QUANSER
INNOVATE·EDUCATE

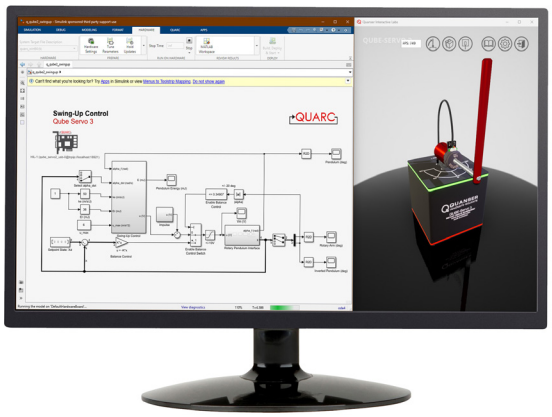
QLABS VIRTUAL QUBE-SERVO 3

Virtual platform for distance and blended undergraduate control systems courses

QLabs Virtual Qube-Servo 3 is a fully instrumented, dynamically accurate virtual twin of a classic Qube-Servo 3 system. It behaves in the same way as the physical hardware and can be measured and controlled using MATLAB®/Simulink® and other development environments. QLabs Virtual Qube-Servo 3 can enrich your lectures and activities in traditional labs, or bring credible, authentic model-based lab experiences into your distance and online control systems course.

Same as the physical Qube-Servo 3, the virtual system features a DC motor with the inertia disk and inverted pendulum modules. Rotary encoders measure the angular position of the DC motor and pendulum. The motor angular velocity is measured through a software-based tachometer for both the base and the pendulum.

Features



Academically appropriate

High-fidelity, credible lab experiences equivalent to use of physical lab equipment

Comprehensive Resources

ABET-aligned curriculum mapped to popular control engineering textbooks

Open access

Full access to system parameters through MATLAB®/Simulink®

Scalable

12-month, multi-seat subscription

Courseware

DC Motor (Inertia Disk) Module

- Hardware integration
- Filtering
- Step response modeling
- Block diagram modeling
- Parameter estimation
- Frequency response modeling
- State-space modeling
- Friction identification
- Stability analysis
- Second-order systems
- Routh-Hurwitz stability
- Nyquist stability
- PD control
- Lead Compensator
- Proportional control
- Steady-state error
- Load disturbance
- Robustness
- Optimal control
- Introduction to digital control
- Discrete stability
- Introduction to discrete control

Pendulum Module

- Moment of inertia
- Pendulum modeling
- Pendulum balance control
- State-space modeling
- Swing-up control
- LQR state-feedback balance control
- Pole-placement state-feedback balance control

QLabs Virtual QUBE-Servo 3 runs on Windows 10 (64-bit) and requires MATLAB and Simulink R2022a or later (not included).