QUANSER
INNOVATE · EDUCATE

A Quanser Take on Physical AI

As the world faces growing demands for automation, productivity, safety and resilience, while simultaneously tackling labor shortages and higher operational complexity, it is becoming increasingly important for systems to utilize artificial intelligence to perceive information, authentically reason on that information, and take real actions in the physical world. Physical AI has become practical at scale due to the convergence of several technologies such as powerful AI models, cheaper and higher quality robotics hardware, high-performance computing options and advanced simulation environments for training. Physical AI turns intelligence into action, allowing robots not only to understand the world but also to interact with and improve it.

Sitting at the intersection of control systems, mechatronics, digital twins, simulation environments and education, Quanser has expertise in the foundational technologies needed for physical AI. Above and beyond the baseline of open-architecture software applications and performance that is both real-time and reliable, Quanser's hardware ecosystem is a prime testbed and platform for physical AI workflows.

Quanser's ecosystem of autonomous vehicles have the fundamental blueprint for enabling physical AI policy deployment in the real-world. With Quanser's ground robots (QBot Platform), manipulators (QArm Research), and self-driving platform (QCar 2) already supported in Isaac Sim, ready for training in Isaac Lab, and ready for policy deployment with the onboard NVIDIA edge compute, you can seamlessly bring complete end-to-end workflows for physical AI to your lab.

With multi-language support and integration with NVIDIA Isaac®, ROS 2™, Python®, C++, digital twins (via Quanser Interactive Labs), as well as MATLAB® and Simulink® (via QUARC®), you have all the software assets, APIs and research examples to get started with your exploration of intelligent automation. You gain access to a global academic network to collaborate with, made possible with our hardware solutions integrated in hundreds of universities, research laboratories and government-funded projects, and over 4000 research publications utilizing our systems.

Academic Objectives

- Kickstart, integrate, accelerate & sustain research workflows in traditional robotics, applied AI & physical AI
- Explore foundational physical AI technologies - realistic simulation, training at scale, and hardware validation
- Plan, implement and execute end-to-end workflows for imitation learning, reinforcement learning and more
- Execute strategies for complex heterogenous systems working together with manipulators and ground robots

Physical AI Lab

This lab is a turnkey, integrated solution designed for end-to-end research workflows in traditional robotics, applied AI, and physical AI. At its center is QArm Research, a precise, highly instrumented, academically-appropriate 6-DOF robotic platform for safe, repeatable experimentation in intelligent robotic systems. The lab also includes QBrain, an NVIDIA-based edge compute node for algorithm deployment, Haptic Robot for human-in-the-loop control

and imitation learning, and force/torque sensing for richer physical interaction. Together with ready-to-use research examples, these components help researchers study how robots perceive, decide, move, interact, learn, and validate intelligent behaviors on physical hardware through one connected end-to-end pipeline.

Mobile Robotics Lab

This research and teaching lab offers a turn-key solution for institutions looking to build or upgrade their mobile robotics capacity. It offers a comprehensive, ready-to-deploy ecosystem equipped with four QBot Platform mobile robots featuring advanced sensors and an integrated NVIDIA GPUs. Complete with ready-to-use courseware and research examples, the lab stands as a full package to cultivate industry-relevant skills and encourage multidisciplinary teamwork.

Physical AI Lab

Mobile Robotics Lab

QArm Research

QBot Platform

Haptic Robot