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NI ELVIS & LabVIEW
Creative Thinking
in
Engineering Education

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ROMANIA
and some pictures
INTRODUCTION

This paper presents some results in the field of:

Virtual Instrumentation & Creativity
LabVIEW & NI ELVIS II

Developed at the:

Creativity Laboratory
Center for Valorization and Transfer of Competence
University “Transylvania” of Brasov – Romania.
Introduction about Creativity

Common Webster's definition: Creativity is marked by the ability or power to create, to bring into existence, to invest with a new form, to produce through imaginative skill, to make or bring into existence something new.
• We do not discuss “creativity” but we like to use the 5WH1 analysis (Prasad 1996)

**WHAT** Engineering Education

**WHO** Schools & Universities

**WHY** We need creative engineers

**WHEN** Life Long Learning LLL

**WHERE** Locally and/or Remotely

**HOW** ...NI ELVIS II & LabVIEW...
WHAT: ENGINEERING EDUCATION

Educational resources

Reference material

Hardware

Software and connectivity support

Easy Graphical Programming LabVIEW

NI ELVIS II and RECONFIGURABLE HARDWARE
University “TRANSILVANIA” of BRASOV
CENTER FOR VALORIZARTION AND TRANSFER OF COMPETENCE
CREATIVITY LABORATORY
Teach people to use right equipment for the right job!!!
Creativity Laboratory

- LabVIEW 2009 (CAMPUS LICENSEE)
- NI ELVIS II and/or NI ELVIS II PLUS
- Some DAQ systems
- EMONA (DATEX – FOTEX – SOLAR)
- CVTC (SolarLAB)
- STUDENTS
- TEACHERS
- Many many hours together!
Students Creativity

• The students gift called creativity can be stimulated but not be imposed

• LabVIEW+NI ELVIS II is one of the very new technologies dedicated to stimulate creativity.
WHY:
WE NEED - CREATIVE ENGINEERS
WHEN:
LIFE LONG LEARNING
WHERE:
UNIVERSITY, INDUSTRY etc.
HOW:
Using NI ELVIS II, DAQ and LabVIEW
FIRST WE START

WITH SIMULATIONS
OLD fashioned LABS
NI ELVIS transformed
LabVIEW 2009
EASY DISTANCE CONTROL

Solar Cell Laboratories IV - With Distance

The IV-With Distance allows the rising of the I-V Characteristics for a solar cell for different illumination levels. The illumination levels are modified by the various distances between the solar cell and the light source.

For connecting press right click on the mouse and select the 'request control'. Then run the application, set-up the parameters and press 'Start' button.
GRAPHICAL FPGA PROGRAMMING

- Digital Electronics FPGA Board in NI-ELVIS mode mounted on the NI-ELVIS II platform and connected to PC via USB cable.

- Digital Electronics FPGA Board in stand-alone mode connected to PC via USB cable, and powered from +15VDC power adapter.
The Digital Electronics FPGA Board Components and Features are:

Xilinx XC3S500E Spartan-3E FPGA
- Up to 232 user-I/O pins, 320-pin FBGA package
- Over 10,000 logic cells
- 4 Mbit Platform Flash configuration PROM
- 16 Mbits of SPI serial Flash (STMicro) for FPGA configuration storage
- On-board USB-based FPGA/CPLD download/debug interface
- 50 MHz clock oscillator
- 6 Digilent 12-pin expansion connectors (PMOD)
- 4-ch, SPI-based DAC (Digital-to-Analog Converter)
- 2-ch, SPI-based ADC (Analog-to-Digital Converter)
- 2-digit 7-segment LED display
- Rotary-encoder with push-button shaft
- Eight discrete LEDs
- Eight slide switches
- Four push-buttons

FPGA Breadboard Area
NI-Elvis Breadboard Area
General Purpose Breadboard Area
NI-ELVIS connector interface
DC MOTOR CONTROL using DIGILENT module
SPECIAL APPLICATIONS

• Master of MELOTERAPY
• Course of MEDICAL ACOUSTICS
Fig. 5. The testing LabVIEW application
(a) The interface of the main application; (b) The Panel of the “Hysteresis” module
(c) The Panel of the “Induction” module; (c) The Panel of the “Contact resistance” module
AERONAUTICS
HELIICOPTER WEIGHTING SYSTEM

[Image of helicopter weighting system interface with readings 0.00 in each channel and total mass 0.00]
CONTROLED HEATING SYSTEM
Monitor | Interrogation

IDNum (-1)
1

Repeated
Time [min]
0.5

Trust Range
0.001

Start Time
06:00:00

Final Time
21:00:00

Visualisation

Observations

Parametri

date string
6/22/2006

date/time string
13:08:50

Tens Cel Mob
0.32788

Tens Cel Fix
0.09863

Tens Senz E-V
-0.00632

Tens Senz N-S
0.00045

Temp
28.118

Humidity
42.5828

Nr. pasi N-S
682

Nr. pasi E-V
0

Cell

Temperature & Humidity

Plot 0

Temperature

Amplitude

Image

STOP
FOR NEW PEOPLE
WE NEED
NEW TECHNOLOGY
Homo Zappiens

Being in control of information flows
Remote Control

- Web CAM
- Real and/or Virtual Instruments
- A good software component
- Remote control
- Remote experiment
MOBILE TECHNOLOGIES

Pregnant women

Training and monitoring

(a) Application interface on a PDA
(b) Server interface for on-line communication
(c) PDA interface for on-line communication
Client – Server
(application using shared variables)

- The application allows the bidirectional data transfer CLIENT ↔ SERVER
- The client sends the data for configuration of the measurement system
- The server application configure the system and perform the measurements.
- The obtained results will be transmitted to the client, closing the communication cycle.
Server Interface and Diagram
(using shared variable)
PDA Interface and Diagram (using shared variable)

Based on the LabVIEW PDA module
PDA – PC – FPGA
NI ELVIS
• Simple Remote Controlled Experiment
• Using a simple TCP-IP protocol
• Client – Server application
• LabVIEW implementation
• Using a PDA Client
PDA AJAX INTERFACE
Conclusions

• Evaluation, creation and innovation have the basis in the educational environment, not only from the university area but also in the case of enterprises: Lifelong Learning (LLL)

• Because the knowledge quantity increase more rapid than people capacity of understanding, oriented creative thinking and knowledge transfer will increase in importance

• DE FPGA combine NI-ELVIS capabilities with the programming and routing capabilities of FPGA

• It is clear for us and for many scientists that engineering education without: hands-on and remote experiment will be impossible in short time.
NI ELVIS II

da real “music”
“from the past” to “the future”
in engineering education!