QUANSER
INNOVATE·EDUCATE

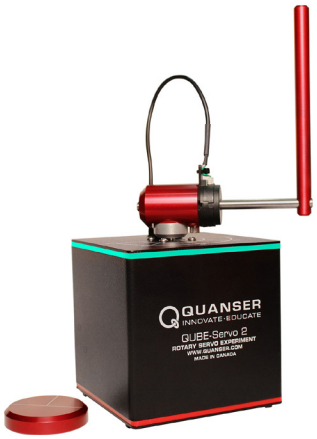
QUBE-SERVO 2

An integrated servomotor solution for undergraduate controls and mechatronics labs

The Quanser QUBE-Servo 2 is a portable, fully integrated servomotor platform designed specifically for teaching control concepts at the undergraduate level. The system is equipped with a high-quality direct-drive brushed DC motor, two encoders, an internal data acquisition system, and an amplifier. Selecting one of three available QFLEX 2 interface panels[1] allows you to connect the unit to a PC using USB, an NI myRIO embedded device, and other microcontrollers such as an Arduino or Raspberry Pi using the SPI protocol.

QUBE-Servo 2 comes with a quick-connect inertia disk and an inverted pendulum module. You can also design and 3D print your own module to expand the scope of the experiment, or create an engaging student project[2]. Take advantage of the comprehensive ABET-aligned course material[3] for MATLAB®/Simulink® and LabVIEW™, or design and validate your own controllers.

Features



Portable

Light weight and small form factor

Safe

Built-in motor stall detection

Comprehensive Courseware

ABET-aligned courseware mapped to popular control engineering textbooks[3]

Options

Inertia disk and pendulum attachment included

Workstation Components

Plant	QUBE-Servo 2 with QFLEX 2 interface panel (USB, NI myRIO, or Embedded)[2]
Data acquisition device	Integrated
Amplifier	Integrated
Control design environment	QUARC™ for MATLAB/Simulink (required for QUBE-Servo 2 USB)

[1] The QUBE-Servo 2 unit comes with one interface panel of your choice. Additional interface panel(s) can be purchased separately.
[2] The performance and safety of the experiment are guaranteed only with the original parts supplied by Quanser. Quanser does not carry any responsibility for damages caused when using any third-party add-on modules.
[3] MATLAB/Simulink course materials are provided for QUBE-Servo 2 USB, LabVIEW course materials for QUBE-Servo 2 for NI myRIO. Arduino examples and interfacing datasheet is available for the QUBE-Servo 2 Embedded

Product Details

Courseware

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

Inverted Pendulum Module:

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

Courseware textbook mapping:

- Control Systems Engineering (Norman S. Nise)
- Feedback Systems (K.J. Åström, R.M. Murray)
- Mechatronics (W. Bolton)
- Modern Control Systems (R.C. Dorf, R.H. Bishop)
- Automatic Control Systems (F. Golnaraghi, B.C. Kuo)
- Control Systems Engineering (I.J. Nagrath, M. Gopal)
- Modern Control Engineering (K. Ogata)
- Feedback Control of Dynamic Systems (G.F. Franklin, J.D. Powell, A. Emai-Naeini)

Device Specifications

Dimensions (w x h x d)	10.2 x 1.02 x 11.7 cm
Weight	1.2 kg
Pendulum length (pivot to tip)	9.5 cm
DC motor encoder resolution (quadrature mode)	2,048 counts/revolution
Pendulum module encoder resolution (quadrature mode)	2,048 counts/revolution
DC motor nominal voltage	18 V
DC motor nominal current	0.54 A
DC motor nominal speed (no load)	4,050 rpm
Available interfaces : QFLEX 2 USB QFLEX 2 myRIO QFLEX 2 Embedded	Support for MATLAB/Simulink (using QUARC) Support for LabVIEW SPI

About Quanser:

For 30 years, Quanser has been the world leader in innovative technology for engineering education and research. With roots in control, mechatronics, and robotics, Quanser has advanced to the forefront of the global movement in engineering education transformation in the face of unprecedented opportunities and challenges triggered by autonomous robotics, IoT, Industry 4.0, and cyber-physical systems.