PURDUE UNIVERSITY | Elmore Family School of Electrical and Computer Engineering

Machine Learning Guest Speaker

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Presentation: 10:30 A.M. – 11:30 A.M.
POTR 234 (Fu Room)
https://purdue-edu.zoom.us/j/93231720452

Scaling Physical AI via Reality World Simulators

Abstract Recent progress in large language and vision models demonstrates how far we can go by scaling with vast internet-scale data. In contrast, physical AI, agents that perceive and act in the real world, still lags far behind. Today, both academia and industry largely pursue scalability in physical AI by collecting ever-growing amounts of action–video-paired data and training large networks, such as VLA models. In my view, this approach is heading in the wrong direction. The central challenge is *not to scale data* for imitation, but *to build a reality world in computation*, a structured, interactive training ground where agents can perceive, act, and learn.

In this talk, I will discuss how to construct **reality world simulators** that can effectively scale AI learning in the physical world. I will introduce a three-pronged recipe: 1) Real-world simulation: generating controllable, interactive digital cousins of real environments from monocular videos. 2) Scene-aware human modeling: bringing realistic dynamics into simulated spaces to enhance the safety and social compliance of trained robots. 3) Hybrid world simulation: combining the strengths of graphics-based simulators and neural world models into a unified framework. Finally, I will share several future directions that I believe can move us closer to generalizable physical AI in the real world.

Bio Dr. Wayne Wu is a postdoctoral researcher at UCLA, working closely with Bolei Zhou and collaborating with Trevor Darrell and Jiaqi Ma. He received his Ph.D. in Computer Science from Tsinghua University in June 2022 and was previously a visiting Ph.D. student at Nanyang Technological University. He also spent several years in industry, where he led products that reached more than 10 million end users worldwide.

His research lies at the intersection of Computer Vision, Robotics, and Computer Graphics, targeting real-world impact on urban mobility and contributing to more sustainable cities.
He focuses on building learning infrastructure to scale up physical AI learning, enabling robots to move reliably and safely in complex urban environments. He was honored with the 2025 UCLA Chancellor's Award for Postdoctoral Research, which recognizes the best postdocs at UCLA. One of his works was selected as a Best Paper Candidate at CVPR 2023, and five others were selected as Oral or Spotlight presentations at top AI conferences. He serves as an Area Chair at CVPR 2026.

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