QUANSER
INNOVATE·EDUCATE

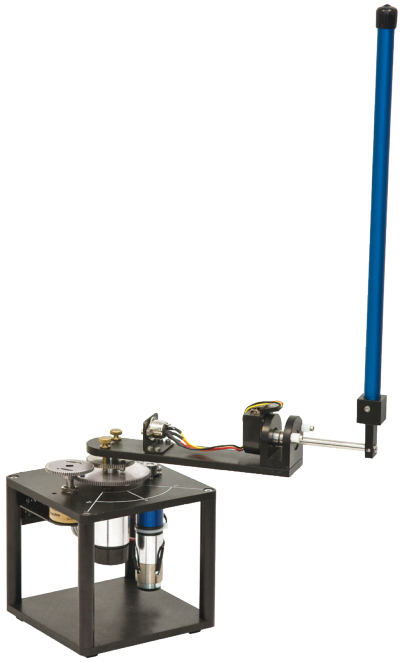
ROTARY INVERTED PENDULUM

Classic control challenge for teaching and research labs

The Rotary Inverted Pendulum experiment is ideal for studying intermediate to advanced concepts encountered in any system that requires vertical stabilization, from Segway vehicles to rocket launching systems.

The Rotary Inverted Pendulum module consists of an arm that mounts to the Rotary Servo Base Unit. The pendulum rod is attached to the arm's metal shaft, instrumented with a high-resolution encoder measuring the pendulum's angle. The Rotary Servo Base Unit rotates the arm with the pendulum in the horizontal plane. Students learn to design controllers that balance the pendulum in the upright position by rotating or changing the angle at the base (inverted pendulum), or swing up the pendulum and maintain it in the upright position (self-erecting inverted pendulum).

Features



Precise

The system's inherent precision helps deliver accurate, repeatable results required for teaching & research labs.

Robust

A durable system able to accommodate enthusiastic undergraduate students.

Comprehensive Courseware

ABET-aligned courseware for MATLAB®/Simulink® or LabVIEW™ covers modelling, hybrid, and non-linear control topics.

Expandable

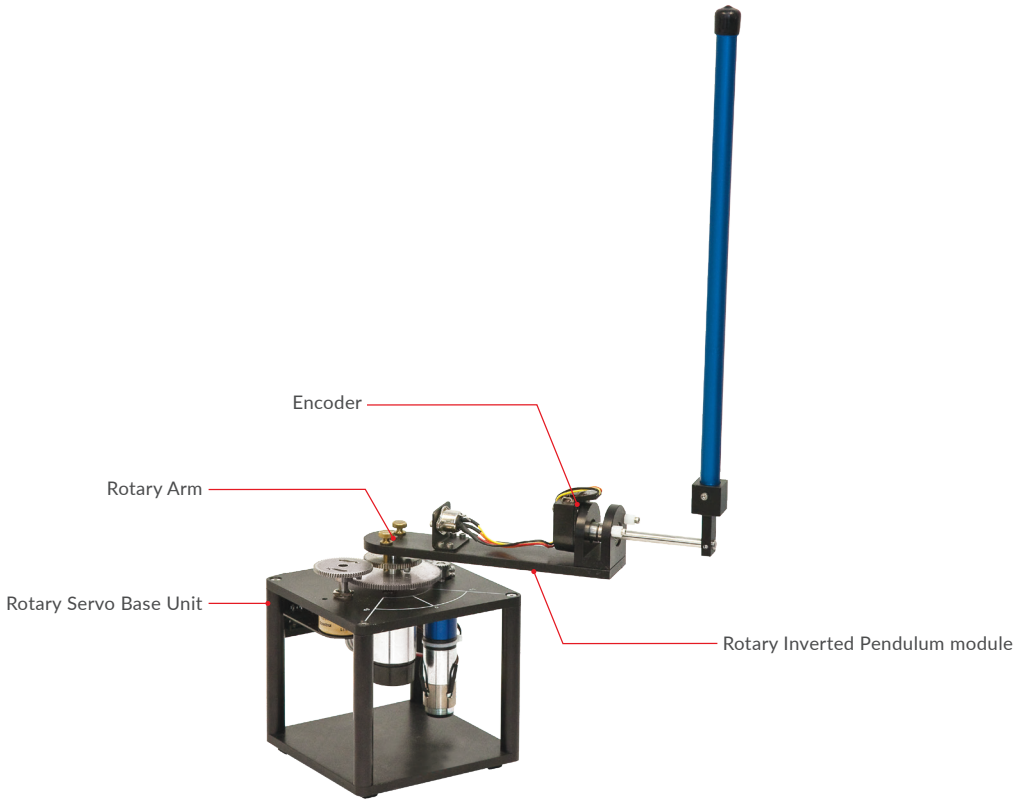
Use the Rotary Servo Base Unit on its own, or add one of other nine modules[1] for experiments of varying complexity across a wide range of topics and disciplines.

Workstation Components

Plant	Rotary Servo Base Unit Rotary Inverted Pendulum module
Data acquisition device	Quanser Q2-USB
Amplifier	Quanser VoltPAQ-X1
Control design environment	QUARC for MATLAB®/Simulink® QRCP for LabVIEW™

[1] The add-on modules are sold separately

Product Details



Courseware

Modelling Topics

- State-space representation
- Linearization

Control Topics

- Hybrid control
- State-feedback balance control using pole placement
- Energy-based/non-linear control

Device Specifications

Rotary arm length	21.6 cm
Pendulum length	33.7 cm
Pendulum mass	127 g
Encoder resolution (in quadrature)	4096 counts/rev

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.