

# Vernier Products for Engineering Education

NI LabVIEW Education Edition software and all of the hardware required for the activities in this book are available from Vernier Software & Technology. A table of order codes follows, as well as product descriptions and other Vernier products for engineering education.

## Vernier Products Used in this Lab Manual

Item	Activity	Order Code
SensorDAQ	All	SDAQ
LabQuest	All (except Ch 8)	LABQ
LabQuest 2	All (except Ch 8)	LABQ2
LabQuest Mini	All (except Ch 8)	LQ-MINI
LabVIEW Education Edition	All	LVEE-1
Temperature Probe	1, 5, 6, 7, 9	TMP-BTA or STS-BTA
Microphone	2, 3, 4, 9	MCA-BTA
Voltage Probe	8 (for SensorDAQ only)	Included with SensorDAQ
<i>Hands-On Introduction to NI LabVIEW with Vernier SensorDAQ</i>	All	LWV

## Product Descriptions

**SensorDAQ** Designed by National Instruments and Vernier, the SensorDAQ offers convenience and power to engineering students. This small USB interface is perfect for data acquisition with Vernier sensors, sensor-control projects, and introducing LabVIEW programming. It includes screw terminals specifically for engineering projects.

**LabQuest Mini** LabQuest Mini is much like a SensorDAQ, but without the screw terminals. It connects via USB and requires no power supply. It has three analog and two digital sensor ports. All the chapters in this book, except Chapter 8, can be done using LabQuest Mini.

**LabQuest 2** LabQuest 2 is the deluxe standalone interface from Vernier. It connects via USB and is powered by a built-in rechargeable, high-capacity battery. When not using it with a computer and LabVIEW software, its large, high-resolution touch screen and Wi-Fi connectivity allow students to collect, analyze, and share sensor data wirelessly on any device with a web browser. All the chapters in this book, except Chapter 8, can be done using LabQuest 2.

## *Appendix C*

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<b>LabQuest</b>	LabQuest is the original standalone interface from Vernier. It can be used for data collection in the field, or it can be used connected to a computer (as it would be using the examples in this book). All the chapters in this book, except Chapter 8, can be done using LabQuest.
<b>LabVIEW Education Edition</b>	The new National Instruments LabVIEW Education Edition software helps teachers bring STEM concepts to life through hands-on learning. This education edition is industry-standard NI LabVIEW (used throughout the engineering disciplines) with modules for educational hardware, such as the Vernier SensorDAQ, Go! Link, and LEGO NXT Sensor Adapter.
<b>Stainless Steel Temperature Probe</b>	This rugged and durable temperature probe has a sealed stainless steel shaft and tip that can be used in organic liquids, salt solutions, acids, and bases in a range of $-40$ to $135^{\circ}\text{C}$ .
<b>Microphone</b>	The Vernier Microphone can be used to display and study the waveforms of sounds from voices and musical instruments.
<b>Voltage Probe</b>	The Voltage Probe has a range of $\pm 10$ V, and can be used to measure the potential in direct-current or alternating-current circuits.

## Optional Vernier Products

In addition to the products used in this book, Vernier Software & Technology offers a wide variety of sensors and products designed for engineering education.

### Vernier Sensors for Engineering Education

Over 50 sensors can be used with SensorDAQ, including those listed below.

Item	Order Code
3-Axis Accelerometer	3D-BTA
Blood Pressure	BPS-BTA
CO <sub>2</sub> Gas Sensor	CO2-BTA
Current Probe	DCP-BTA
EKG Sensor	EKG-BTA
Hand Dynamometer	HD-BTA
Instrumentation Amplifier	INA-BTA
Light Sensor	LS-BTA
Motion Detector	MD-BTD
Photogate	VPG-BTD
Rotary Motion Sensor	RMV-BTD
Spirometer	SPR-BTA
Thermocouple	TCA-BTA

## Vernier Products for Engineering Education

### Engineering Projects with NI LabVIEW and Vernier

This book is meant to follow the *Hand-on Introduction to NI LabVIEW with Vernier* book. It is a collection of 12 open-ended, challenging projects. Each project involves some construction and some LabVIEW programming.

### Digital Control Unit (DCU)

The Digital Control Unit gives you an easy way to use SensorDAQ, LabPro, LabQuest 2, the original LabQuest, or LabQuest Mini digital sensor ports for exciting, do-it-yourself projects. It provides useful current (up to 600 mA) for controlling electrical devices.

### Breadboard Cable

The Breadboard Cable is an easy way for students to build their own sensor circuitry and then input the signal into a Vernier interface. One end of the cable is a standard British Telecom Analog (BTA) connector that plugs into the interface's sensor port. The other end of the cable is a prototyping board connector that exposes the six sensor lines.

### **Power Amplifier**

The Vernier Power Amplifier allows you to control useful output circuits with SensorDAQ and other Vernier lab interfaces. You can drive loads with +/-10 V and currents up to 1 A. It has a built-in current sensor so you can monitor the current output at the same time you control the voltage. Engineering projects, with feedback loops, motor speed control, PID control, and many others are naturals with this hardware.

### **NXT Sensor Adapter**

The NXT Sensor Adapter can be used with LEGO MINDSTORMS NXT robots and over 30 Vernier sensors for sensor-based control systems. The adapter is slightly larger than the LEGO Sound Sensor, and includes a LEGO NXT cable socket on one end and a Vernier BTA sensor socket on the other end. Incorporate science, control, and engineering into your NXT projects using this low-cost adapter.

### ***STEM with Vernier and LEGO MINDSTORMS NXT Lab Manual***

This book contains 14 experiments and four robotics projects for data collection using the LEGO NXT Intelligent Brick. This book covers topics in environmental science and engineering, including soil, water, acidity, and UV radiation. Full construction and programming instructions are given for the robotics projects, such as an aquarium monitor or a plant waterer.

### ***STEM 2 with Vernier and LEGO MINDSTORMS NXT Lab Manual***

This book contains 12 experiments and eight robotics projects for data collection using the LEGO NXT Intelligent Brick. It covers topics in physical science and engineering, including mechanics, pressure, electricity, and magnetism. Full construction and programming instructions are given for robotics projects, such as a battery tester, string tension tester, Cartesian diver, and mine sweeper.