

NIDays

THE LabVIEW CONFERENCE

Academic Keynote - An Ecosystem for Every Student

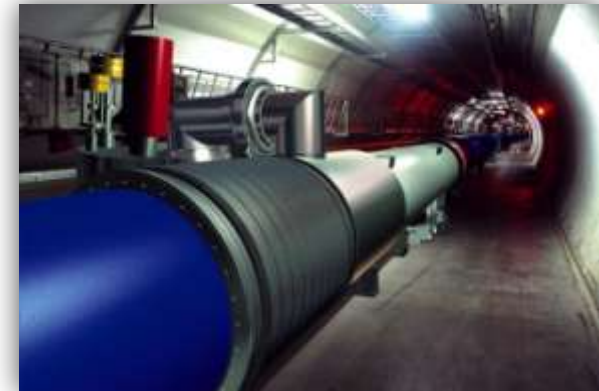
Graphical System Design



**LEGO®
MINDSTORMS®
NXT**

*“the smartest, coolest
toy of the year”*

ni.com



**CERN Large
Hadron Collider**
*“the most powerful
instrument on earth”*

High-Level Design Models

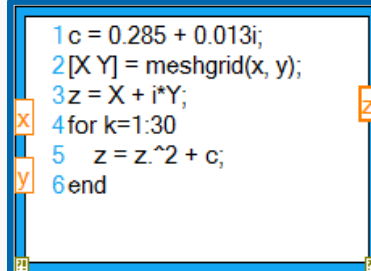
Data Flow



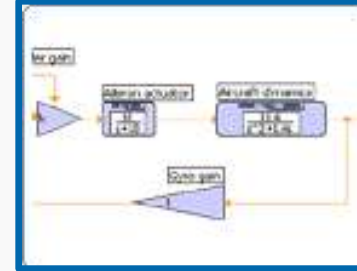
C Code



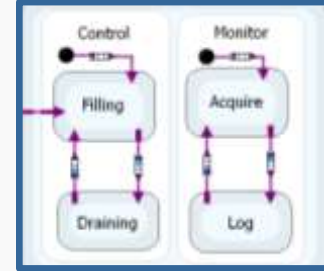
Textual Math



Simulation



Statechart



NATIONAL INSTRUMENTS

LabVIEW™

Graphical System Design Platform

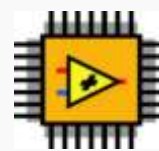
Desktop



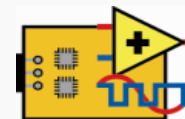
Real-Time



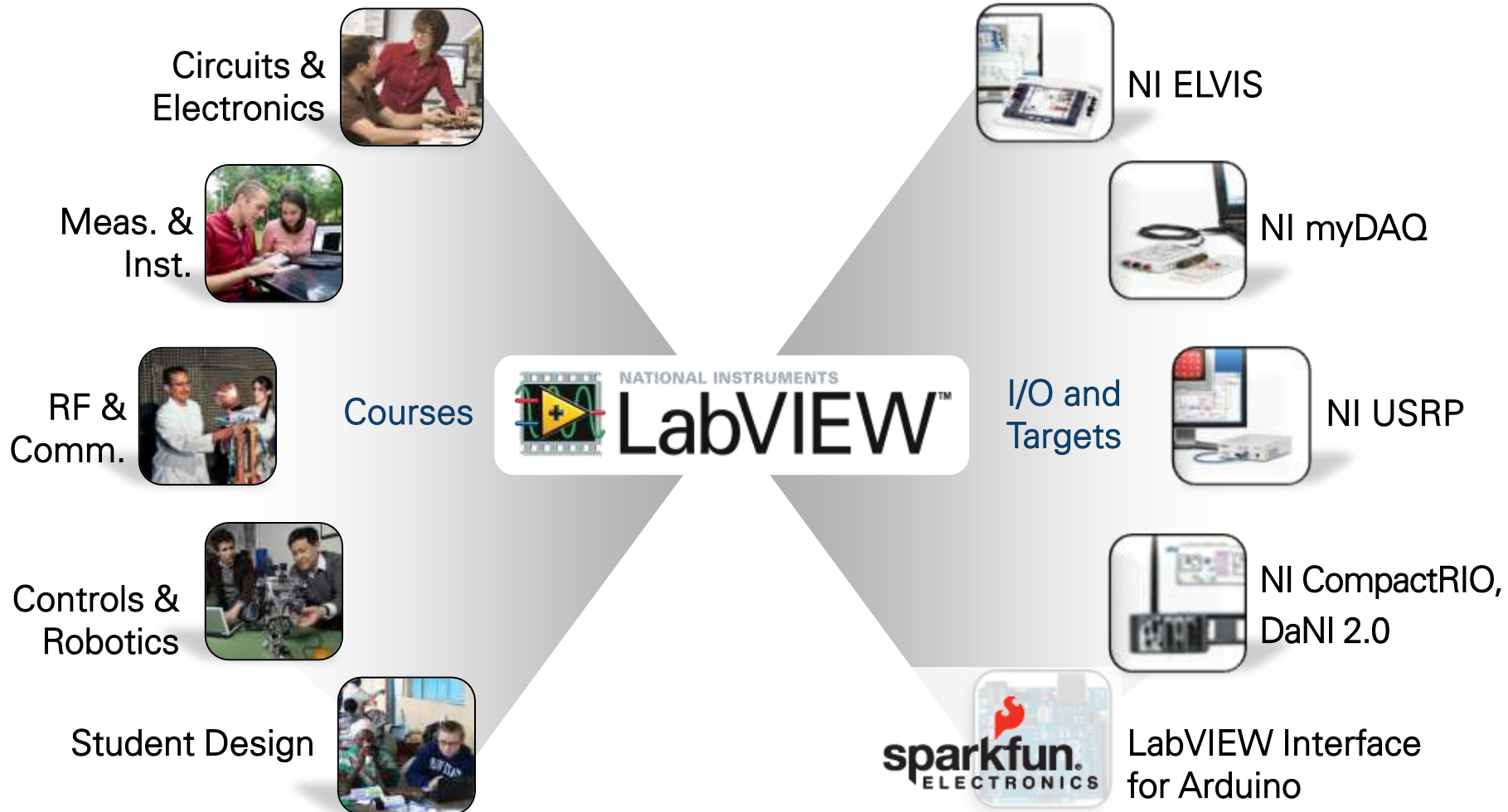
FPGA



Microprocessors



NI Graphical System Design in Education



NI ELVIS | Do Engineering: In the Lab



ni.com/nielvis

Adam Foster
Academic Product Manager

NI ELVIS

Oscilloscope

- ELVIS II+: 100MS/s Sampling Rate
- ELVIS II: 1.25 MS/s single channel, 500kS/s two channel aggregate
- 16-bit resolution
- 1 to 1.5 MHz Bandwidth
- 1x and 10x probe
- ± 10 V input range
- AC/DC coupling

Internal Circuit Protection

- Resettable fuses

USB Connectivity

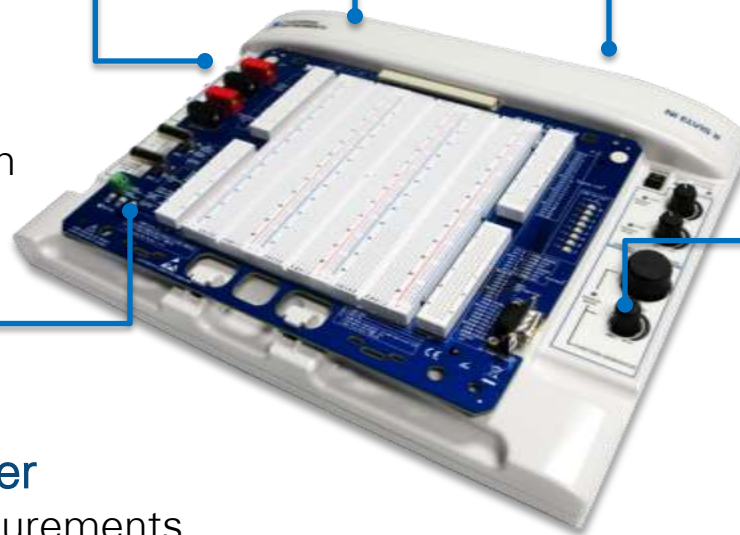
- Plug-and-play capability
- USB 2.0 Connection

Function Generator











- 10 bit, ± 5 V range
- 0.2 Hz to 5 MHz Sine
- 0.2 Hz to 1 MHz Triangle/Square
- Software or manual control
- BNC or prototyping board connection

Digital Multimeter



- Isolated measurements
- 5½ digit resolution
- 60 VDC, 20Vrms, 2 ADC, 2 RMs, 100M Ω



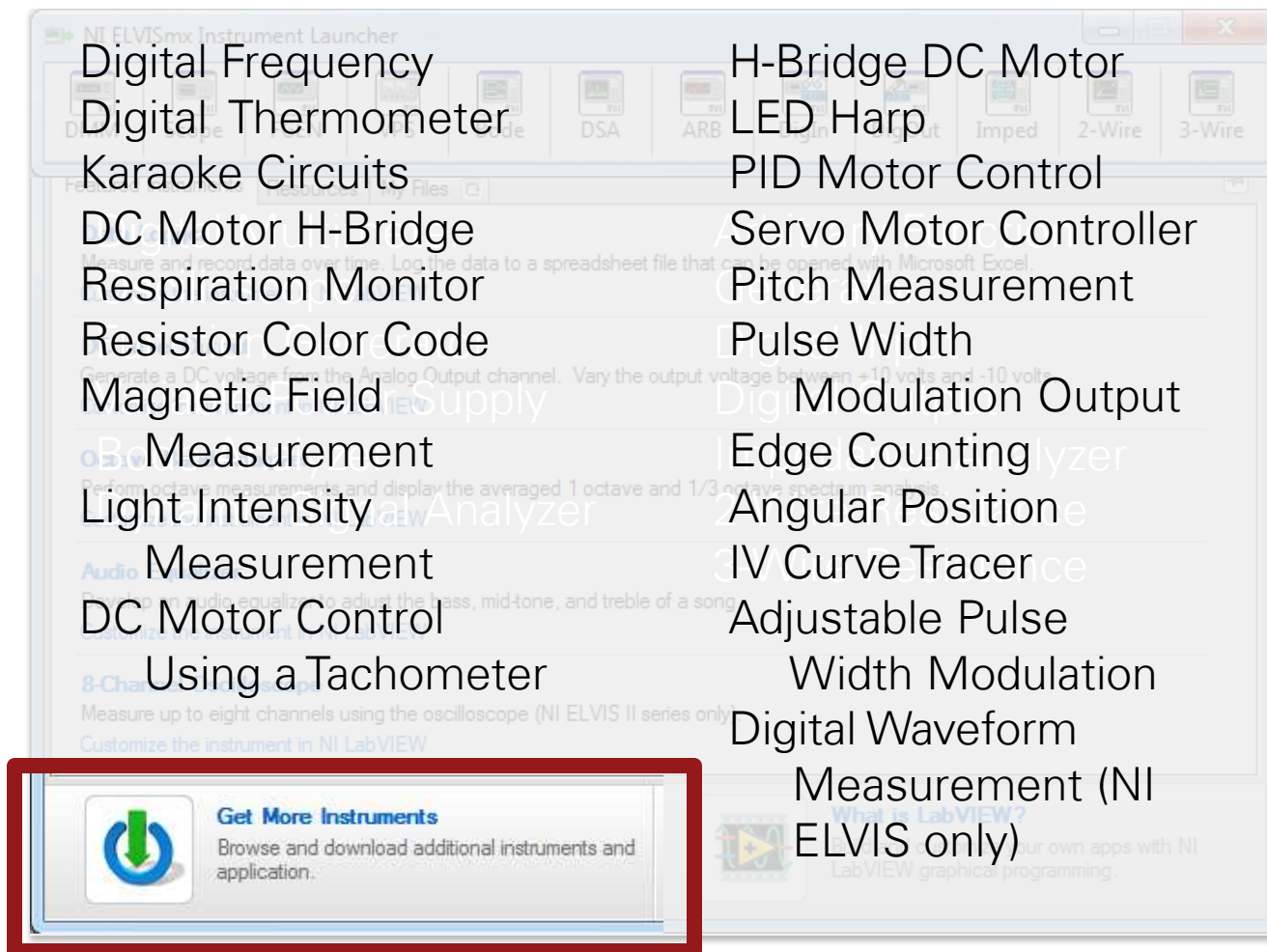
Multidisciplinary Teaching Platform

Circuits	Measurements	Control	Embedded	Communications
Electrical, Biomedical, Mechatronics	Physics, Chemistry	Electrical, Mechanical, Systems	Electrical, Computer	Electrical, Computer, Physics
 	 	 	 	 

Partner Board Additions

Biomedical	Signal Processing
QNET Myoelectric Trainer	SIGEx Signals & Systems Trainer
 <p>The image shows a blue circuit board with various electronic components, including a microcontroller, resistors, and jumper wires. It is housed in a white plastic enclosure. Below the board, there is a blue and black cable with a small blue sensor or probe attached. The Quanser logo, a stylized 'Q' inside a circle, is visible below the board.</p> <p>QUANSER INNOVATE. EDUCATE.</p>	 <p>The image shows a white circuit board with a breadboard and various electronic components, including a microcontroller, resistors, and jumper wires. It is housed in a white plastic enclosure. A black cable is connected to the board. The EMONATE logo, with 'EMONATE' in blue and 'tims' in orange, is visible below the board.</p> <p>EMONATE tims</p>

Virtual Instruments



Electronics at The University of Manchester



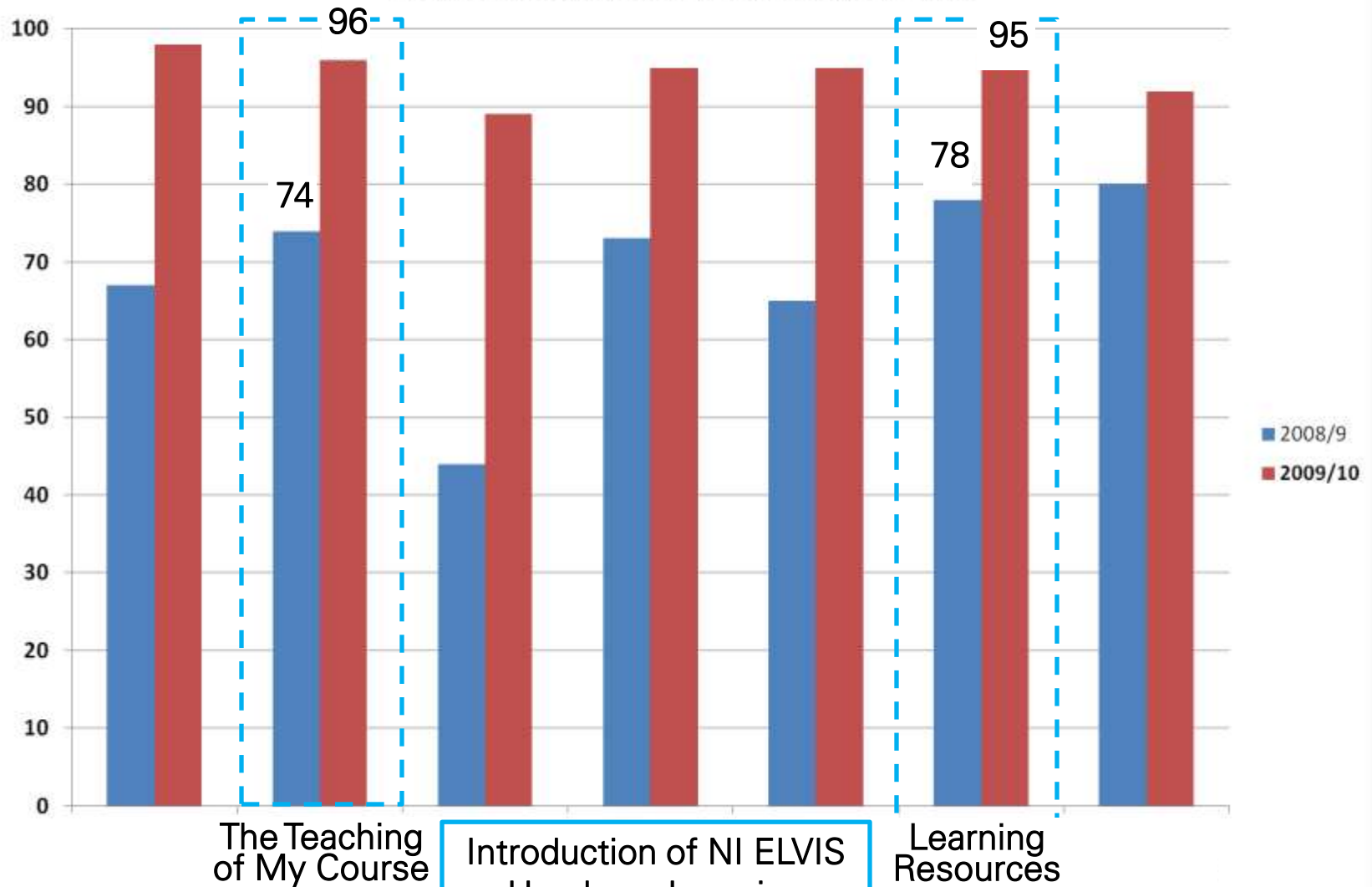
“...students are now exposed to the hands-on learning experience throughout the first course to complex final year projects.”

Dr. Danielle George

[School of Electrical and Electronic Engineering]

MANCHESTER
1824

School of Electrical and Electronic Engineering National Student Survey Results 2010



NI myDAQ | Do Engineering: Anywhere, Anytime



Analog ICs Supplied
by  **TEXAS
INSTRUMENTS**

ni.com/mydaq

Mark Walters
Academic Product Manager

Universities Using NI myDAQ



MÄLARDALEN UNIVERSITY
SWEDEN



NI myDAQ

Analog Input:

2 channels, 200kS/s/ch,
16-bit

Analog Output:

2 channels, 200kS/s/ch,
16-bit

DIO: 8 lines

CTR: 1 counter

Integrated DMM: V, A, Ohm

Power Supply: +5V, +/-15V
3.5mm stereo audio jacks

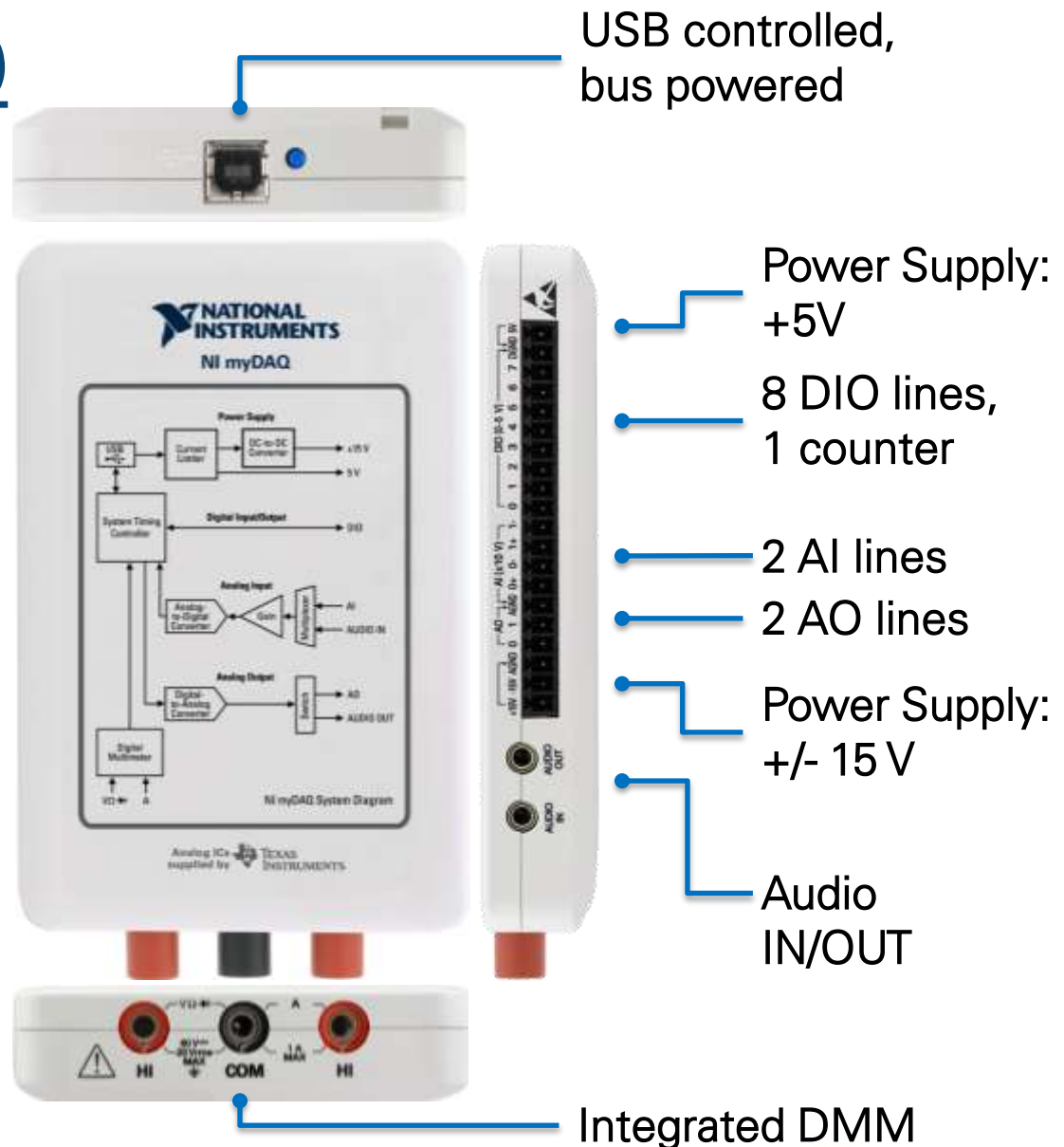
ELVISmx SW Instruments:

DMM, O-scope, FGEN,
Bode, DSA, ARB,
Digital In/Out

Analog ICs Supplied
by

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INSTRUMENTS**

myDAQ: Hands-on Learning Anywhere, Anytime for Students

Circuits



Signal Processing



Measurements



Controls



A woman with dark, wavy hair, wearing a purple top, is smiling and holding a small, white, three-bladed paper wind turbine in her right hand. The background is a soft, out-of-focus blue-grey gradient.

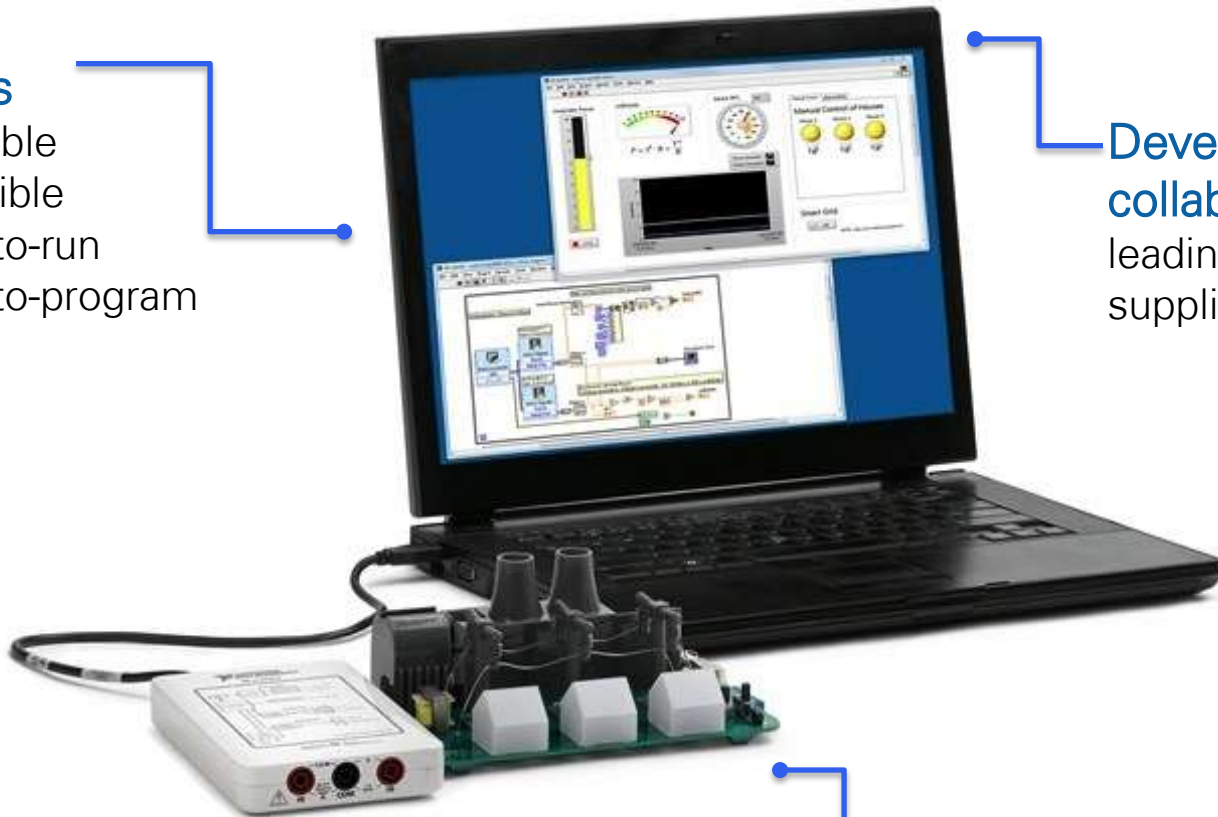
Make experimentation
relevant and
accessible to
every single student.

NI miniSystems

Within the constraints

- Affordable
- Accessible
- Ready-to-run
- Ready-to-program

Developed in collaboration with leading educational suppliers



Inspired by customer applications

Instant Relevance in Engineering and Science Education

NI myDAQ: The Ecosystem

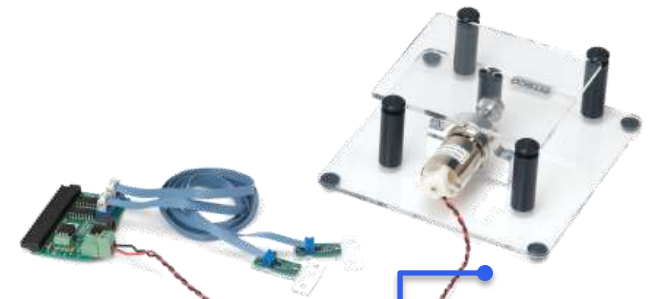


Orderable from:

Analog ICs Supplied by:



ELENCO™



myQuake

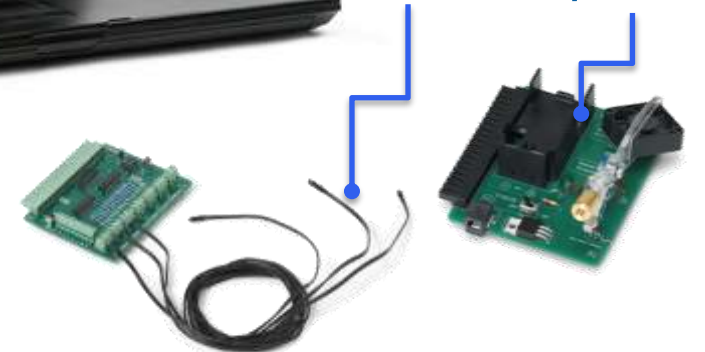
PITSCO
EDUCATION

myGrid



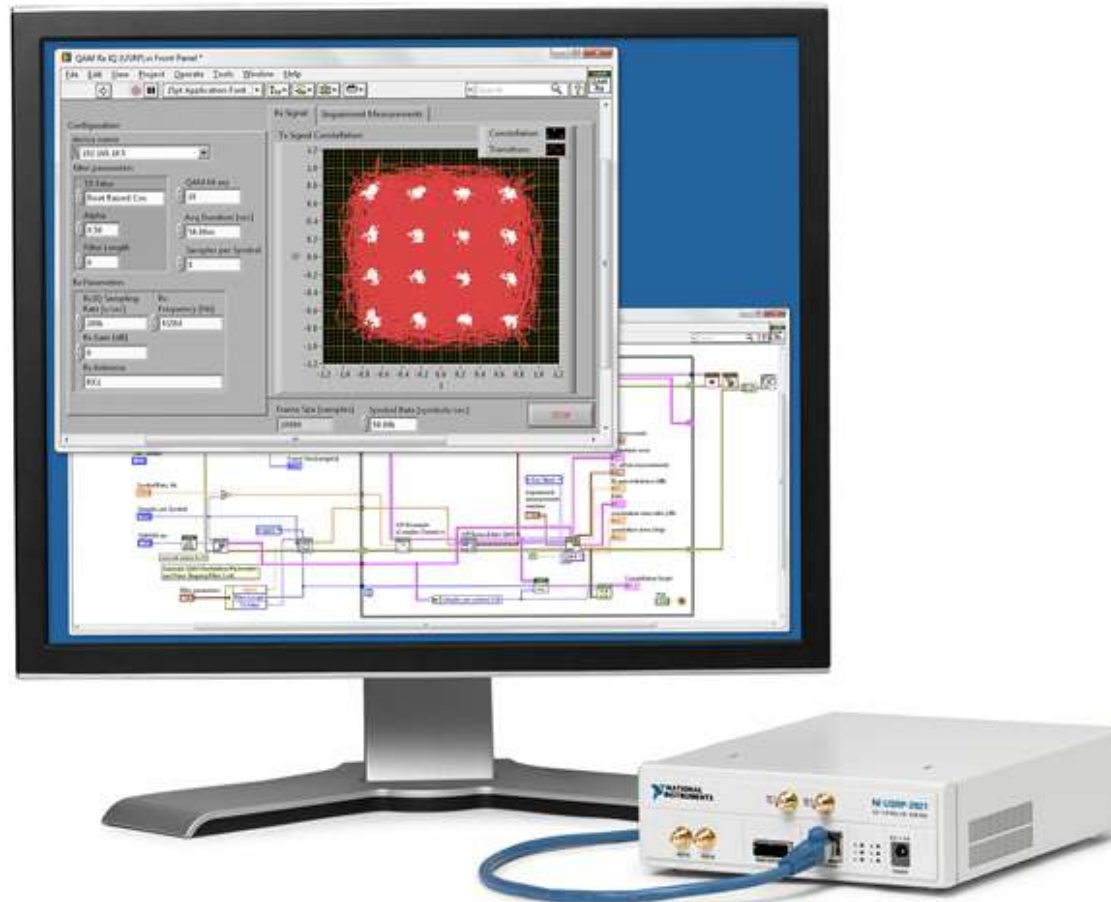
myTemp

myVTOL



ni.com/minisystems

NI USRP | Do Engineering: In Communications Design



ni.com/usrp

Erik Luther & Sam Shearman
Sr. Product Marketing Managers, RF and Communications

NI USRP

Tunable RF Transceiver Front Ends

- Frequency Range
50 MHz – 2.2 GHz (NI-2920)
2.4 GHz & 5.5 GHz (NI-2921)

Signal Processing and Synthesis

- NI LabVIEW to develop and explore algorithms
- NI Modulation Toolkit and LabVIEW add-ons to simulate or process live signals



Applications

- FM Radio
- TV
- GPS
- GSM
- Zigbee
- Safety Radio
- OFDM
- Passive Radar
- Dynamic Spectrum Access

1 Gigabit Ethernet Connectivity

- Plug-and-play capability
- Up to 25 MS/s baseband IQ streaming

NI USRP at Stanford University



STANFORD
UNIVERSITY

“...with the NI USRP, we’re able to provide exposure in introductory courses for the first time.”

Dr. Sachin Katti

[Electrical Engineering & Computer Science]

NI USRP at Stanford University

“

Awesome class! I really enjoyed the lectures, where I learned a lot, and the labs were **really cool** because we got to use the hardware.
... I am glad that I took this class!

”

NI USRP at Stanford University

“

Awesome class! I really enjoyed the lectures, where I **learned a lot**, and the labs were really cool **because we got to use the hardware**.
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”

Packet Radio & OFDM

Lab 1 Source Coding
Lab 2 Packet Communication,
Sync, and Channel
Correction
Lab 3 Modulation
Lab 4 Demodulation
Lab 5 Design Challenge:
Packet based Transceiver

(Available Online)

Lab 1.1 AWGN Simulator
Lab 1.2 Intro to the NI USRP
Lab 2.1 Modulation /Demodulation
Lab 2.2 Pulse Shaping
Lab 3 Energy Detection
Lab 4 Equalization
Lab 5 Frame Detection
Lab 6 Intro to OFDM
Lab 7 Frequency Correction & Sync
Lab 8 OFDM Channel Coding

(Ships in Bundle)

YOU TEACH ENGINEERING.

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