NIDays

THE LabVIEW CONFERENCE

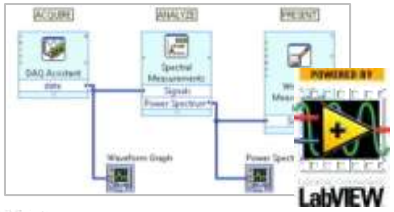
Academic Keynote - An Ecosystem for Every Student

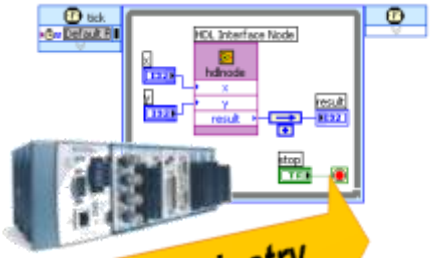
Payman Tehrani
Academic Team Northern Region

NATIONAL INSTRUMENTS

National Instruments Academic Program

From Kindergarten to Rocket Science





Kindergarten - 12

University

Research

Industry

Collaboration with Leading STEM Programs

Textbook & Author Support Program

In More Than 7500 Universities in 110 Countries

LabVIEW Academy Certification

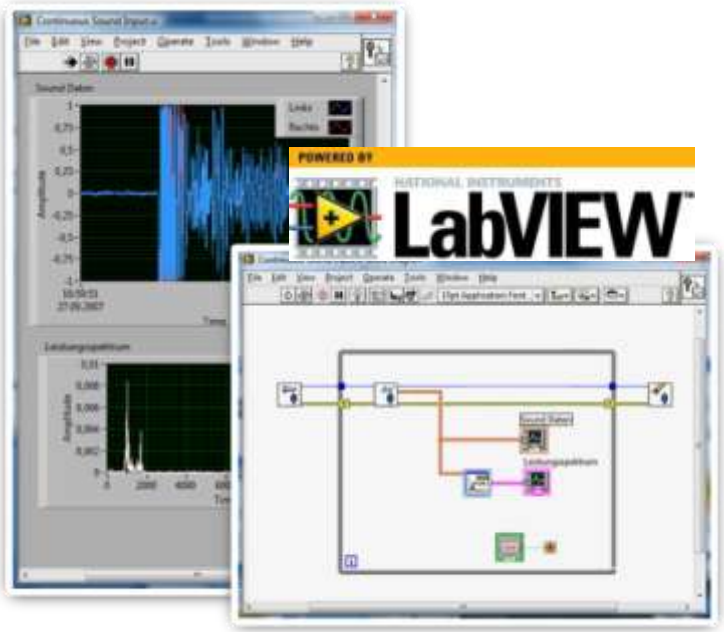
Collaborative Research

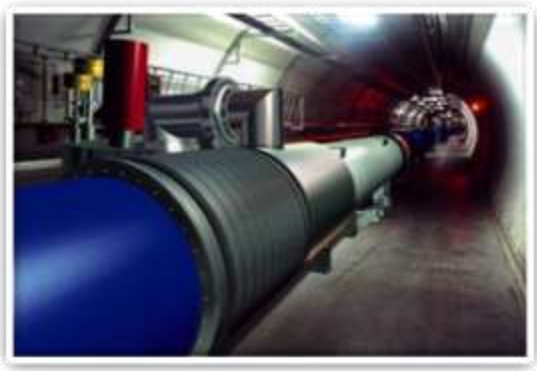
NATIONAL INSTRUMENTS

Graphical System Design

K-8 | High school | College | University | Research | Industry

LEGO MINDSTORMS NXT
"the smartest, coolest toy of the year"





CERN Large Hadron Collider
"the most powerful instrument on earth"

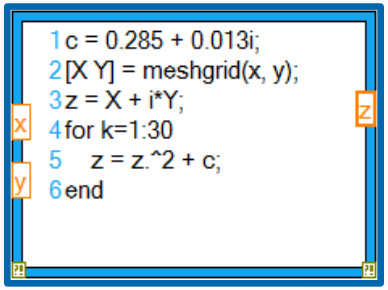
NATIONAL INSTRUMENTS

High-Level Design Models

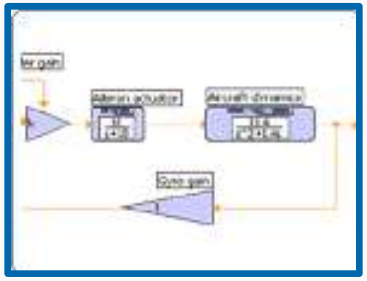
Data Flow

C Code

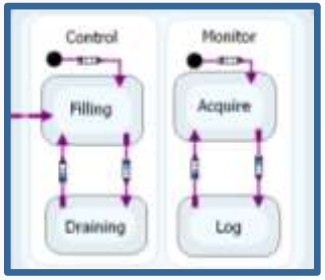
Textual Math



Simulation



Statechart



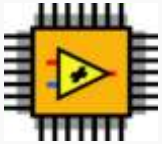
NATIONAL INSTRUMENTS LabVIEW™

Graphical System Design Platform

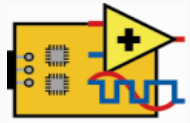
Desktop

Real-Time

FPGA



Microprocessors



NI Graphical System Design in Education

Circuits & Electronics

Meas. & Inst.

RF & Comm.

Controls & Robotics

Student Design

Courses

NATIONAL INSTRUMENTS LabVIEW™

I/O and Targets

NI ELVIS

NI myDAQ

NI USRP

NI CompactRIO, DaNI 2.0

LabVIEW Interface for Arduino

NATIONAL INSTRUMENTS

NI ELVIS | Do Engineering: In the Lab

ni.com/nielvis

NI ELVIS

Oscilloscope

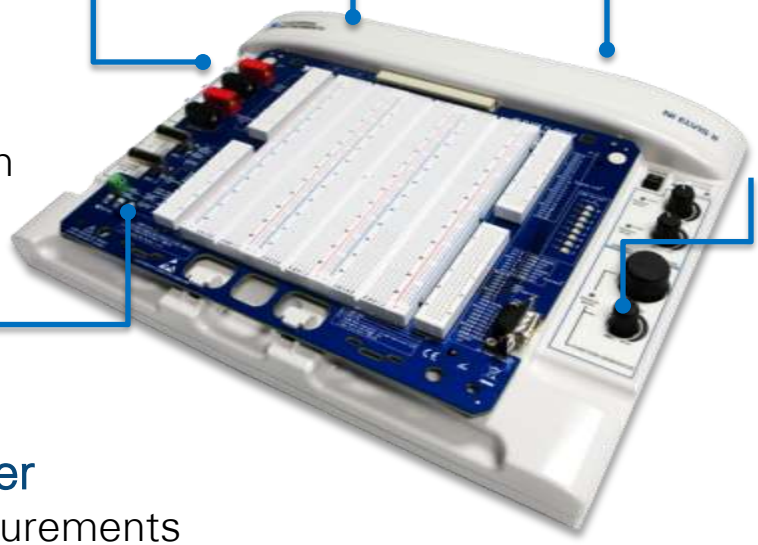
- ELVIS II+: 100MS/s Sampling Rate
- ELVIS II: 1.25 MS/s single channel, 500kS/s two channel aggregate
- 16-bit resolution
- 1 to 1.5 MHz Bandwidth
- 1x and 10x probe
- ±10 V input range
- AC/DC coupling

Internal Circuit Protection

- Resettable fuses

USB Connectivity

- Plug-and-play capability
- USB 2.0 Connection



Function Generator

- 10 bit, ±5V 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

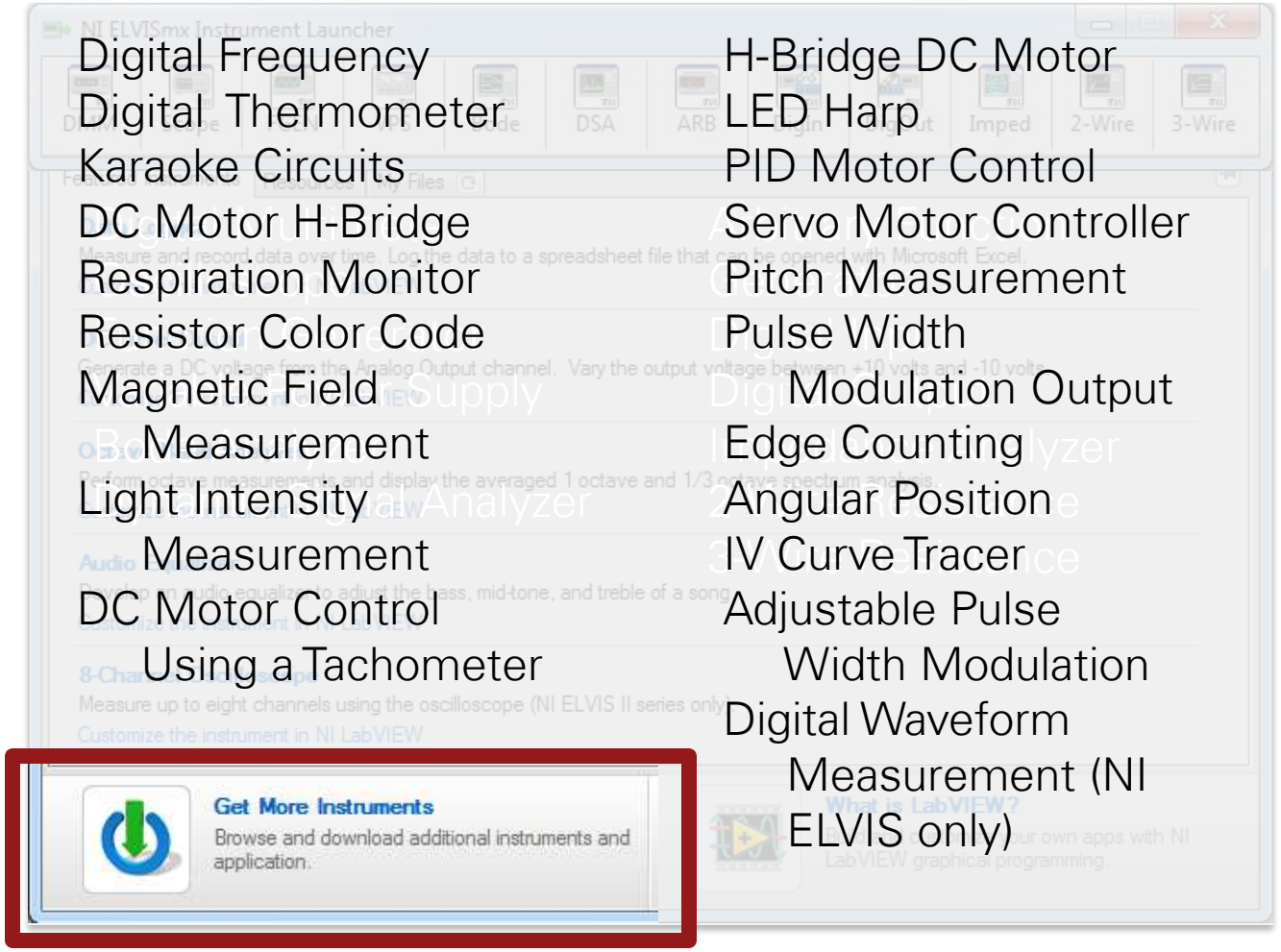
- Isolated measurements
- 5½ digit resolution
- 60 VDC, 20Vrms, 2 ADC, 2 RMs, 100MΩ

Multidisciplinary Teaching Platform

Circuits	Measurements	Control	Embedded	Communications
Electrical, Biomedical, Mechatronics	Physics, Chemistry	Electrical, Mechanical, Systems	Electrical, Computer	Electrical, Computer, Physics
				
NATIONAL INSTRUMENTS	Vernier	QUANSER INNOVATE EDUCATE	freescale semiconductor	EMONA tims

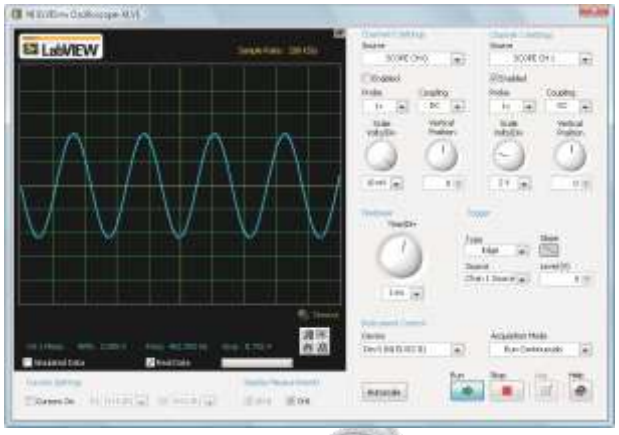
Virtual Instruments

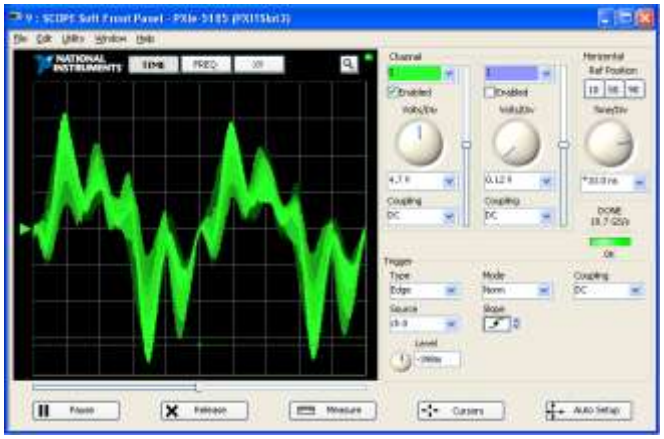
- Digital Frequency
- Digital Thermometer
- Karaoke Circuits
- DC Motor H-Bridge
- Respiration Monitor
- Resistor Color Code
- Magnetic Field Measurement
- Light Intensity Measurement
- DC Motor Control Using a Tachometer
- H-Bridge DC Motor
- LED Harp
- PID Motor Control
- Servo Motor Controller
- Pitch Measurement
- Pulse Width Modulation Output
- Edge Counting
- Angular Position
- IV Curve Tracer
- Adjustable Pulse Width Modulation
- Digital Waveform Measurement (NI ELVIS only)

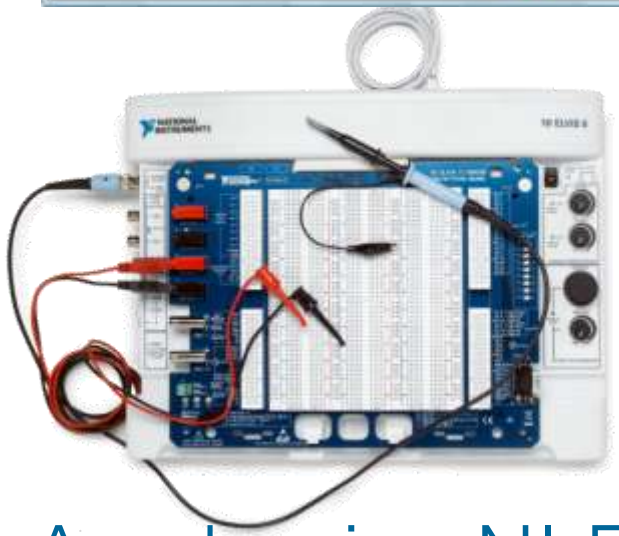


NATIONAL INSTRUMENTS

Begin Taking Measurements
Soft Front Panels







Academic: NI ELVIS

Industry: PXI

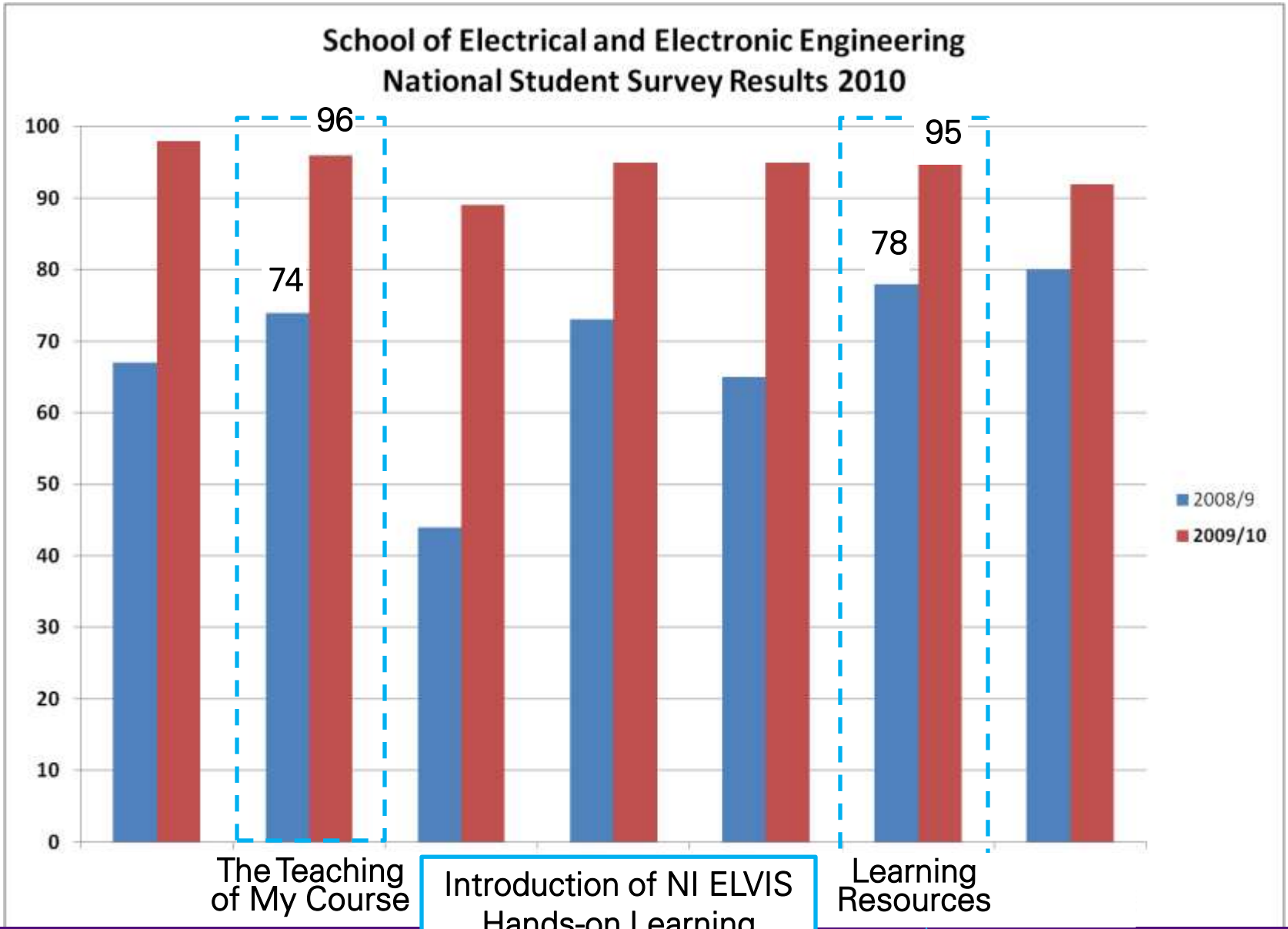
NATIONAL INSTRUMENTS

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]


School of Electrical and Electronic Engineering
National Student Survey Results 2010
100
90
80
70
60
50
40
30
20
10
0
96
74
95
78
2008/9
2009/10
The Teaching of My Course
Introduction of NI ELVIS Hands-on Learning
Learning Resources

NI myDAQ | Do Engineering: Anywhere, Anytime

ni.com/mydaq

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

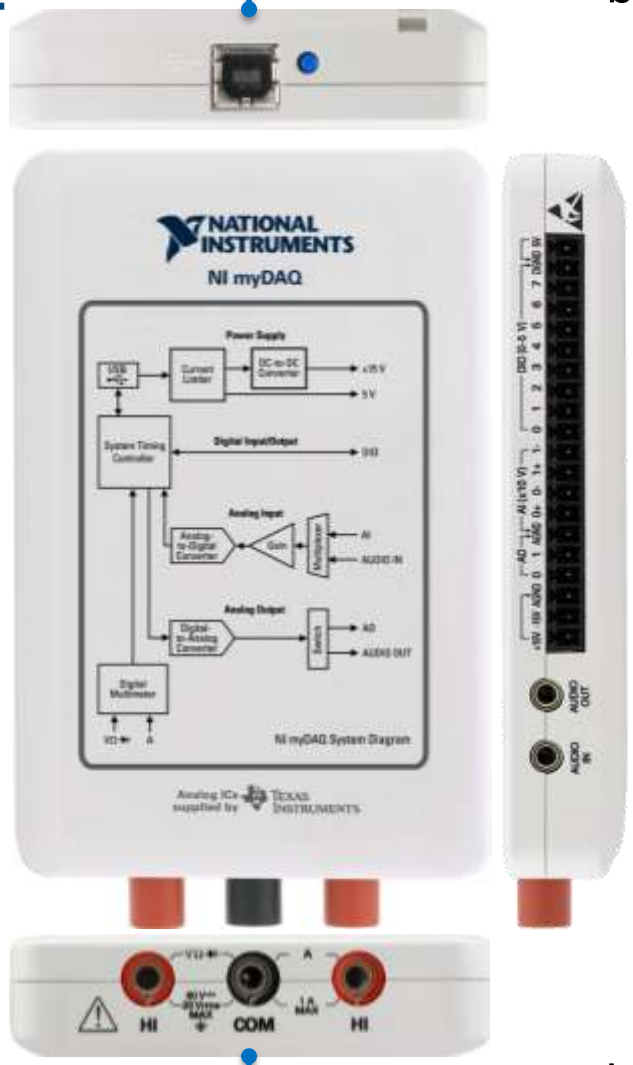
Power Supply: +5V, +/-15V

3.5mm stereo audio jacks

ELVISmx SW Instruments:

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

Analog ICs Supplied by: Texas Instruments



USB controlled, bus powered

Power Supply: +5V

8 DIO lines, 1 counter

2 AI lines

2 AO lines

Power Supply: +/- 15 V

Audio IN/OUT

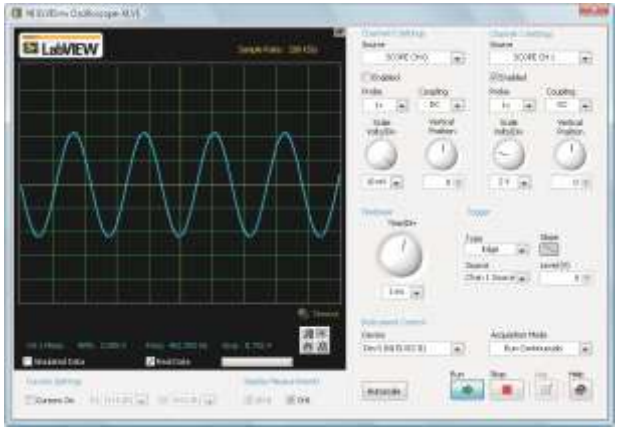
Integrated DMM

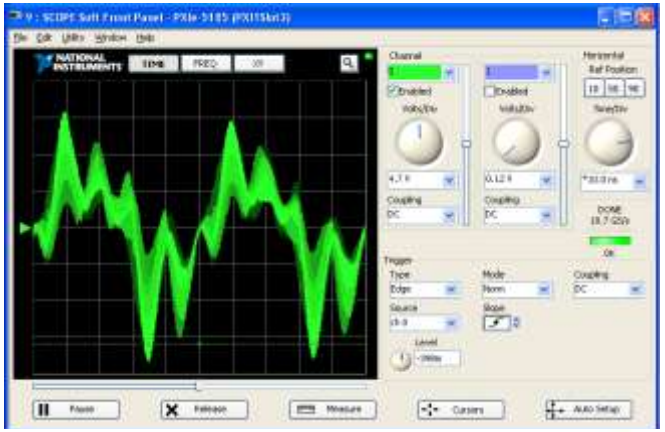
National Instruments

Universities Using NI myDAQ

NATIONAL INSTRUMENTS

Begin Taking Measurements
Soft Front Panels





Academic: NI myDAQ

Industry: PXI

NATIONAL INSTRUMENTS

myDAQ: Hands-on Learning Anywhere, Anytime for Students

Circuits

Signal Processing

Measurements

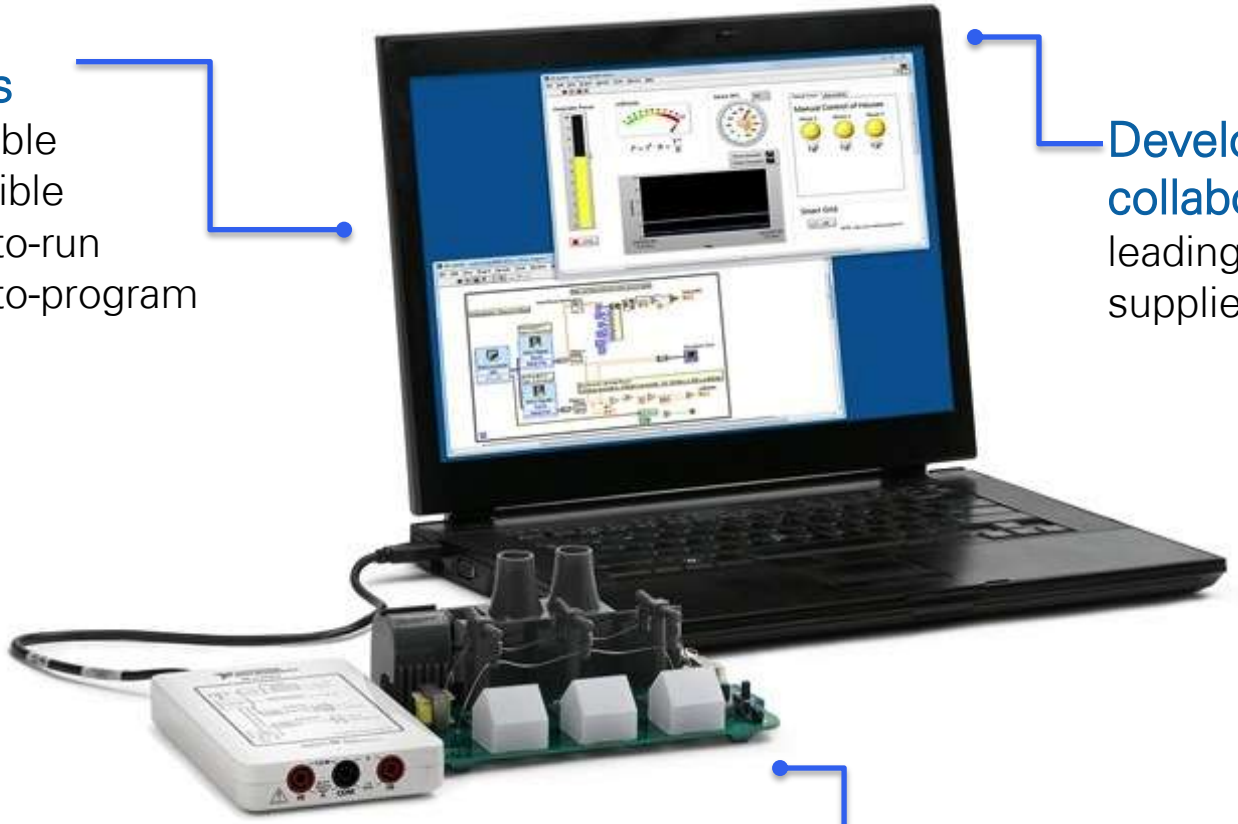
Controls

NATIONAL INSTRUMENTS

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

NATIONAL INSTRUMENTS

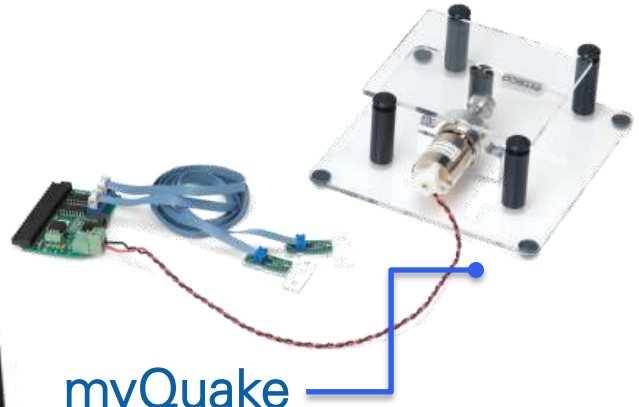
NI myDAQ: The Ecosystem

Studica

Orderable from:

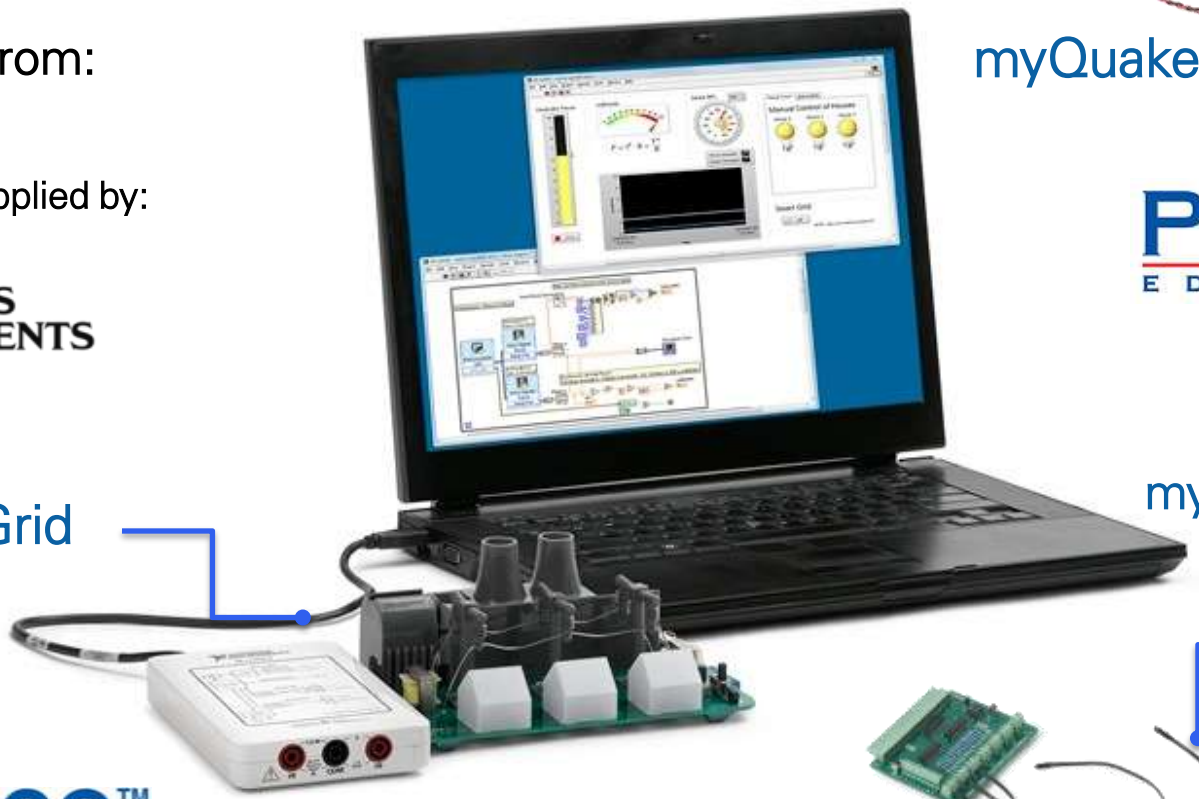
Analog ICs Supplied by:

TEXAS INSTRUMENTS



myQuake

PITSCO EDUCATION



myGrid

myTemp

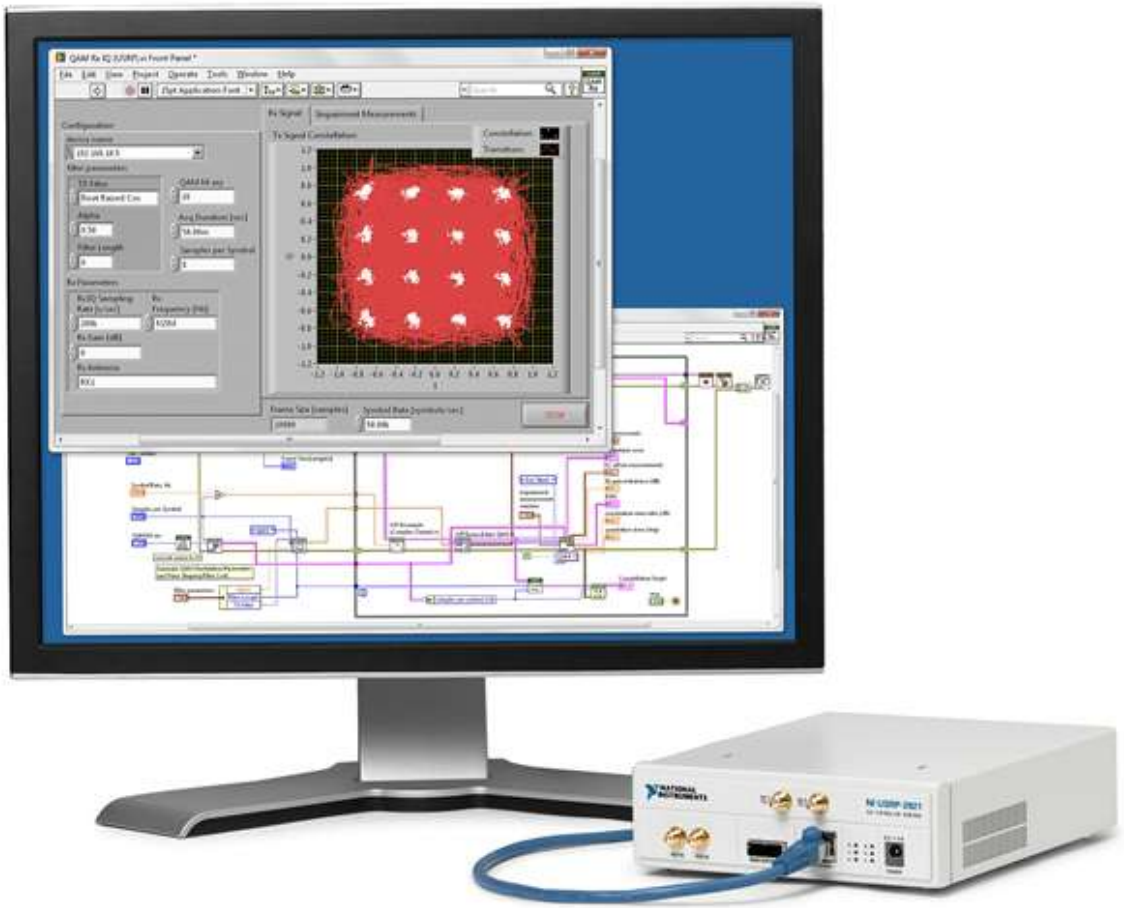
myVTOL

ELENCO™

ni.com/minisystems

NATIONAL INSTRUMENTS

NI USRP | Do Engineering: In Communications Design



ni.com/usrp

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

NATIONAL INSTRUMENTS

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]

NATIONAL INSTRUMENTS

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!

Source: Stanford EE 49: Teaching Evaluations (Spring Quarter 2011)

NATIONAL INSTRUMENTS

NI USRP at Stanford University

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> … I am glad that I took this class!

Source: Stanford EE 49: Teaching Evaluations (Spring Quarter 2011)

NATIONAL INSTRUMENTS

Packet Radio & OFDM

Communications Systems Labs

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)

Digital Communications Labs

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)

NATIONAL INSTRUMENTS

YOU TEACH ENGINEERING.

We'll Help You Teach LabVIEW.

ni.com/students/learnlabview

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