# QNET 2.0 VERTICAL TAKE-OFF AND LANDING BOARD FOR NI ELVIS

Demonstrate the basic principles of flight dynamics and control, using NI ELVIS platform and LabVIEW™ software.
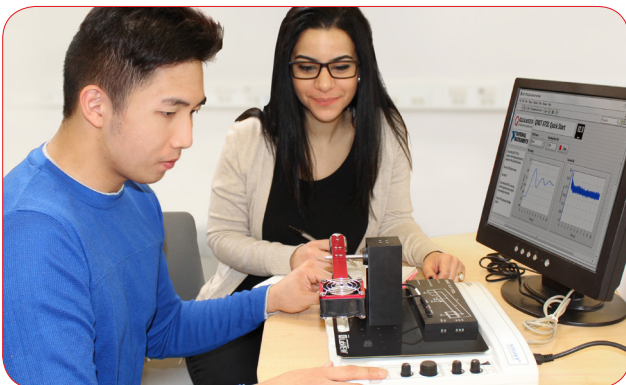
TEACH CONTROLS FOR VERTICAL TAKE-OFF AND LANDING

The Quanser QNET 2.0 Vertical Take-off and Landing (VTOL) board is a versatile system designed to teach and demonstrate the fundamentals of flight dynamics and vertical take-off and landing control. Designed exclusively for NI ELVIS platform and LabVIEW™ software, the system can easily be configured to demonstrate various control techniques, including PID and cascade control.

Free-body diagram of QNET VTOL
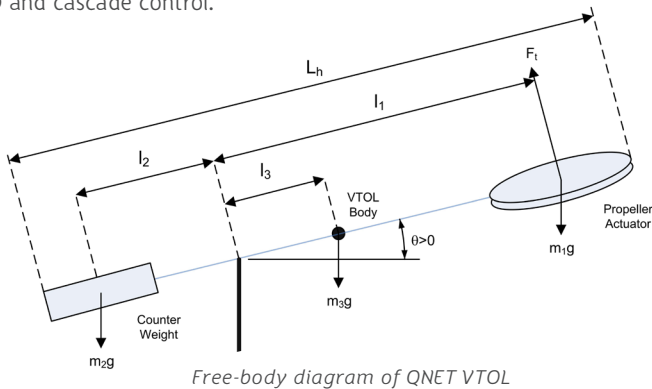
HOW IT WORKS

The QNET 2.0 VTOL board consists of a high air flow DC fan with a safety guard, attached to a solid aluminum arm. An adjustable counterweight is attached on the other end of the arm. This allows the position of the weight to be changed, which in turn affects the dynamics of the system. The arm assembly pivots about a single-ended optical encoder shaft. The encoder measures the angular position of the arm, i.e. the VTOL pitch position.

QNET VTOL board introduces students to fundamentals of aerospace engineering topics, such as flight dynamics and control.

NI Part No. 783652-01

System specifications on reverse page.

QNET 2.0 VERTICAL TAKE-OFF AND LANDING (VTOL) WORKSTATION COMPONENTS

- QNET 2.0 VTOL board
- NI ELVIS II or ELVIS II+[1]
- ABET-aligned course resources with comprehensive lab exercises, fully documented system models, and pre-designed VIs

ACCELERATE DISCOVERY WITH NI ELVIS PLATFORM

The NI Educational Laboratory Virtual Instrumentation Suite (NI ELVIS) presents a modular teaching platform suitable for any engineering lab. Integrating 12 most commonly used instruments, including an oscilloscope, digital multimeter, function generator, dynamic signal analyzer in one device allows for quick and easy measurement, design and prototyping in an educational laboratory setting.
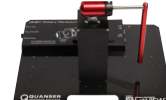
With a wide range of Quanser plug-and-play add-on boards for NI ELVIS, you can give students a great lab experience, and increases the value of your investment in NI ELVIS and LabVIEW software. Plus the comprehensive courseware reduces your lab planning time and allows you to focus on higher-value tasks.

For the full range of Quanser QNET boards, visit www.quanser.com
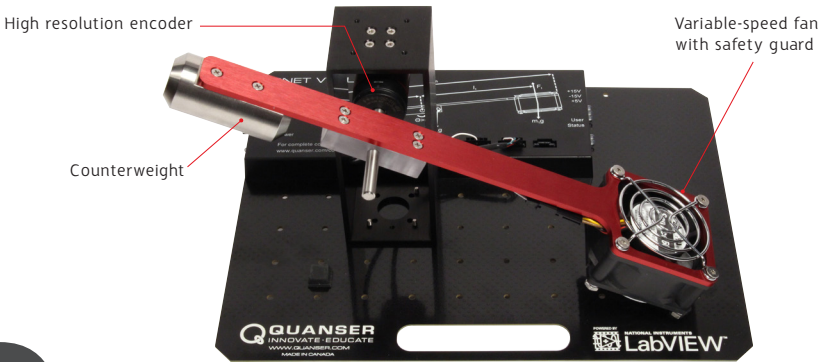
Teach Mechatronics

Teach Control

Teach Power Electronics

[1] Can be purchased directly from Quanser in selected regions. For details contact sales@quanser.com

SYSTEM SPECIFICATIONS

QNET 2.0 VTOL BOARD

High resolution encoder

Variable-speed fan with safety guard

Counterweight

FEATURES

- High air flow DC fan with safety guard
- High quality rugged propeller assembly
- Built-in current sense and digital tachometer
- Built-in PWM amplifier with linear response
- High resolution optical encoders to measure angular position of VTOL arm
- Protective cover to shield the circuitry

- Built-in PCI connector for NI ELVIS II /ELVIS II+ for quick and easy lab setup
- Fully compatible with LabVIEW™
- Fully documented system models and parameters provided for LabVIEW™
- Comprehensive digital course resources aligned with ABET requirements
- Additional community-created resources available on www.QuanserShare.com

COURSEWARE TOPICS COVERED

- Experimental modeling
- Experimental parameter identification
- Model validation
- PID control
- Current control
- Pitch control
- Cascade control
- Actuator dynamics

DEVICE SPECIFICATION

VTOL assembly length (center of counterweight to center of fan)	22.75 cm
Counterweight mass	258 g
Encoders line count	512 lines/rev
Encoders line count (in quadrature)	2048 lines/rev
Encoders resolution (in quadrature)	0.176 deg/count
Amplifier type	PWM
Amplifier peak current	2.5 A
Amplifier continuous current	0.5 A
Amplifier output voltage	± 24 V with 42% duty cycle limit (± 10 V)

About Quanser:

Quanser is the world leader in education and research for real-time control design and implementation. We specialize in outfitting engineering control laboratories to help universities captivate the brightest minds, motivate them to success and produce graduates with industry-relevant skills. Universities worldwide implement Quanser's open architecture control solutions, industry-relevant curriculum and cutting-edge work stations to teach Introductory, Intermediate or Advanced controls to students in Electrical, Mechanical, Mechatronics, Robotics, Aerospace, Civil, and various other engineering disciplines.