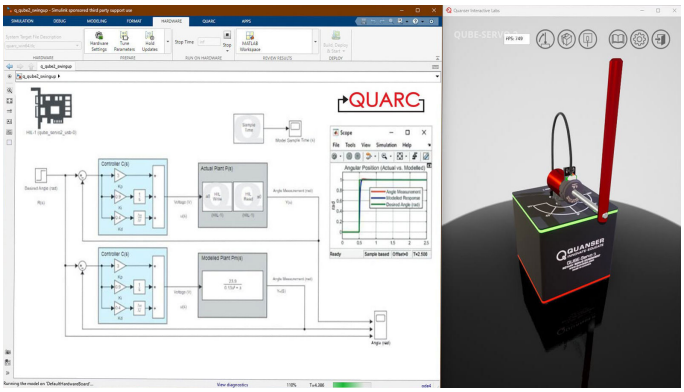
QUANSER
INNOVATE · EDUCATE

A Quanser Take on Controls & Dynamics

Control Systems play a pivotal role in the precise regulation of numerous processes in complex machines deployed in every stage of modern industry. With broad applicability and impact on operational consistency, optimization, safety, as well as adaptability to uncertainties, control systems are an aspect of automation and intelligence that are central to every engineering discipline.

Our approach to Controls education focuses on the development of broad fundamentals as well as skills in applying those fundamentals to application contexts. This education experience involves deploying control systems to a variety of SISO, SIMO and MIMO systems from aerospace, robotics, mechatronics and autonomous systems.



The provided curriculum includes over 40 labs covering a range of topics from modeling techniques (step response, frequency response, block diagram, state-space, etc.), system characterization and parameter estimation, hardware interfacing, position and speed control, stability analysis, qualitative and quantitative P/PD/PI/PID control, energy control, state-feedback control, gain scheduling and more.

Learning Objectives

- Apply common modeling techniques to a variety of SISO, SIMO and MIMO systems
- Gain broad engineering literacy in the characterization and performance of plants and controllers
- Walk through a complete controls pipeline from plant modeling, sys ID, control design and hardware deployment
- Contrast and analyze the performance of modern control methods, such as PID, state-feedback, MPC, etc.

Textbook Mapping & Reference Material

- *Control Systems Engineering* by N. S. Nise
- *Feedback Systems* by K. J. Astrom, R. M. Murray
- *Feedback Control of Dynamic Systems* by G. F. Franklin, J. D. Powerll and A. Emami-Naeini
- *Modern Control Engineering* by K. Ogata
- *Automatic Control Systems* by F. Golnaraghi and B. C. Kuo

Multidisciplinary Lab for Research, Teaching, and Outreach

EPFL
(Switzerland)

University of Manchester
(England)

Tec De Monterrey
(Mexico)

McMaster University
(Canada)

Tsinghua University
(China)

SeoulTech
(SeoulTech)

Queens University
(Canada)

Stralsund University
(Germany)

Sacred Heart University
(USA)

University of District of Columbia
(USA)

Kennesaw State University
(USA)

Mauá Institute of Technology
(Brazil)

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 Controls & Dynamics

Qube3-Servo 3

Aero 2