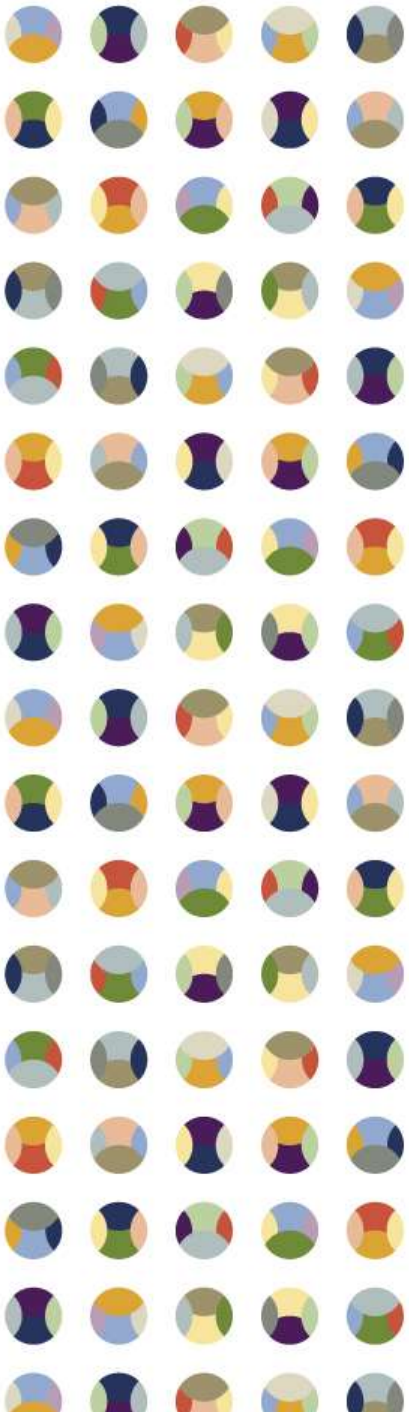


NIDays

WORLDWIDE GRAPHICAL SYSTEM DESIGN

CONFERENCE

NATIONAL INSTRUMENTS™

Welcome

Branch Manager NI Sweden

René Voorhorst

Do More Innovation with Graphical System Design

Everyone is talking about the world economy!


Layoffs cut deep
Economy
Dow falls
0,000

Engineering Grand Challenges

Cancer Detection

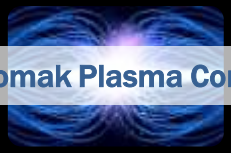
Advance health informatics

Hadron Collider

Engineer the tools of scientific discovery

Infant Brain Scans

Reverse-engineer the brain



Tokomak Plasma Control

Provide energy from fusion

IV Drift Pump

Engineer better medicines

Advanced Purification

Provide access to clean water

Xbox Testing

Enhance virtual reality

Olympic Stadium Safety

Restore and improve urban infrastructure

CO_2 Storage

Develop carbon sequestration methods

Distance Learning

Advance personalized learning

Cheap Solar Panels

Make solar energy economical

Material Monitoring

Prevent nuclear terror

Spectral Monitoring

Secure cyberspace

Costa Rica Rain Forest

Manage the nitrogen cycle

Source: National Academy of Engineering

“Engineering is Tomorrow’s Future
along with the solution
for Today’s Problems”

[EDN]

Swedish challenges solved by Graphical System Design

A Partnership in Innovation

Your Domain Knowledge
and
Graphical System Design
Tools of Innovation

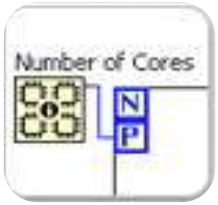
DESIGN → PROTOTYPE → DEPLOY

Do More

[with NI LabVIEW]

NATIONAL INSTRUMENTS

LabVIEW™ 2009



Multicore Processors

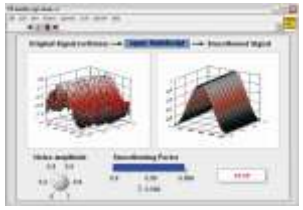
Personal Supercomputing

FPGA Technology

Rapid Embedded Design and Prototyping

Wireless Systems

Intelligent Distributed Systems



Real-Time Math

Deterministic Algorithm Deployment

NATIONAL INSTRUMENTS

Improved Productivity | Feedback | Enable latest Technology

Fixed-Point Casting Functions

Data Value References

New Dynamic Data Express VI

Command-Line Differencing

Using Xpath to Query XML Documents

Group Digital Signals Express VI

TDMS and NI-DAQmx Logging Integration

RSS-Driven Getting Started Window

VI Snippets

Guaranteed Downcasting of Classes

New System Directory VIs

Enhanced Curve-Fitting Functionality

LabVIEW DataFinder Toolkit

New VI Analyzer Tests

Sound VIs on Mac

Native Recursion

New Signal Processing VIs

Enhanced Icon Editor

SSL Security for Web Services

CPU Information Palette

VI Hierarchy Window Enhancements

Quick Drop Improvements

Bus/Line Configuration in Digital Waveform Graph

Partial Differential Equation Palette

Generate .NET Interop Assemblies

Domain Account Manager Enhancements

Probe Watch Window

New In-Place Element Structure I/O Nodes

New Matrix Functions

Feedback Node Configuration Options

LabVIEW MathScript RT Module

Parallel For Loops

New 2D and 3D Plots

TDMS File Format Improvements

Enhanced Block Diagram Cleanup

Search Algorithm Enhancements

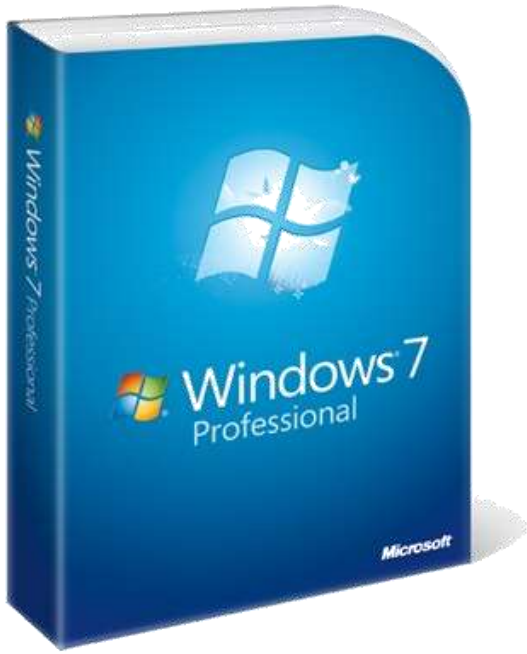
NATIONAL INSTRUMENTS

Graphical Scripting for LabVIEW

David Ek and Pelle Steen

Supporting the Next OS: Windows 7

- Improved multicore/multitasking
- Increased USB DAQ throughput
- Enhanced performance with 64-bit
- Tested LabVIEW 2009/driver support

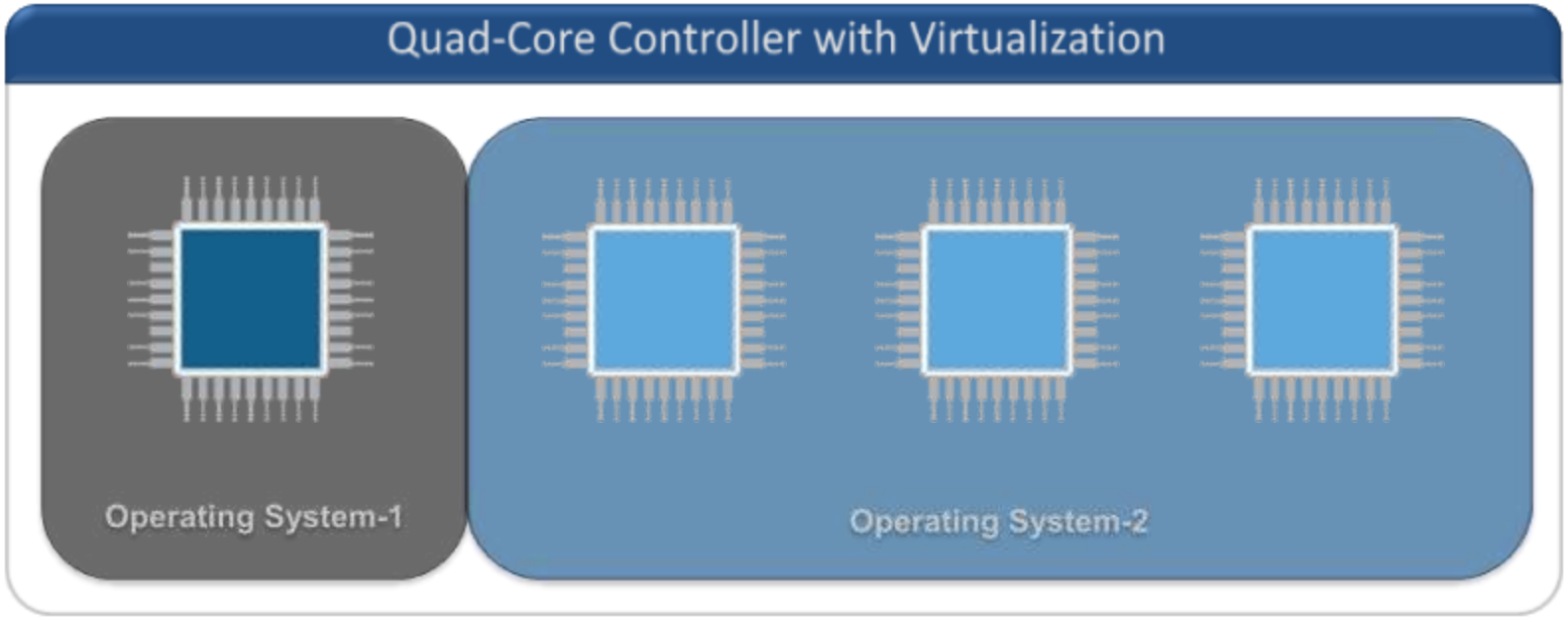


Do More

[Multicore]


Applications
Graphics
Services
Windows XP
LabVIEW Real-Time
Determinism
Real-Time I/O
Timing

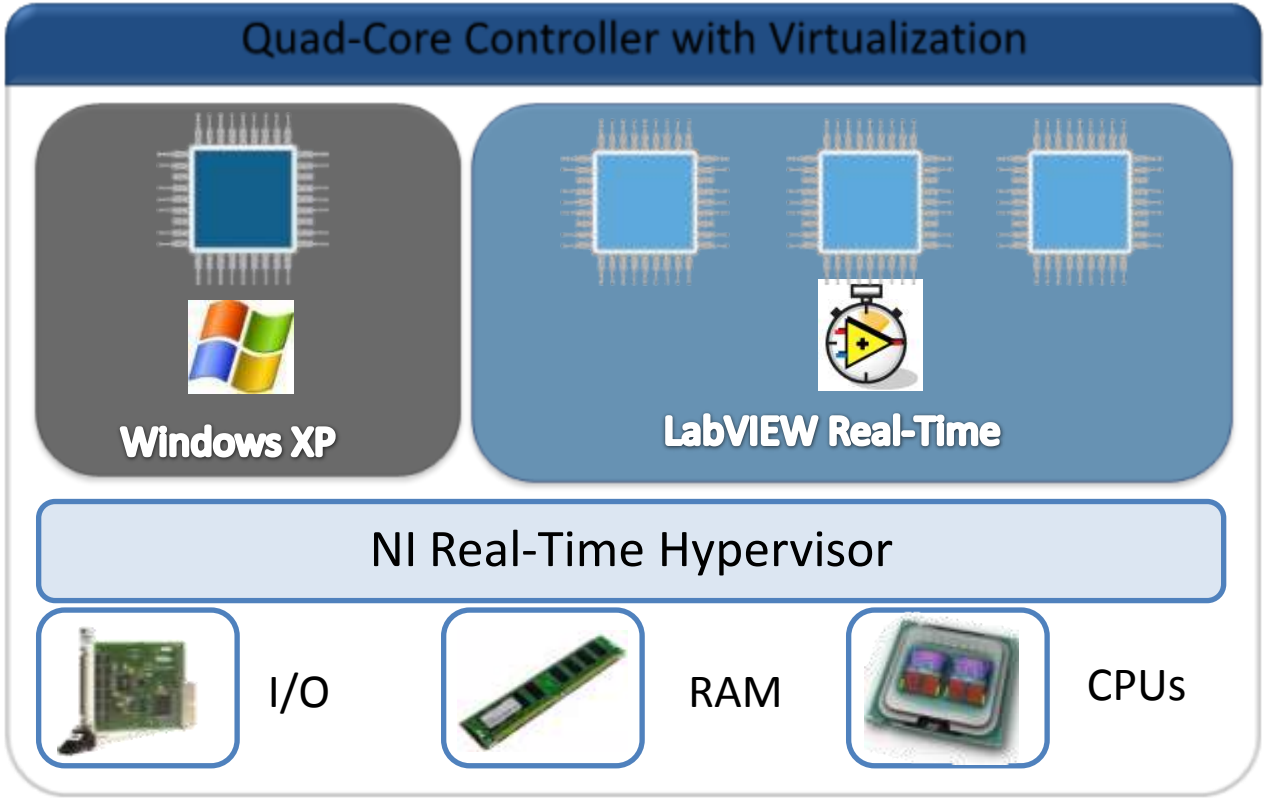
Evolution of Multicore



NATIONAL INSTRUMENTS

NI Real-Time Hypervisor

Run LabVIEW RealTime and Windows XP simultaneously



Available on multicore PXI and industrial controllers

NATIONAL INSTRUMENTS

Do More

[Data Acquisition]

20 Years | NI Data Acquisition

NuBus

1988

PCI

1989

ISA

1995

E Series

1996

PXI

1998

R Series

2003

M Series

2004

USB

PCI Express

2005

PXI Express

NI CompactDAQ

2006

NI Wi-Fi DAQ

Ethernet DAQ

2008

NATIONAL INSTRUMENTS

New Products | NI CompactDAQ

- Three AI timing engines
- Built-in BNC triggers
- Four counters
- Locking USB cable
- 9 to 30 VDC power
- Four-slot option

New Products | NI X Series Multifunction DAQ

16 PCI Express and PXI Express devices

Enhanced NI-STC3

- 4 enhanced counters
- 100 MHz timebase
- Independent analog/digital timing engines

Higher throughput and lower latency

- Native x1 PCI/PXI Express interface
- 8 DMA channels for parallel data stream

NATIONAL INSTRUMENTS

X Series Data Acquisition Demo

Pelle Steen

Introducing | SC Express

High Channel Count DAQ Systems

1 Increased Accuracy

- Up to 24-bit resolution
- Delta-Sigma A/D converters
- Anti-aliasing filters per channel

2 High Bandwidth

- PCI Express - Dedicated bandwidth/device
- Dynamic strain measurements
- ADC per channel

3 Best-in-Class Synchronization

- 100 MHz reference clock built-in chassis
- ns synchronization with DAQmx Multi-Device
- Automatic synchronization with DSA & X Series

4 Easy to Use

- Same DAQmx driver as DAQ & DSA
- New Bridge Channel Type in DAQmx
- Modules & Terminal Blocks auto-recognized

NATIONAL INSTRUMENTS

Do More

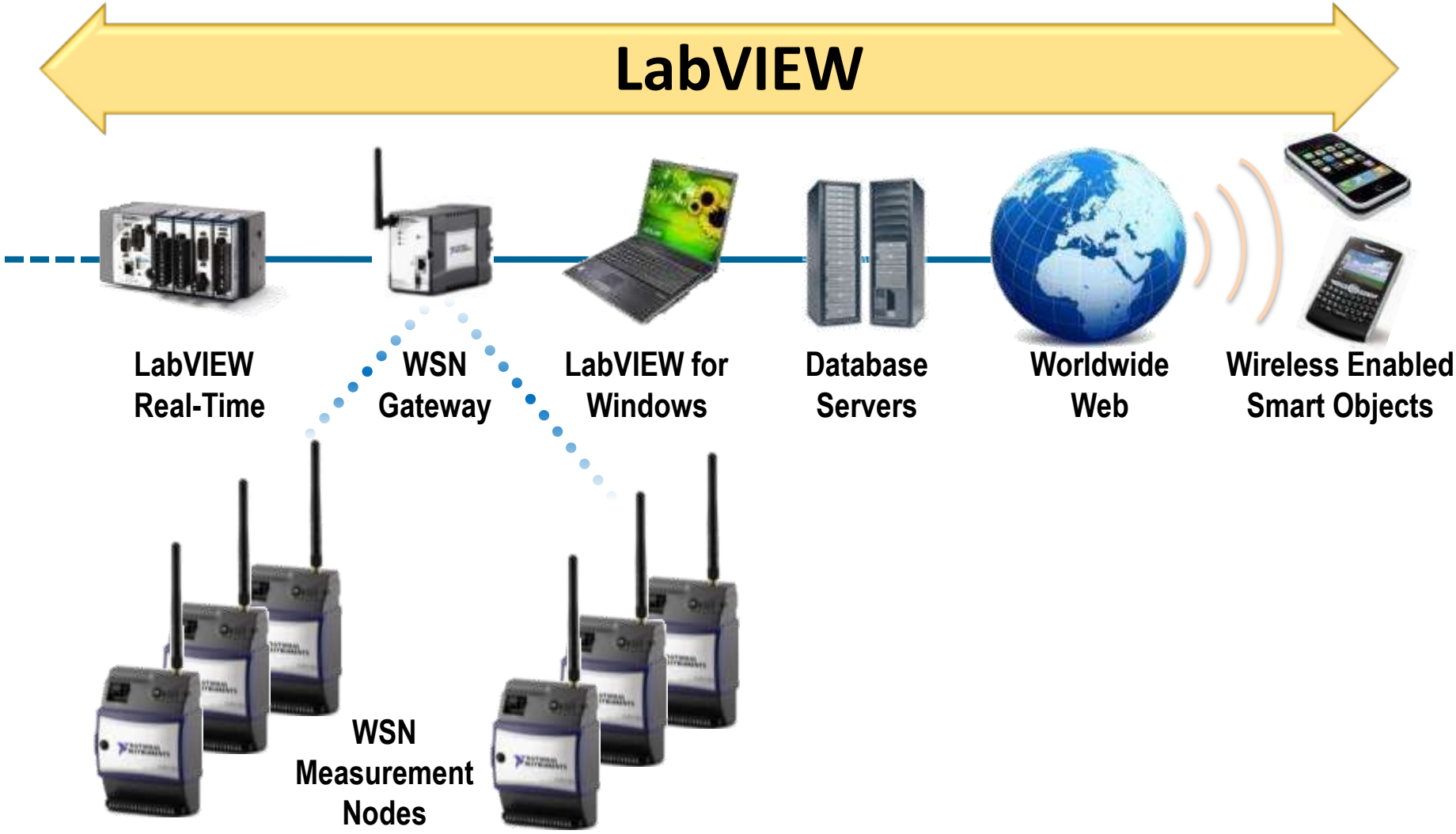
[Wireless Measurements]

NI Wireless Sensor Networks

Low Power. Reliable.

- 16-bit voltage input node
- 24-bit thermocouple node
- Up to 3-year battery life
- 2.4 GHz, IEEE 802.15.4 radio
- Programmable nodes

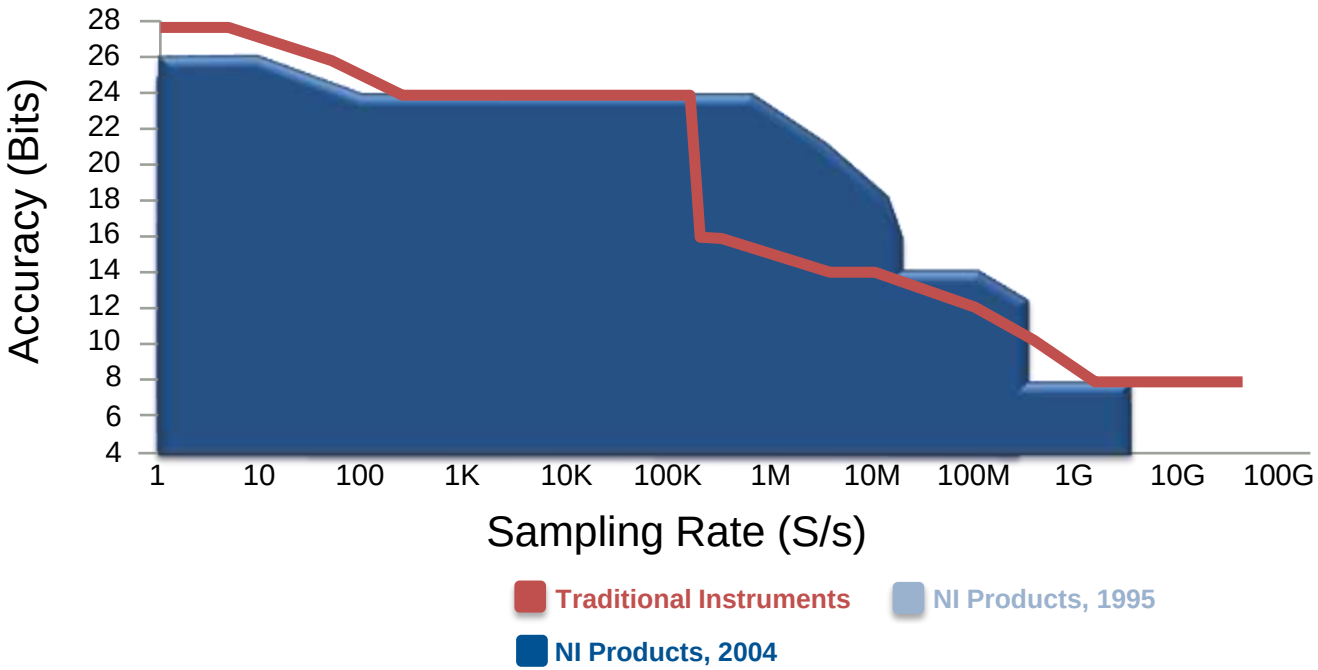
WSN System Architecture



Do More

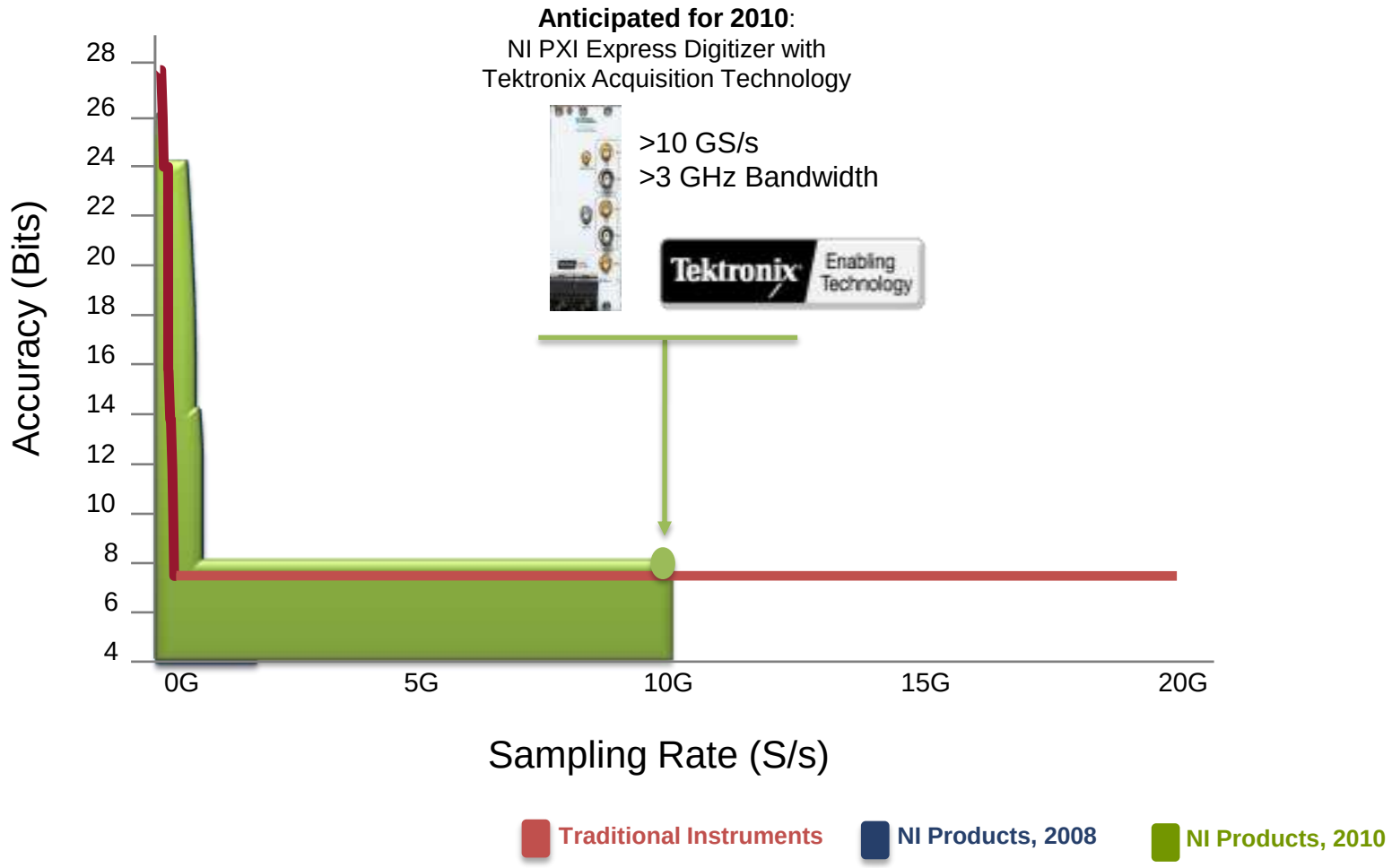
[Automated test]

Expanding Measurement Capabilities

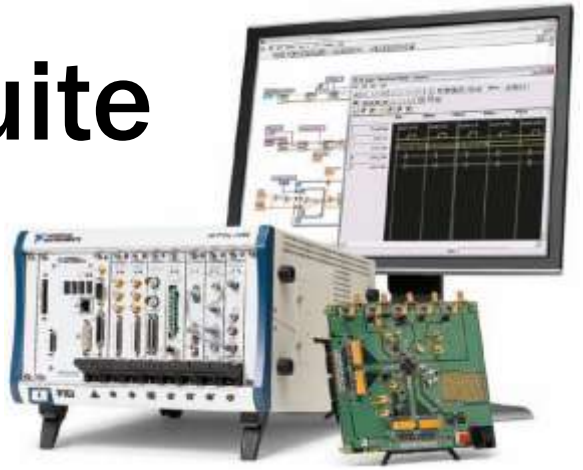


NATIONAL INSTRUMENTS

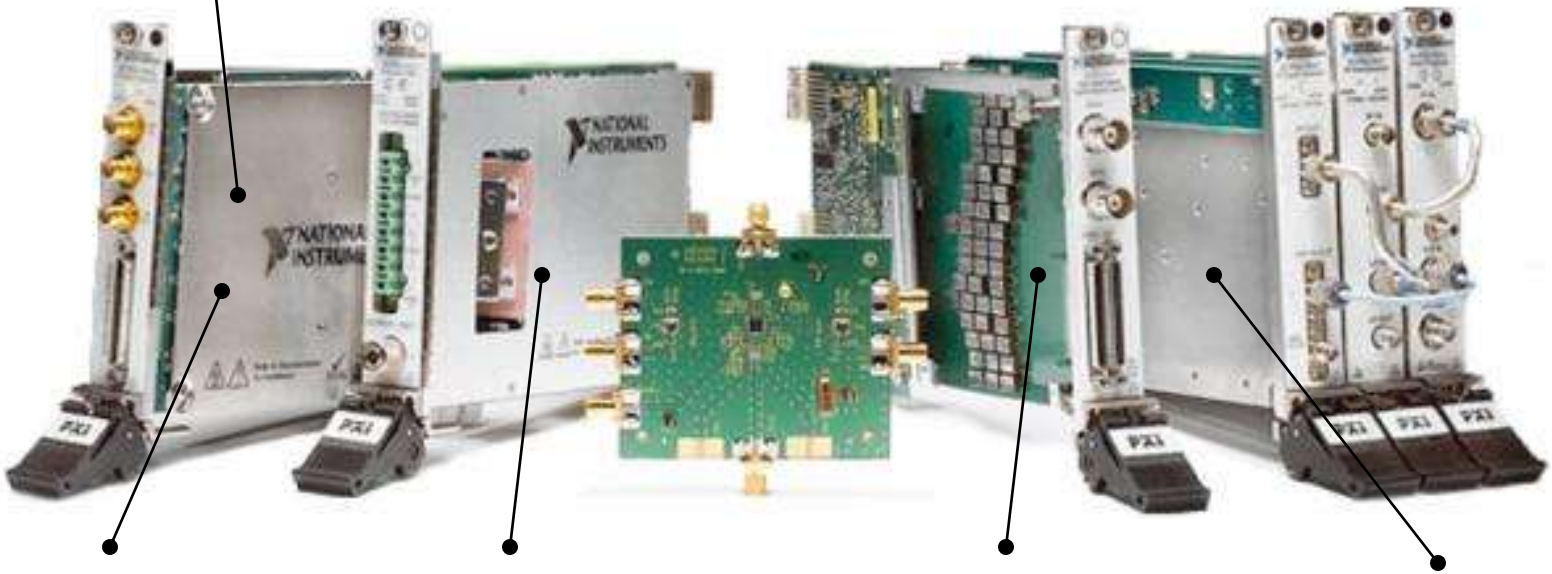
Expanding Measurement Capabilities



NI PXI Semiconductor Suite



WGL/STIL Importing Software



High-Speed Digital I/O

Source Measure Unit

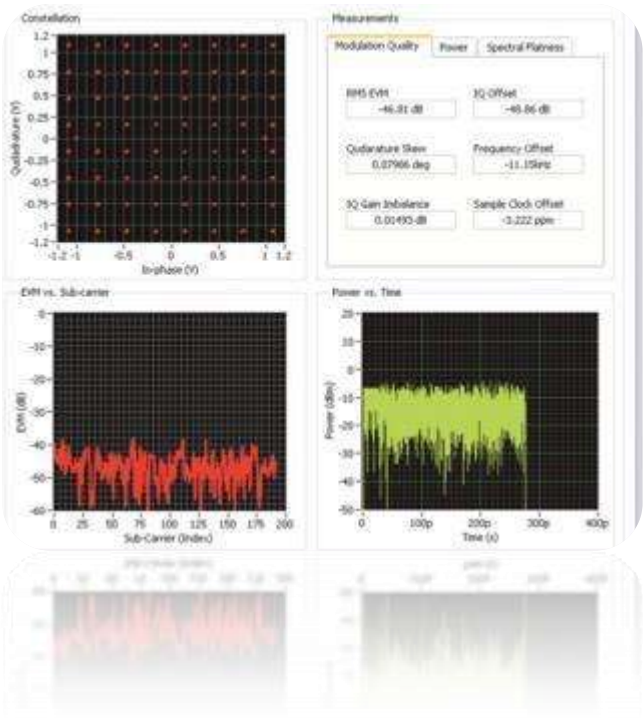
High-Speed Signal Insertion Switch

RF 6.6 GHz VSA/VSG

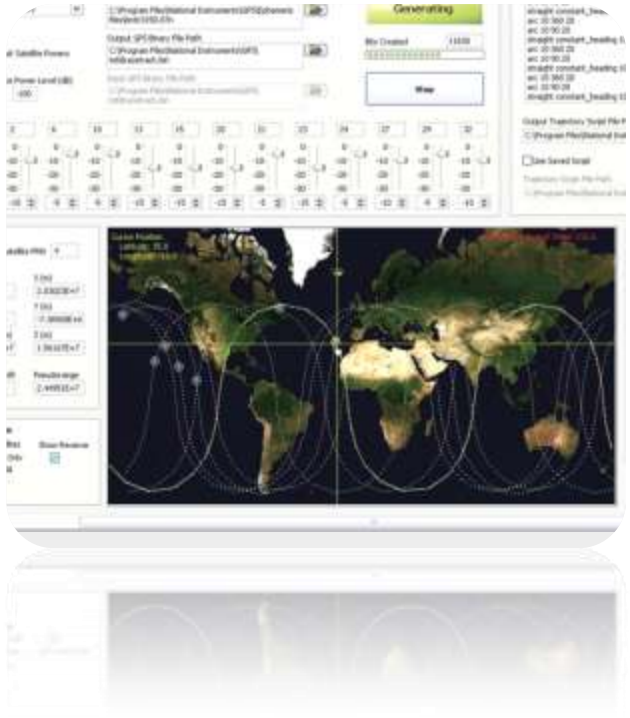
NATIONAL INSTRUMENTS

New RF Toolkits | LabVIEW and LabWindows™/CVI

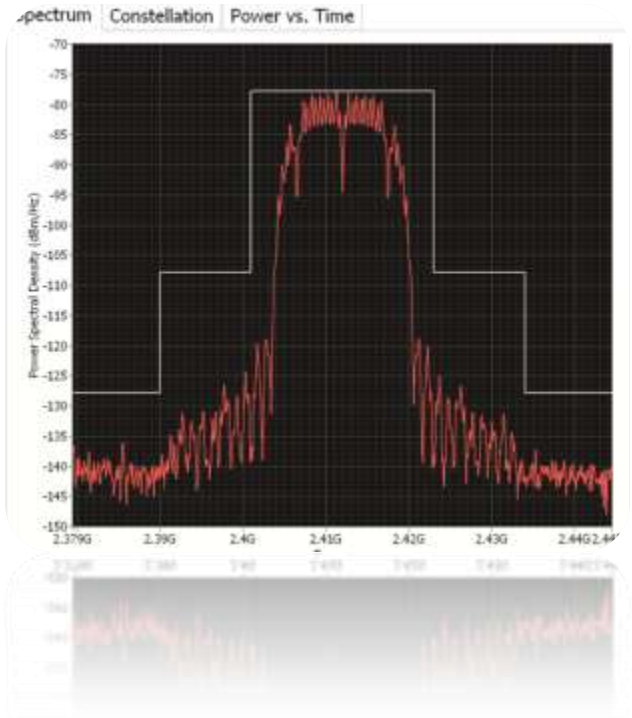
WLAN Toolkit



GPS Simulation Toolkit



WiMAX Toolkit



The mark LabWindows is used under a license from Microsoft Corporation. Other product and company names listed are trademarks or trade names of their respective companies.

NATIONAL INSTRUMENTS

NI FlexRIO | Reconfigurable FPGAs for Test

Announced November 2008

Announced February 2010

NI PXI-795x PCI-based FlexRIO FPGA Modules

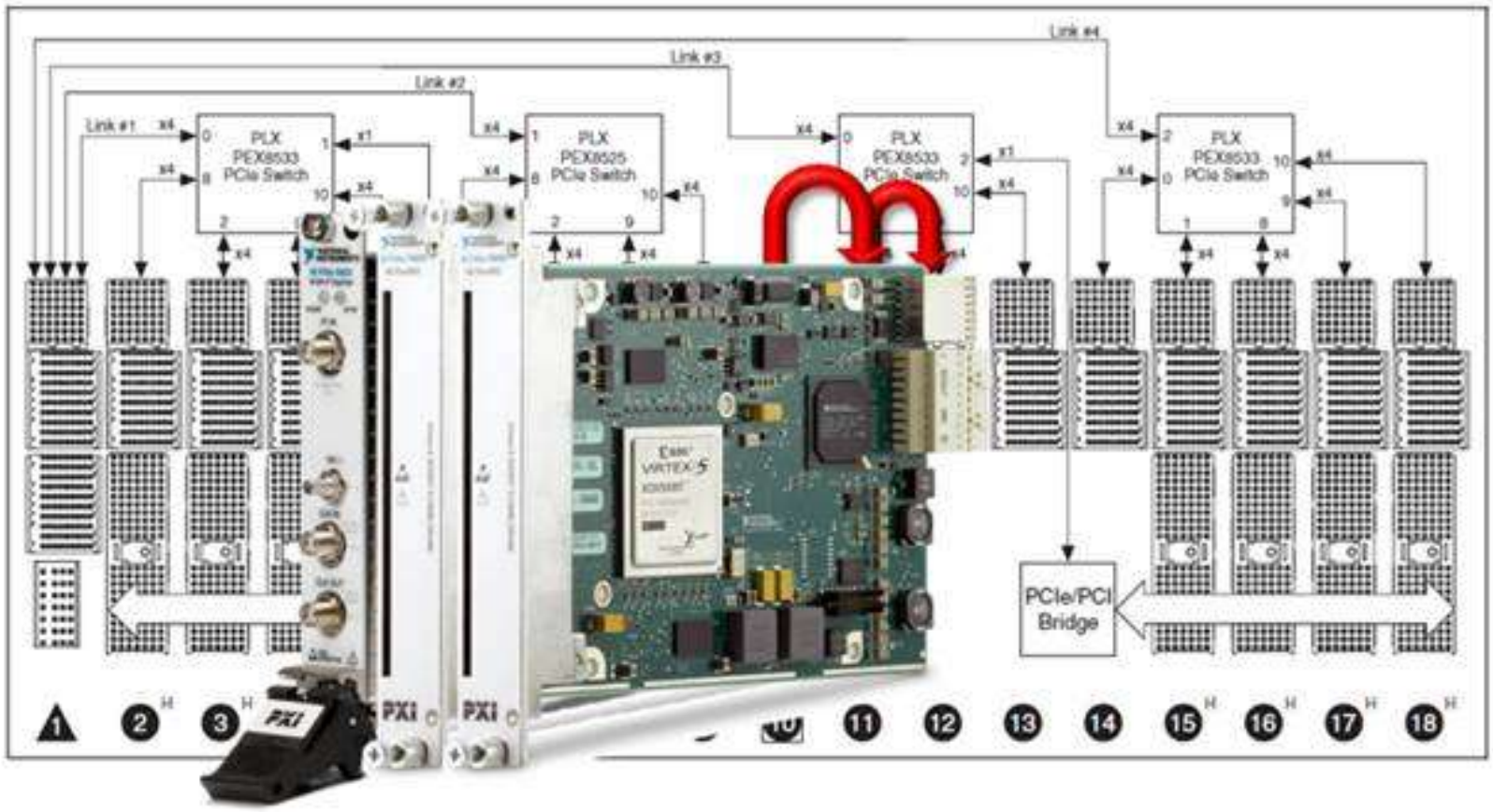
- Virtex-5 **LX** Series FPGAs
- **128 MB** onboard DRAM

NI PXIe-796x PCI Express-based FlexRIO Modules

- Virtex-5 **SXT** Series FPGAs
- **512 MB** onboard DRAM
- **Co-processing** for other instruments

NATIONAL INSTRUMENTS

PCI Express Streaming | Traditional NI Model



Peer-to-Peer Streaming demo

René Voorhorst & Pelle Steen

NI FlexRIO | New Adapter Modules for Test

NI 5752 32-Channel Digitizer Adapter module

Optimized for nondestructive test and ultrasound applications:

- 50 MS/s with 12-bit resolution on all channels
- 100 Ω differential inputs
- AC coupling
- Selectable antialias filters
- Programmable time-variable gain control

NI 5781 Baseband Transceiver Adaptor Module

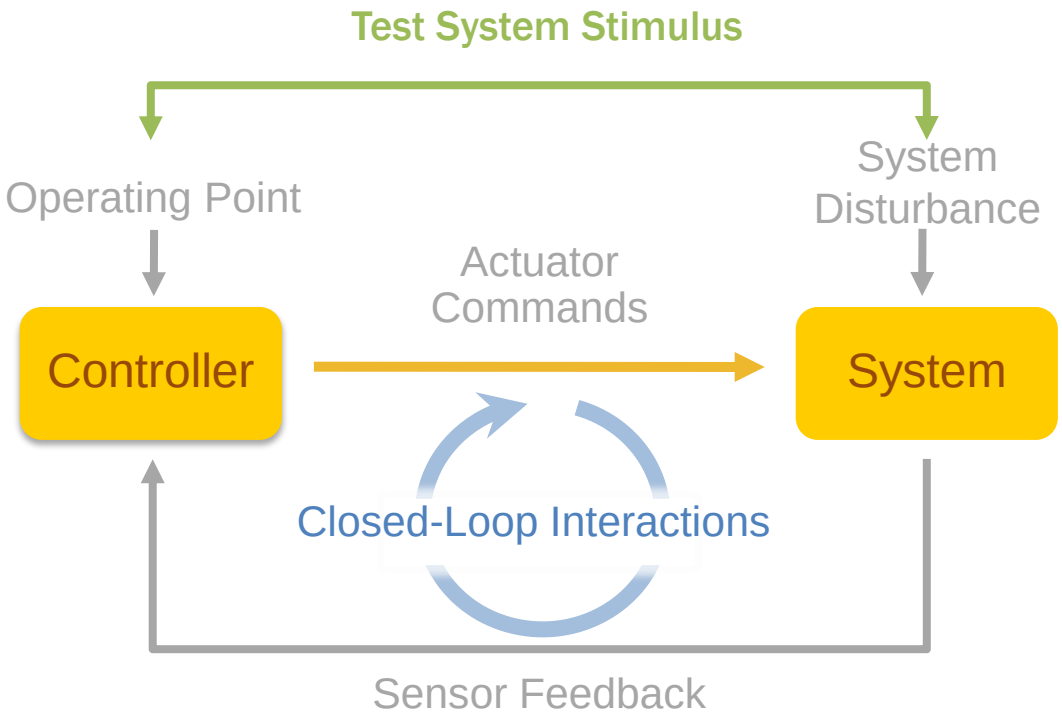
Implement custom RF modulation and demodulation, channel emulation, bit error rate testing, or spectral monitoring and jamming.

- Two 100 MS/s, 14-bit, differential, DC-coupled inputs and outputs (outputs 16-bit)
- 40 MHz bandwidth (-3 dB)

Do More

[Real-Time Test]

Real-Time Testing and Simulation

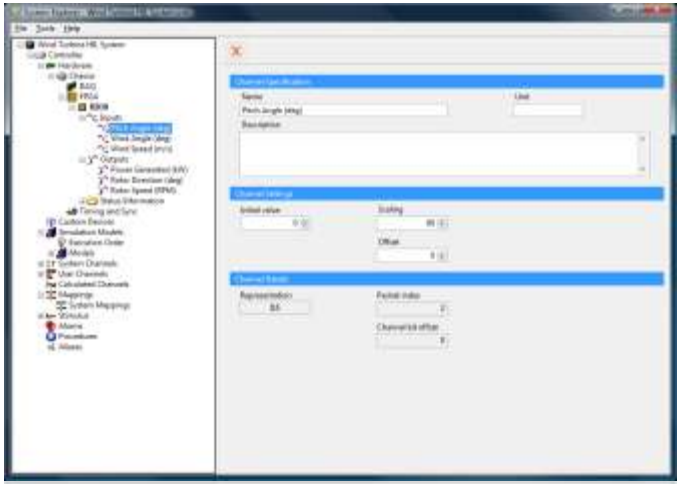


NATIONAL INSTRUMENTS

NI VeriStand

Real-Time Testing and Simulation Software

- Hardware I/O
- Models
- Stimulus Profiles
- Data Logging
- Calculated Channels
- Alarming



Ready to configure and use

NATIONAL INSTRUMENTS

VeriStand demo

Jimmie Adolph

Do More

[Embedded Control]

NI RIO Technology Platform

Processor

- Enet
- USB
- RTOS
- Analysis
- Control
- Logging
- Comm

FPGA

- Analysis IP
- Control IP
- Timing IP
- Comm IP
- IPNet
- 3rd party IP

I/O

- Analog I/O
- Digital I/O
- Comm I/O
- Motion I/O
- 3rd party I/O

NATIONAL INSTRUMENTS LabVIEW™

NI RIO Hardware

Packaged

Board-Level

CompactRIO Evolution | Hardware & Software

cRIO 9023 and cRIO 9025

New Rugged Performance RT Controllers

cRIO 911x

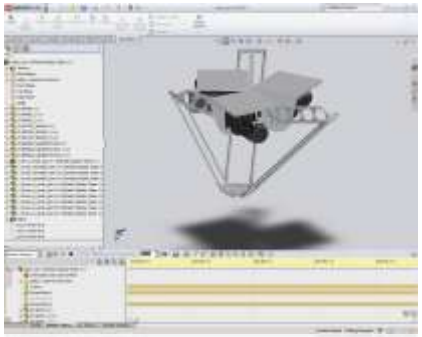
Virtex-5 LX family CompactRIO Reconfigurable Chassis

- Real Time Mathscript
- Vision Capabilities
- File I/O througput
- Model execution
- Math IP Fixed point
- Signal Processing and measurements
- MXI-Express RIO for high channel count

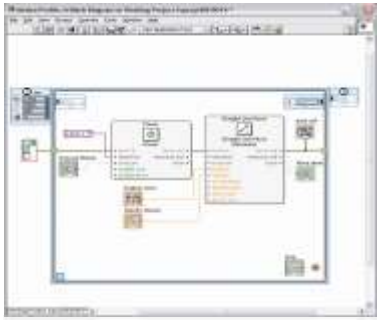
NATIONAL INSTRUMENTS

NATIONAL INSTRUMENTS LabVIEW 2009

CompactRIO Motion Control



New LabVIEW
SolidWorks Interface
Simplified digital prototyping



New LabVIEW
NI SoftMotion Module
Simplified motion

New C Series Drive
Interface Modules
Servo drives | Stepper drives

SolidWorks

NATIONAL INSTRUMENTS

NATIONAL INSTRUMENTS

Delta Robot Demo

David Ek

Do More

[Robotics]

LabVIEW and Robotics World

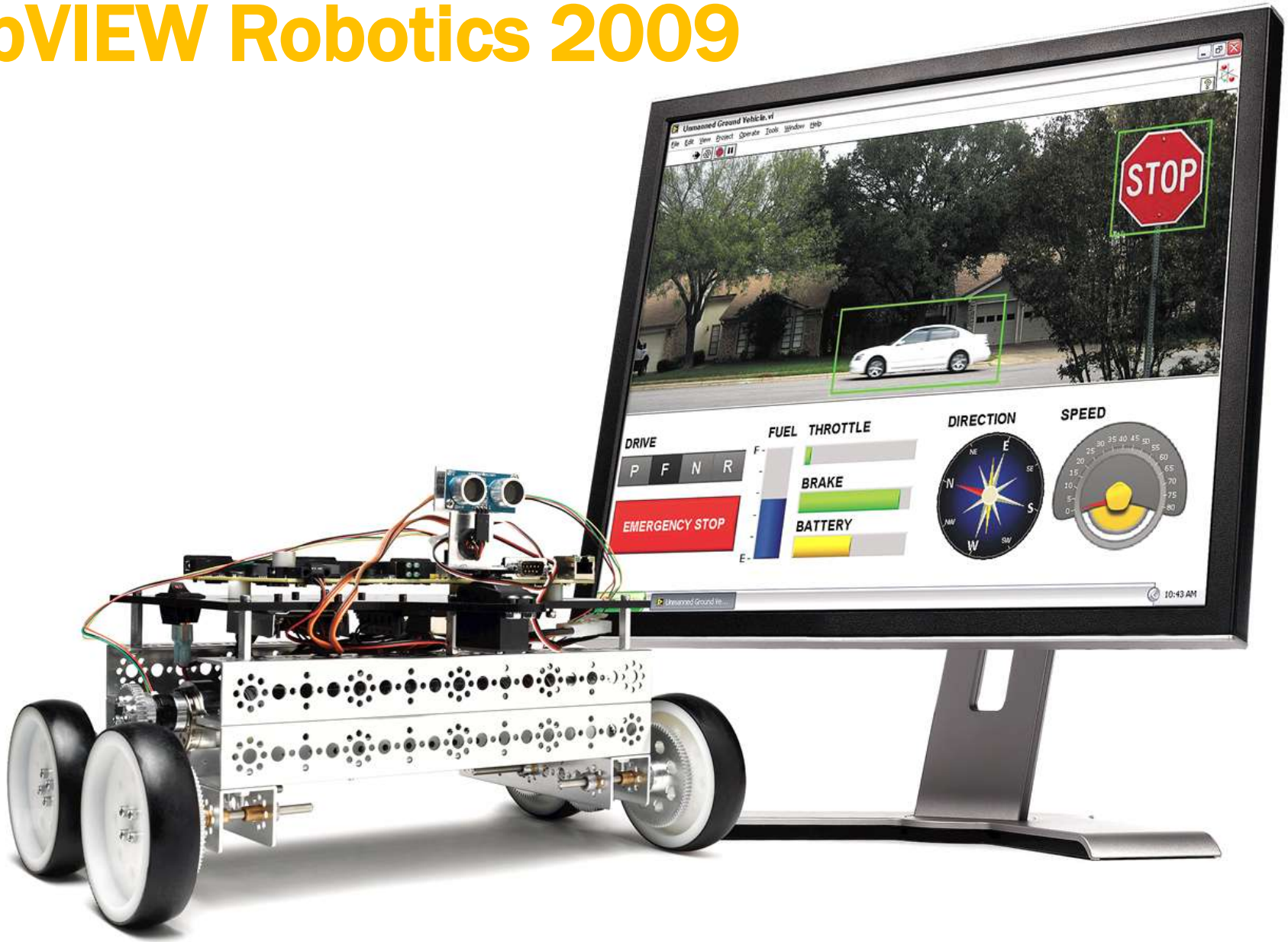
LabVIEW Robotics 2009

LEGO® MINDSTORMS®
NXT LabVIEW Module

ImagingLab Library
for DENSO

NATIONAL INSTRUMENTS

LabVIEW Robotics 2009



Advanced Robotics Applications

- **Pick & Place**

Assembly
Lab Automation
Flexible Manufacturing

- **Test**

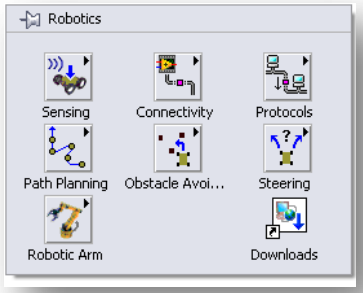
Automated Test
Visual Inspection
Multiple Measurements

- **Material Work**

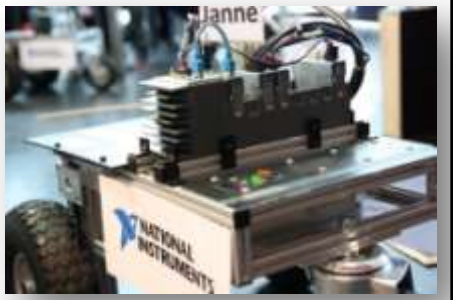
Polishing
Deburring
Machining

LabVIEW Robotics Key Offerings

IP for navigation, steering, kinematics and more

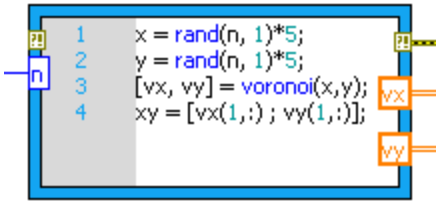


Deployment to Real-Time and FPGA hardware

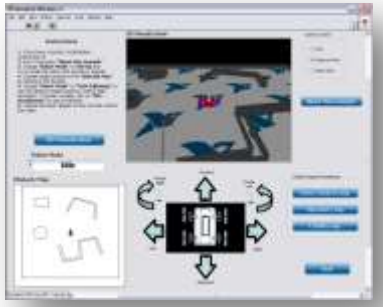


NATIONAL INSTRUMENTS
LabVIEW™

Tools for integrating **text-based algorithms**



Examples of real-world applications



Delivering Innovation Together

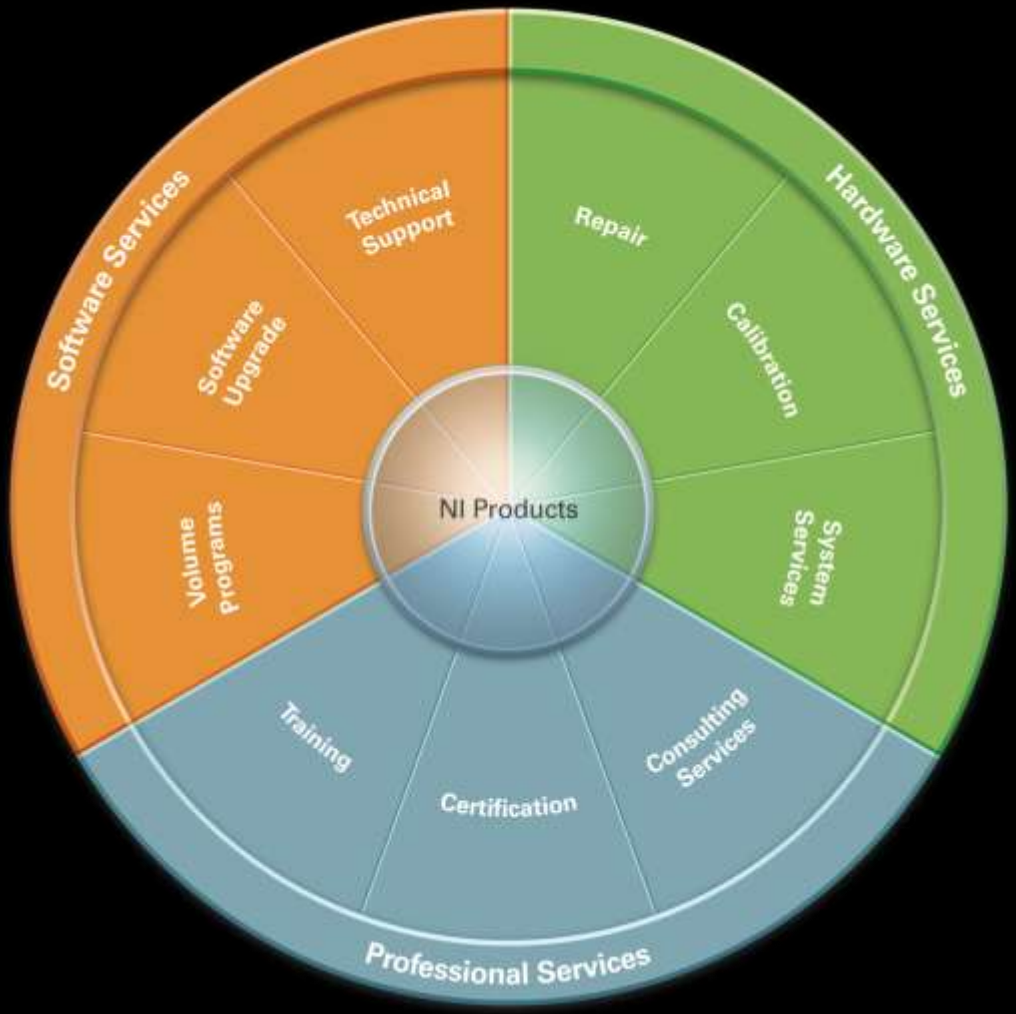
Your Domain Knowledge

and

Graphical System Design
Tools of Innovation

DESIGN → PROTOTYPE → DEPLOY

Ensuring Complete System Success



Do More

[with Graphical System Design]

Graphical System Design Awards

Christine Nilsson
&
Mats Hanson

Professor Mechatronics and
Director KTH Learning Lab

NIDays
WORLDWIDE GRAPHICAL SYSTEM DESIGN
CONFERENCE

Graphical System Design
ACHIEVEMENT AWARDS

Title	Author(s)
Designing an acoustic spectrometry instrument	Felix Törner, Acosense AB
CompactRIO used for Control and Measurements in the Low Voltage Marine Substation at the Lysekil Wave Power Research Site	O. Svensson, Uppsala University
Standalone Operation of "Oldie but a Goodie" Hardware, with Newly Developed Labview Program and Data Acquisition System, for Atmospheric Measurements at Remote and Harsh Locations.	Staffan Sjogren, Maria Berghof & Göran Frank, Div. of Nuclear Physics, Lund University
Developing a State-of-the-Art Diesel Exhaust Measurement Platform with CompactRIO and LabVIEW	Rune Berge, Rowaco AB
Internal Combustion Engine Mode Switch Control Using LabVIEW Real-Time and FPGA	Patrick Borgqvist, Lund University

NIDays
WORLDWIDE GRAPHICAL SYSTEM DESIGN
CONFERENCE

Graphical System Design
ACHIEVEMENT AWARDS

Title	Author(s)
Automated Vision Interpretation	Dan Olsson & Ulf Jonsson, Infotiv AB
Using the NI PXI-platform to achieve high resolution in dolphin sonar recordings	Josefin Starkhammar, Lund University
Test Laboratory Supervision System	Anders Olofsson, Cool Engineering AB
A Configuration Driven Approach for LabVIEW Development - A Volvo CE Case Study	Jan Klasson & Helena Dimitriou, Symbio
An online workbench for electrical experiments using LabVIEW and PXI instruments	Ingvar Gustavsson, Blekinge Institute of Technology

Winner Swedish GSD Awards 2010

Author:

Patrick Borgqvist,

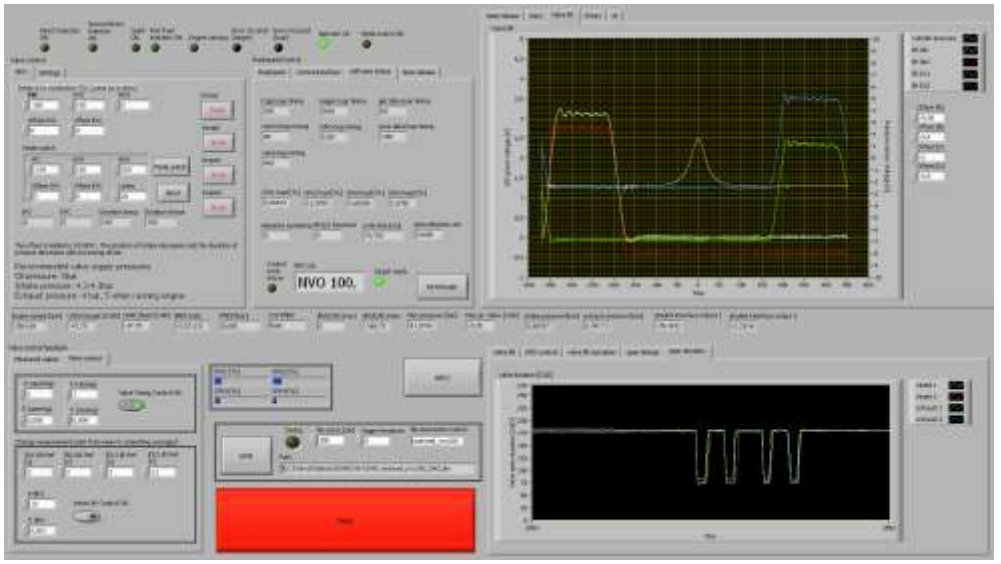
- Department of Energy Science
- Lund University

Title:

Internal Combustion Engine Mode Switch Control Using LabVIEW Real-Time and FPGA

Case Study
- Internal Combustion Engine Mode Switch Control -

- PhD student Patrick Borgqvist, Department of Energy Sciences, Lund University



- Decreased fuel consumption through mixed combustion modes utilizing Cargine fully flexible pneumatic valve train

- Utilizing LabVIEW Real-Time and LabVIEW FPGA on a PXI-8110

LabVIEW Control System - Design

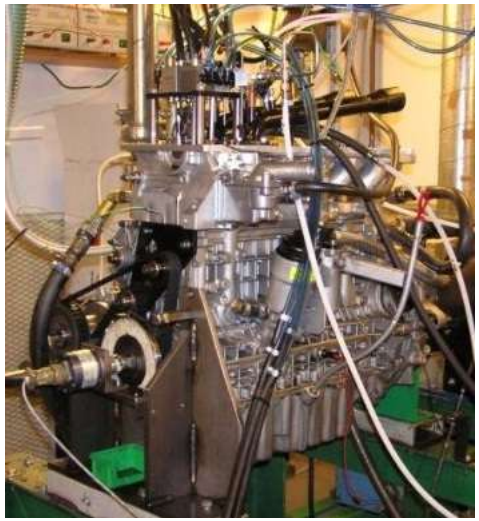
TCPIP

Host PC

Target PC

- Data acquisition
- Real-time data analysis
- Real-time control (*combustion timing, load, valve timings…*)

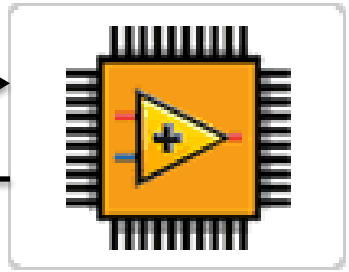
- Monitoring (*in-cylinder pressure trace, combustion timing, valve lift curves, temperatures…)*
- Send control commands over TCPIP



Single Cylinder Volvo D5 Research Engine

•In-cylinder pressure trace
•Valve lift Curves @ 1800pulses/rev (1000rpm = 30kHz)

Actuator commands



FPGA

- Cycle resolved programmable sampling
- Programmable actuator logic

LabVIEW Control System – Benefits

Flexible

- New control tasks are easily added to the real-time target using timed loops executing in parallel

Complicated Tasks Made Easy

- m-files executed in real-time
- Hardware and sampling tasks are easily reprogrammed using LabVIEW FPGA

Multi-Tasking

- Previously used control system distributed over different applications and PCs have been successfully merged into a single LabVIEW project

Partner Introductions

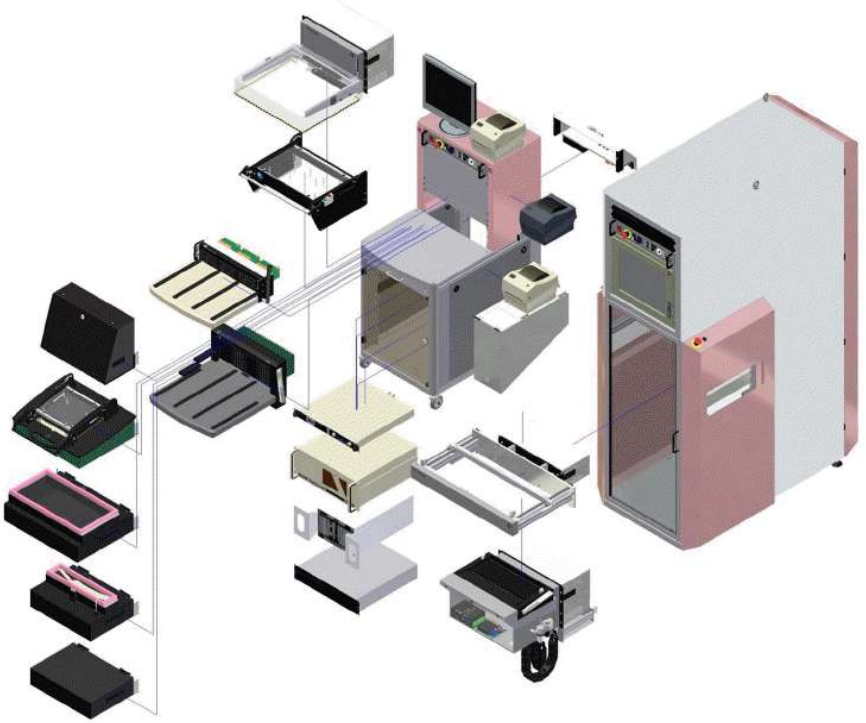
COLUMBIA

Your Partners in True-
Flexible, Reliable, Modular,
Re-usable Test Solutions &
Mass Interconnect Systems.

NI – Partner presentation
15h00 – Track 3

6TL´s true modular test systems save money and time

By 6TL Engineering and SA Sistel



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CIM Industrial
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THE ART OF TESTING

member of Etteplan

- **Cool Engineering**'s business idea is to offer services regarding testing, mainly for the automotive industry.

- We **are specialised in climate testing,** simulation, evaluation, analysing and presenting the results. We are able to execute tests in our **in house laboratory** or in our contractor's test-rigs: Heat- and cooling performance, battery cooling and pressure-drop performance.

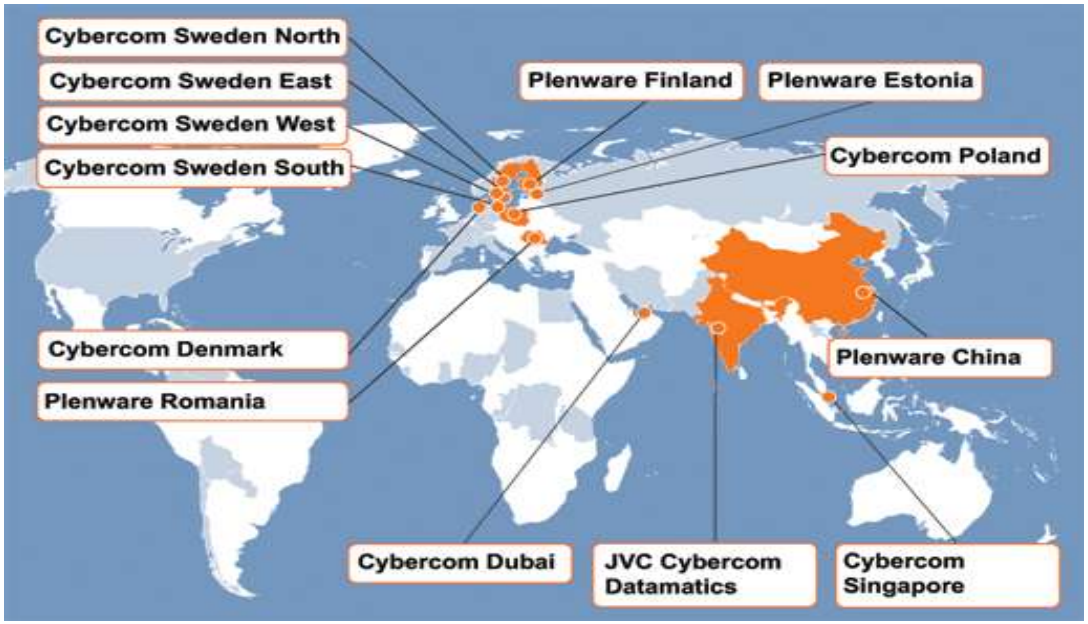
- We also perform **engine tests in our own engine test rig**, such as aging of catalysers and engine performance.

- Cool Engineering develops and markets our own test equipments.
Our company possesses the expertise in areas such as mechanical design, electrical design, software programming.

- We deliver "turn key equipment" with the right quality, delivered at the right time.
Cool Engineering develops software for data acquisition systems in a LabView™ based user interface. Cool Engineering is an Alliance Partner of National Instruments.

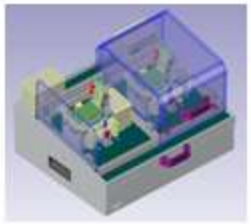
- We also offers: **Consultancy assignments** regarding testing, verification, design and simulations of climate comfort, engine optimization and **systems for electrical and hybrid vehicles**.

Cybercom – “Local presence Global reach”



- **Cybercom is a high-tech IT consultancy with global delivery capability for turnkey solutions as well as specialist competence**
- **Well established within: Telecom, Industry, Media, Bank & Finance, Retail, Public**
- **2000 employees with 24 offices in 10 countries mainly within Europe and Asia**
- **Long experience in Test Methods and Testsystem Design**

DSE
TEST SOLUTIONS



DSE Test Solutions – when test really matters....

GOPEL electronic
Intelligent Boundary Scan Solutions
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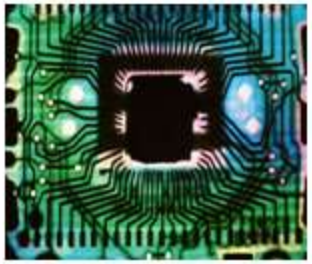
TDFrame®

Business Case

- Project management
- Audits
- Mentorship
- Pre-studies
- Roadmaps

System Architecture



- System Architecture HW & SW
- Platform Architecture
- Usability

Development

- Embedded design & implementation SW
- Embedded Design HW
- FPGA design
- Communication Design

Test & Validation

Test System Design

- Test and Verification
- Test Process Design
- Test Management

Support & Maintenance

- Trouble Report Handling
- New requirement implementation
- Cost Reduction HW
- CM

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