

3 DOF HELICOPTER

Explore Aerospace Fundamentals More Effectively

The 3 DOF Helicopter experiment provides a bench top model of a Tandem rotor helicopter used for transport and search and rescue missions. As a research validation platform, the 3 DOF Helicopter system can be used to develop control laws for a vehicle that has dynamics representative of a dual rotor rigid body helicopter, or any device with similar dynamics. As a teaching tool, it exposes students to more advanced flight dynamics concepts by extending control to three axes (travel, pitch, and elevation).

Features



Fully Instrumented

All 3 axes measured using high-resolution encoders for precise position feedback

Ready to Use

Comprehensive student and instructor course resources, with sample of pre-built controllers and complete dynamic model

Accelerate Research

Validate advance flight dynamics concepts by extending control to three axes (travel, pitch, and elevation)

Open Architecture

Open controller design using QUARC real-time control software for MATLAB/Simulink and NI LabVIEW using the Quanser Rapid Control Prototyping (RCP) Toolkit

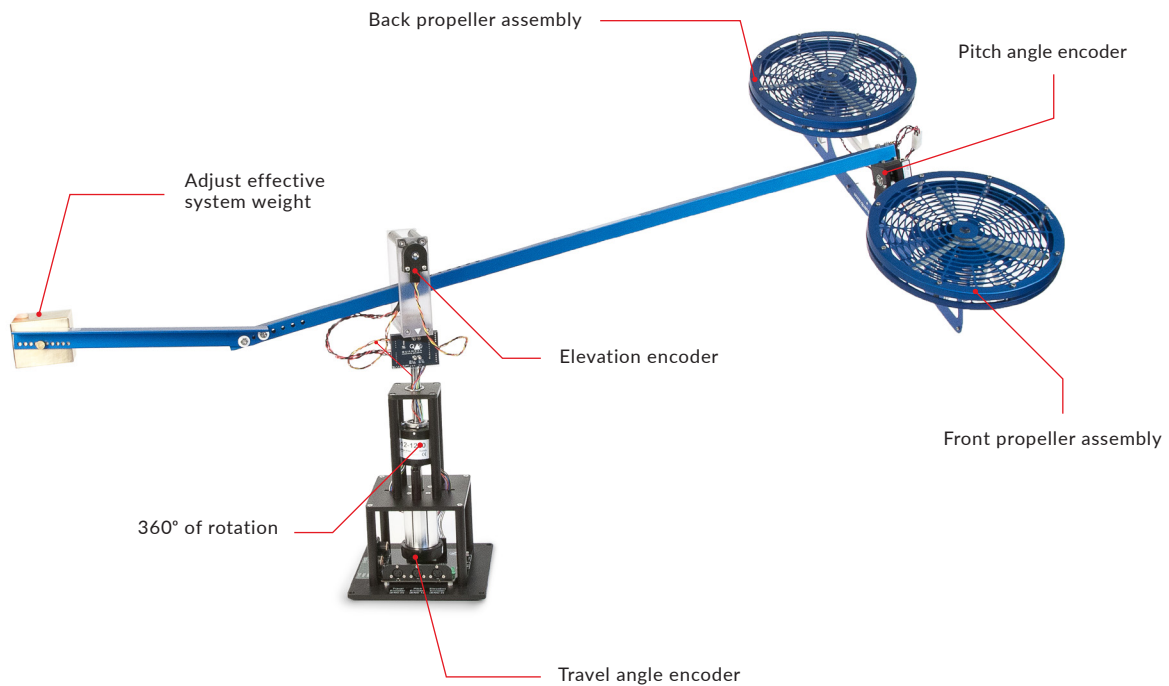
Workstation Components

Plant	3 DOF Helicopter
Control design environment	QUARC™ for MATLAB®/Simulink® Quanser Rapid Control Prototyping™ (QRCP) Toolkit for NI Labview™
Data acquisition devices	Quanser Q8-USB, or QPIDe, or NI CompactRIO with two Quanser Q1-cRIO modules
Amplifier	VoltPAQ-X2 or two VoltPAQ-X1 linear voltage amplifiers

Courseware

- Derivation of simple dynamic model using system parameters
- State-space representation
- State feedback control
- LQR control design
- Control parameter tuning

Product Details



Device Specifications

Device mass	6.2 kg
Device height (ground to top of base)	45 cm
Device length (counterweight to front of propellers)	127 cm
Base dimensions (W × L)	17.5 cm x 17.5 cm
Pitch encoder resolution (quadrature mode)	4,096 counts/rev
Travel encoder resolution (quadrature mode)	8,192 counts/rev
Pitch angle range	± 32.0 deg
Elevation angle range	63.5 deg
Travel angle range	360 deg

About Quanser:

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