with Visual Servoing and Force Feedback.” In 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), pp. 8276-8282. IEEE, 2023. ([Link](#))

JOURNAL PUBLICATIONS

Cao, Hongpeng*, Lukas Dirnberger*, Daniele Bernardini, Cristina Piazza, and Marco Caccamo. "6IMPOSE: Bridging the reality gap in 6D pose estimation for robotic grasping." **Frontiers in Robotics and AI** 10 (2023): 1176492. ([Link](#))

Zhong, Bingzhuo, Abolfazl Lavaei, **Hongpeng Cao**, Majid Zamani, and Marco Caccamo. "Safe-visor architecture for sandboxing (AI-based) unverified controllers in stochastic cyber-physical systems." **Nonlinear Analysis: Hybrid Systems** 43 (2021): 101110. ([Link](#))

PROFESSIONAL ACTIVITIES

Reviewer

- Annual Conference on Neural Information Processing Systems (NeurIPS) 2024
- International Conference on Learning Representations (ICLR) 2024
- International Conference on Machine Learning (ICML) 2024
- International Conference on Artificial Intelligence and Statistics (AISTATS) 2024
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2022 - 2024
- IEEE Transactions on Control Systems Technology (TCST) 2022 - 2024
- IEEE Embedded systems letters (ESL) 2022 - 2024

Teaching

- Design and Analysis of Digital Control Systems 2021/2022/2023/2024

Student Supervisor

- Python APIs Development for Robotic Grasping Simulation in Unity (Semester Thesis)
- Understanding Impacts of Photometric Transformations on DNNs in Computer Vision Tasks (Semester Thesis)
- Learning 3D Object Detection From Multi-view Images in Simulation (Semester Thesis)
- Autonomous Robotic Assembly via Object Detection and Reinforcement Learning (Master thesis)
- Autonomous Robotic Pick-and-Place Using Object Segmentation and Reinforcement Learning (Master thesis)
- Toward Real-world Deployment of Deep Reinforcement Learning on a Quadruped Robot (Master thesis)

SKILLS

Languages: Mandarin, English, German

Technical Skills: Python, C++, TensorFlow

Theory: Deep Learning, Reinforcement Learning, Computer vision, Control