A Quanser Take on Robotics

Robotics has been evolving since the onset of industrialization and is only further fueled by recent advances in all aspects of machine design and intelligence. With an impact on a variety of industries from food and manufacturing, health and rehabilitation, industry automation, self-driving, space exploration, etc., the field is growing its scope towards intelligence, collaboration and digital twins.

Quanser's robotics curriculum offers comprehensive, application-centric learning solutions that span both manipulator and mobile platforms. Built on an open-architecture foundation and designed to be language agnostic, this unified ecosystem provides hands-on experience with industry-standard tools across multiple departments and educational levels. By integrating physical hardware with high-fidelity digital twins—and supplying structured curriculum for each environment—Quanser ensures accessible, flexible instruction for both in-person and remote learners.

The curriculum uses a goal-directed skills progressions and scaffolded labs, exploring fundamental mathematical concepts on kinematics, statics and dynamics hand-in-hand with industrial applications such as workspace identification, lead through, teach pendant, object tracking, self-localization, line-following, etc. By combining solid theoretical foundations with industry/research relevant application, Quanser's curriculum prepares students for both academic research and real-world challenges—from manipulator robotics to mobile robotics, and beyond.

Learning Objectives

- Explore foundational robotic mathematics - position/differential kinematics, statics & dynamics
- Gain operational skills in the practical software implementation of kinematic and dynamic formulations
- Explore essential robotic algorithms related to self-localization, object tracking, path planning & navigation
- Explore industrial applications such as workspace identification, lead through, teach pendant, & task automation
- Critically analyze robot configuration, design and cascade control while developing broad engineering literacy

Textbook Mapping & Reference Material

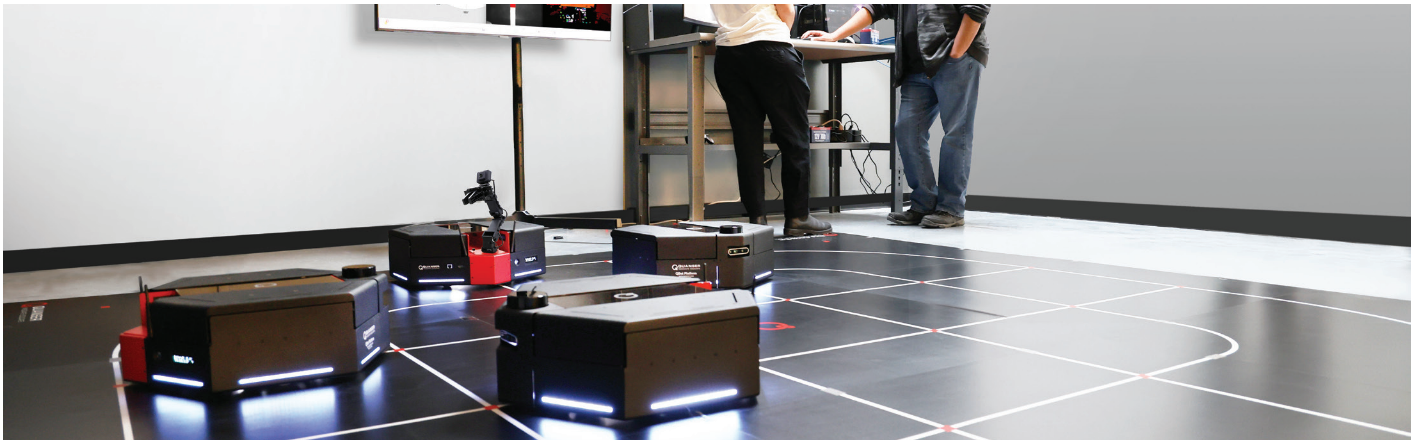
- Robot Modeling and Control by **M. W. Spong**, **S. Hutchinson** and **M. Vidyasagar**
- Introduction to Robotics: Mechanics and Control by **J. Craig**
- Introduction to Autonomous Mobile Robots by **R. Siegwart**, **I. R. Nourbakhsh** and **D. Scaramuzza**

Introduction to Robotics Teaching Lab

This teaching lab empowers educators by providing turn-key experiences consisting of hardware, software, digital twins, full student lab material as well as instructor resources. Equipped with six QArm Mini manipulators, each with four degrees of freedom and an RGB camera, the lab comes with ready-to-deploy curriculum for teaching key manipulation concepts including but not limited to position and velocity kinematics, as well as object recognition and visual servoing.

Mobile Robotics Lab

This teaching and research 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 high-powered NVIDIA GPUs, along with one QArm Mini for hands-on manipulator robotics learning. 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.



Multidisciplinary Lab for Research, Teaching, and Outreach

University of Manchester United Kingdom	McMaster University Canada	University of Waterloo Canada	Southern Methodist University USA
University of Calgary Canada	Sacred Heart University USA	Cal Poly Pomona USA	Simon Fraser University Canada
California Polytechnic State University USA	University of the District of Columbia USA	Howard University USA	St. Mary's University USA

Quanser users are building a global community by sharing code, research, and teaching materials to help each other learn and build together.

Quanser solutions for Robotics

QArm

QBot Platform

QArm Mini

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