Embedded Vision Systémy
- využití ve výuce a v průmyslu

Radim ŠTEFAN

NI Embedded Vision

NI Smart Cameras

NI CVS – Compact Vision System

NI EVS – Embedded Vision System

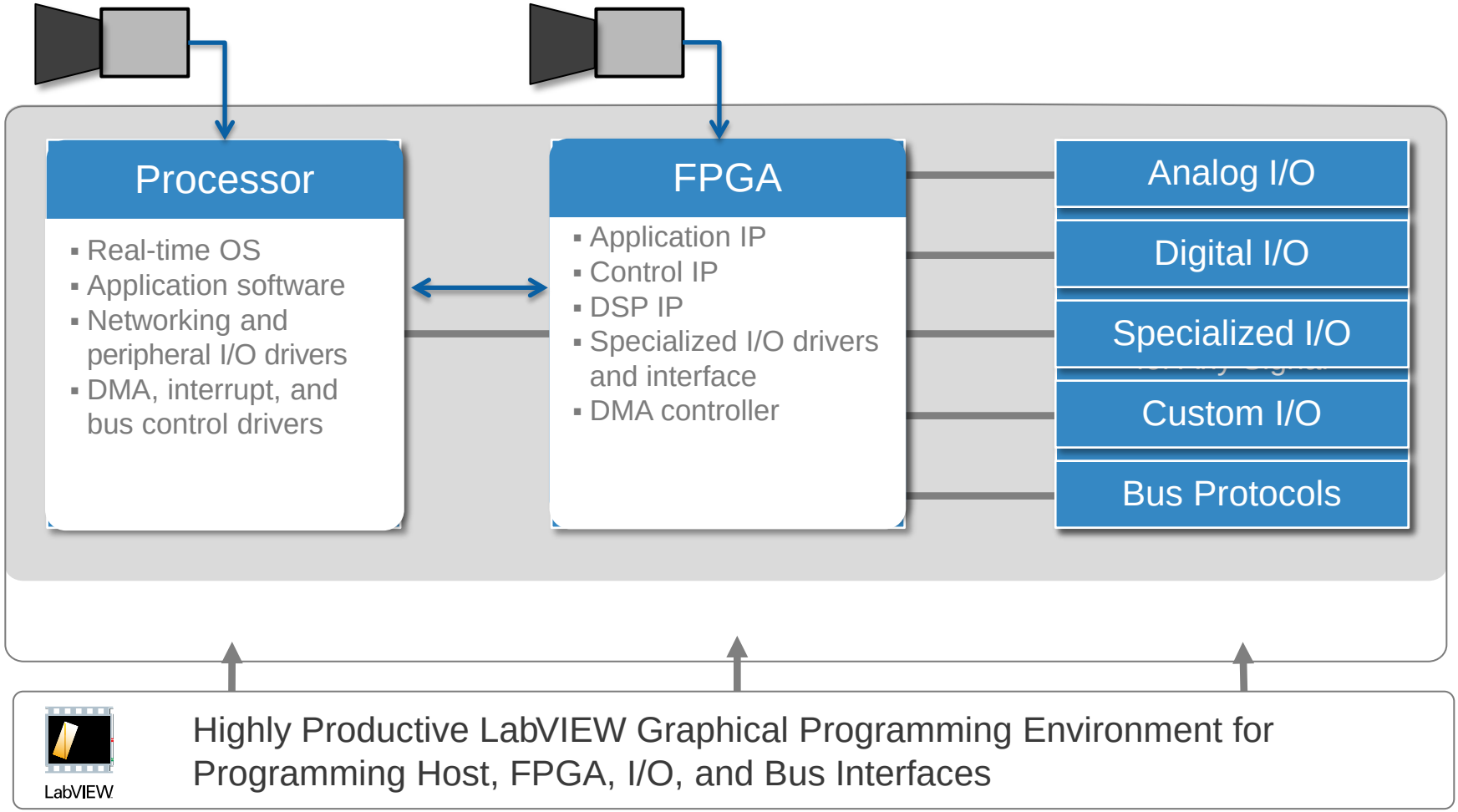
NI Embedded Vision - continued

NI CompactRIO and CompactDAQ controllers

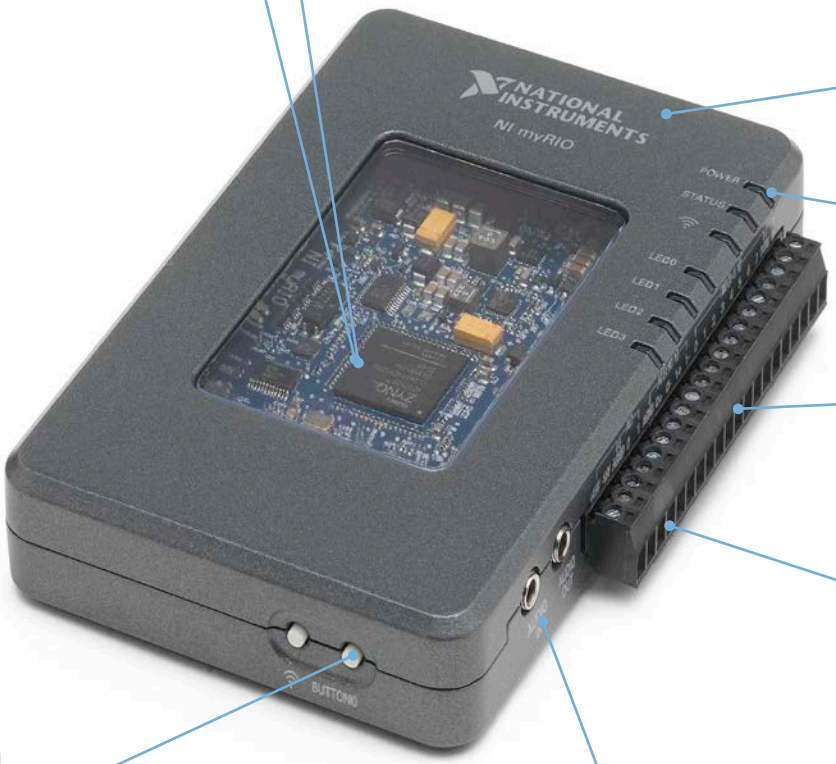
NI PXI

NATIONAL INSTRUMENTS

RIO Architecture for Embedded



NI myRIO



Xilinx Zynq FPGA and dual-core ARM Cortex-A9

Onboard 3-axis accelerometer

Integrated WiFi

User defined LEDs

40 channels digital I/O (SPI, I2C, UART, PWM, Encoder input)

10 channels analog input
6 channels analog output

User defined button

Stereo audio I/O

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Additional Features

- Fully programmable FPGA through LabVIEW FPGA
- Dual-Core ARM Cortex-A9 processor
- Expandable ecosystem of sensors and actuators
- Ready to use projects and courseware
- Deploy code to real-time processor and FPGA via USB or WiFi
- Minutes to first measurement
- Processor programmable in C/C++

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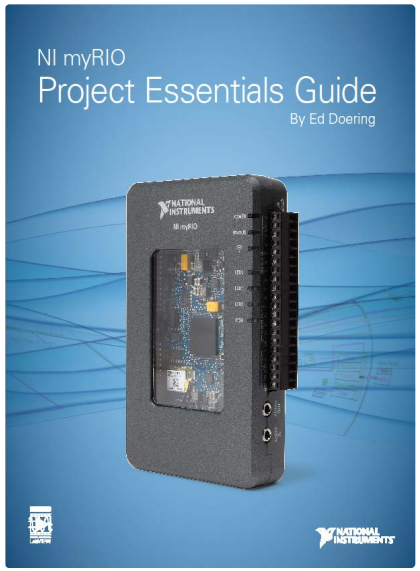
2 Form Factors

- WiFi
- miniSystems Port
- Student ready enclosure

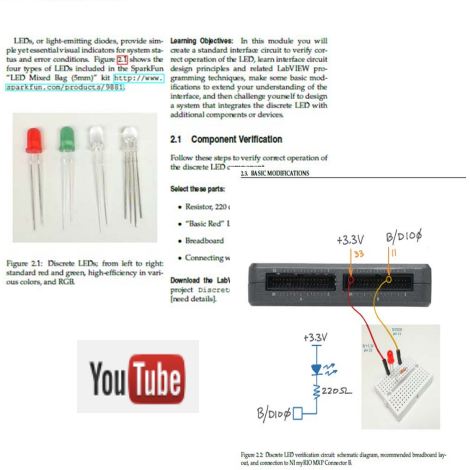
- Smaller form factor
- No WiFi
- No miniSystems Port

NATIONAL INSTRUMENTS

Project Essentials Guide: I/O Fundamentals for myRIO



- Multimedia learning resource
- Explains wiring, I/O requirements, device theory, and programming details of over 20 different devices



Alignment with off-the-shelf component kits

Starter

LEDs & switches
7-segment display
Potentiometer
Thermistor
Photo resistor
Hall effect
Microphone/Speaker
DC motor

Mechatronics

DC gear motors/encoders
H-bridge driver
Accelerometer
Triple-axis gyro
Infrared proximity sensor
Ambient light sensor
Ultrasonic range finder
Compass
Hobby servo motors

Embedded

Numeric keypad
LED matrix
Digital potentiometer
Character LCD
Digital temp sensor
Bluetooth

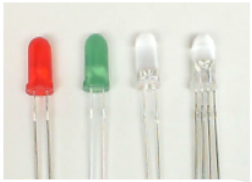
NI myRIO

Project Essentials Guide

By Ed Doering

2 Discrete LED

LEDs, or light-emitting diodes, provide simple yet essential visual indicators for system status and error conditions. Figure 2.1 shows the four types of LEDs included in the SparkFun "LED Mixed Bag (5mm)" kit `http://www.sparkfun.com/products/9881`.



Learning Objectives: In this module you will create a standard interface circuit to verify correct operation of the LED, learn interface circuit design principles and related LabVIEW programming techniques, make some basic modifications to extend your understanding of the interface, and then challenge yourself to design a system that integrates the discrete LED with additional components or devices.

2.1 Component Verification

Follow these steps to verify correct operation of the discrete LED component.

Select these parts:

- Resistor, 220 ohm
- "Basic Red" LED from Sparkfun 9881
- Breadboard
- Connecting wires [need details]

ownload the LabVIEW project: Download the roject `Discrete LED demo.lvproj` from eed details].

2.3. BASIC MODIFICATIONS

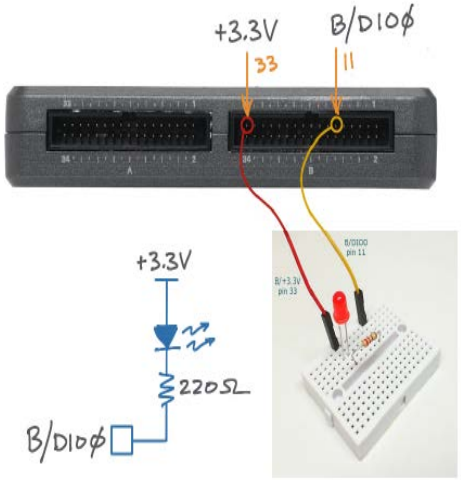


Figure 2.2: Discrete LED verification circuit: schematic diagram, recommended breadboard layout, and connection to NI myRIO MXP Connector B.

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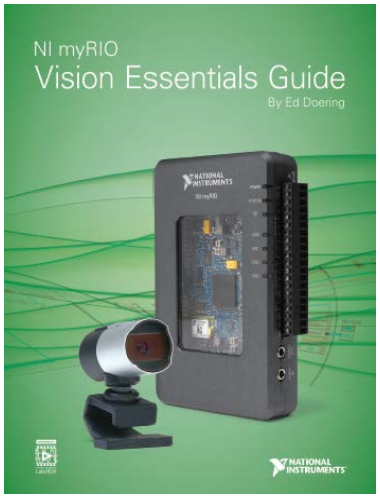
Extending the Essentials Guide Concept

NEW!

Vision Essentials Guide

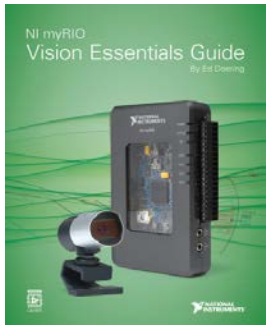


Brings the exciting world of machine vision to myRIO projects

- Implement common vision algorithms
- Real world application context with systems approach
- Demonstrate value of myRIO seamless vision integration

Multimedia Resource with 115 Instructional Videos

Vision Essentials Guide: Courseware Format



Machine Vision Fundamentals

Application Development Flow

Design Pattern for Machine Vision Applications

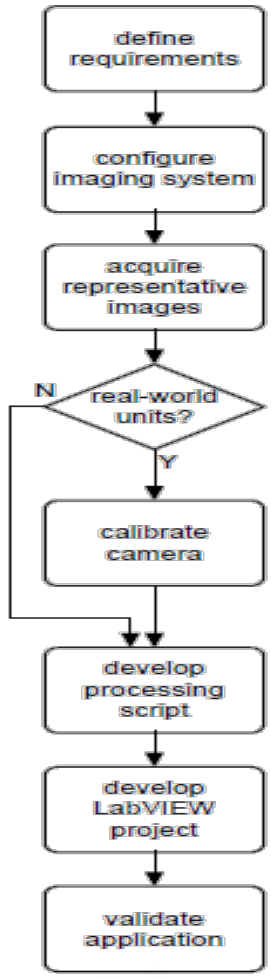
Introductory Projects

Camera Setup

Coin Caliper I

Coin Caliper II

Machine Vision Application Projects



Common Development Flow for All Projects

Vision Essentials Guide: Courseware Format

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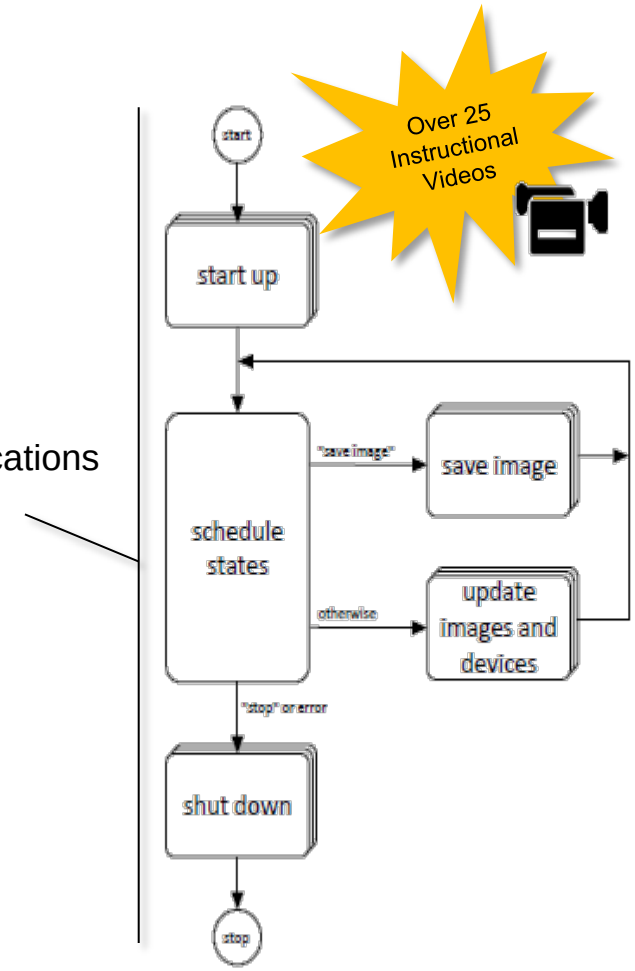

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Vision Essentials Guide: Courseware Format

Machine Vision Fundamentals
- *Application Development Flow*
- *Design Pattern for Machine Vision Applications*

Introductory Projects
- Camera Setup
  1. Measure a camera's pixel aspect ratio
  2. Determine necessary camera-to-object distance
  3. Calculate the field of view (FOV)
  4. Calibrate a camera to use real-world units
  5. Correct lens distortion and tangential distortion
- *Coin Caliper I*
- *Coin Caliper II*

Machine Vision Application Projects

5 Related Instructional Videos

NATIONAL INSTRUMENTS

Vision Essentials Guide: Courseware Format

Machine Vision Fundamentals
- *Application Development Flow*
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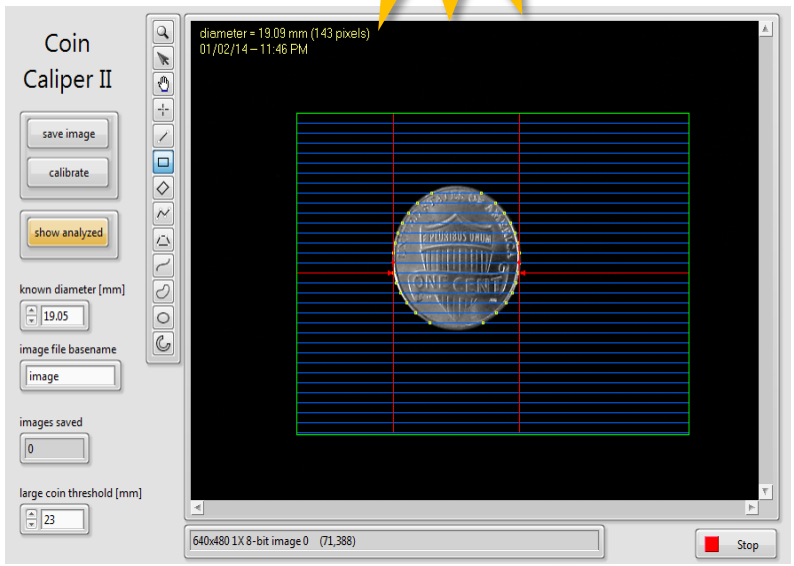
Machine Vision Application Projects

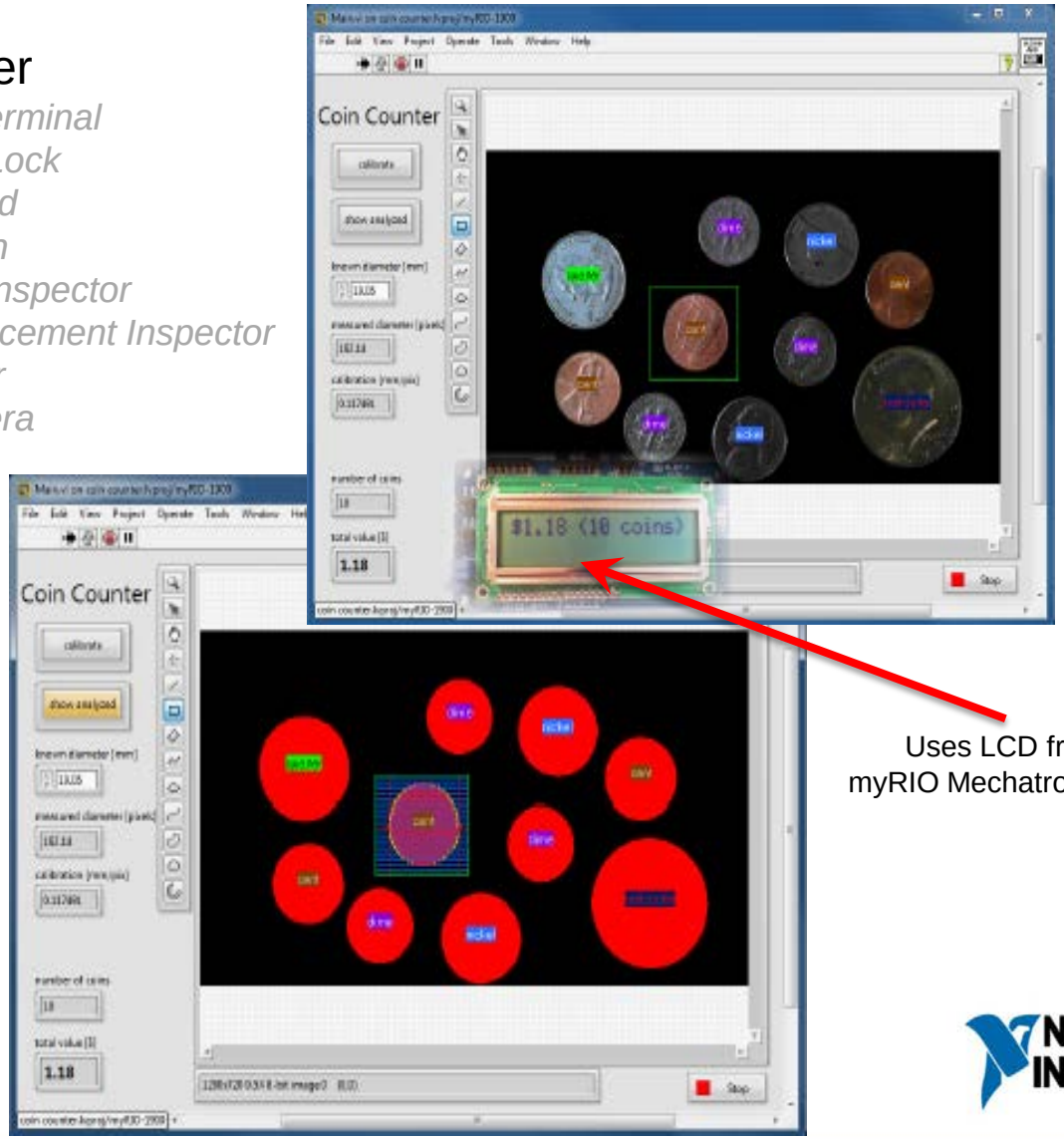
~10 Related Instructional Videos



Vision Essentials Guide: Project Topics

Coin Counter

Point of Sale Terminal
Keyed Optical Lock
DMM Test Stand
Gauging Station
Product Label Inspector
Component Placement Inspector
Motion Detector
Auto-pan Camera
Marble Sorter



Uses LCD from
myRIO Mechatronics Kit

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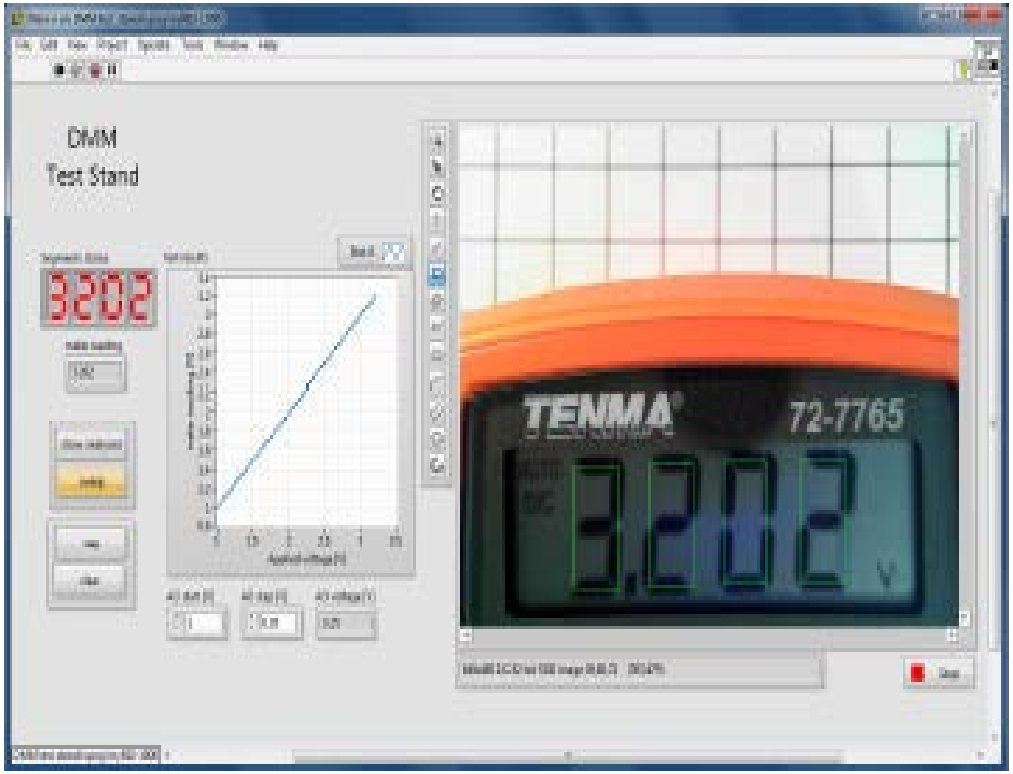

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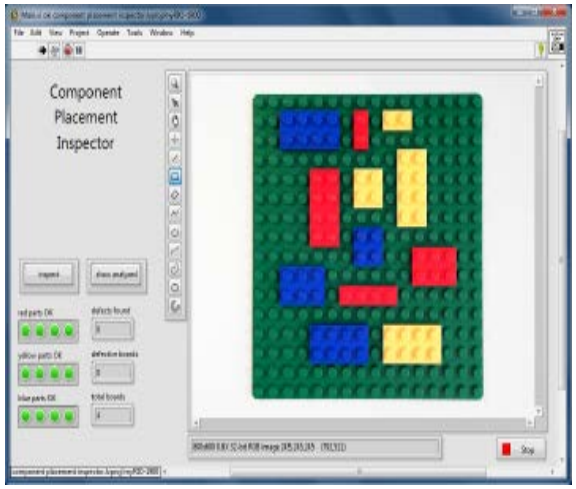

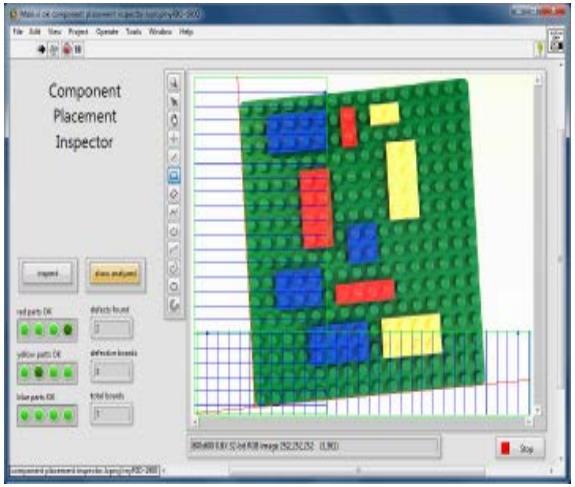

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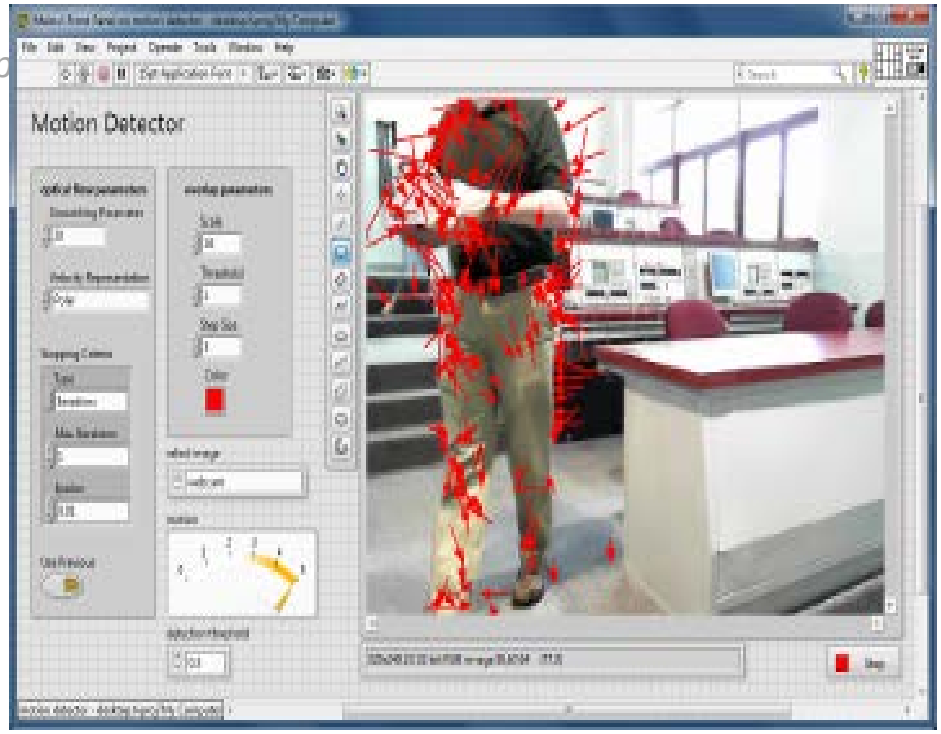

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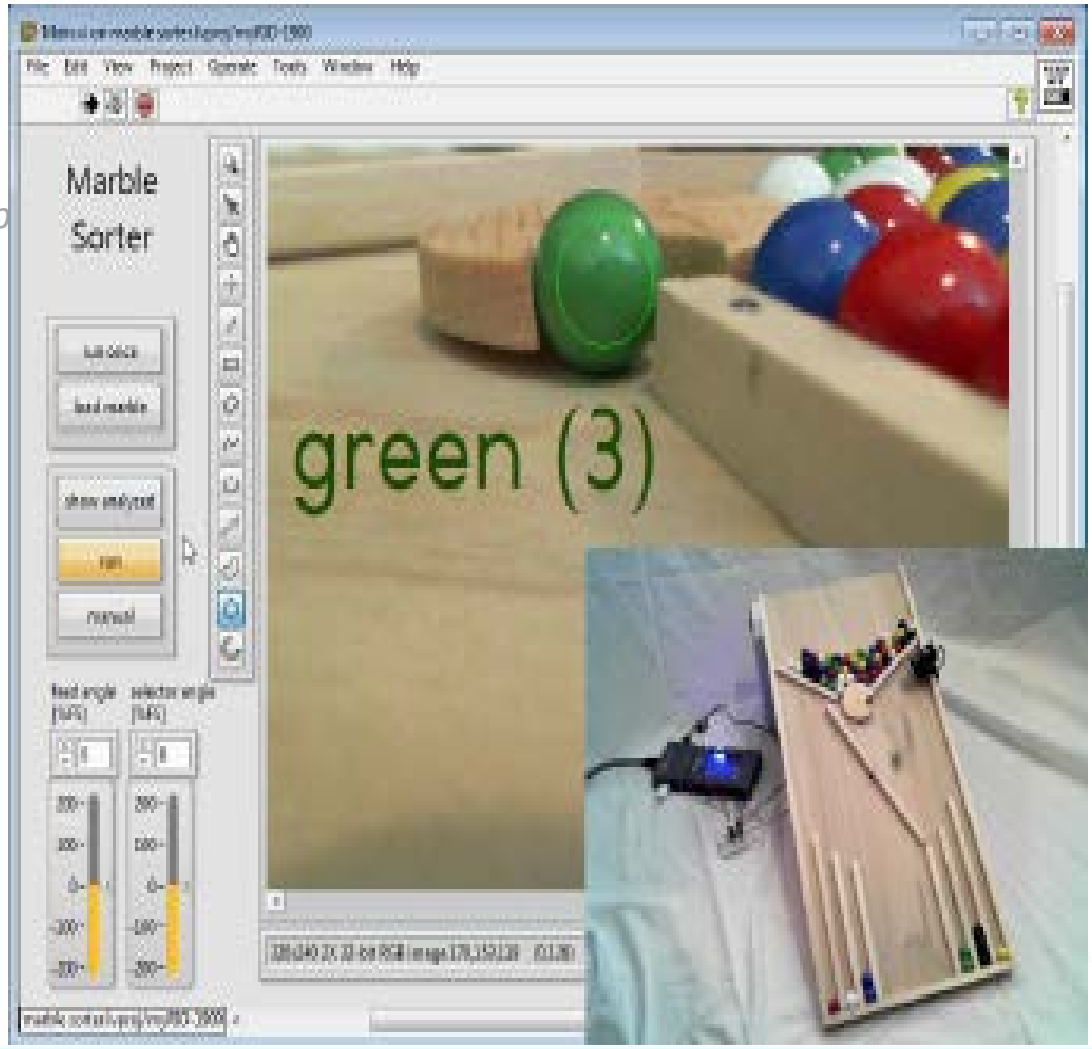

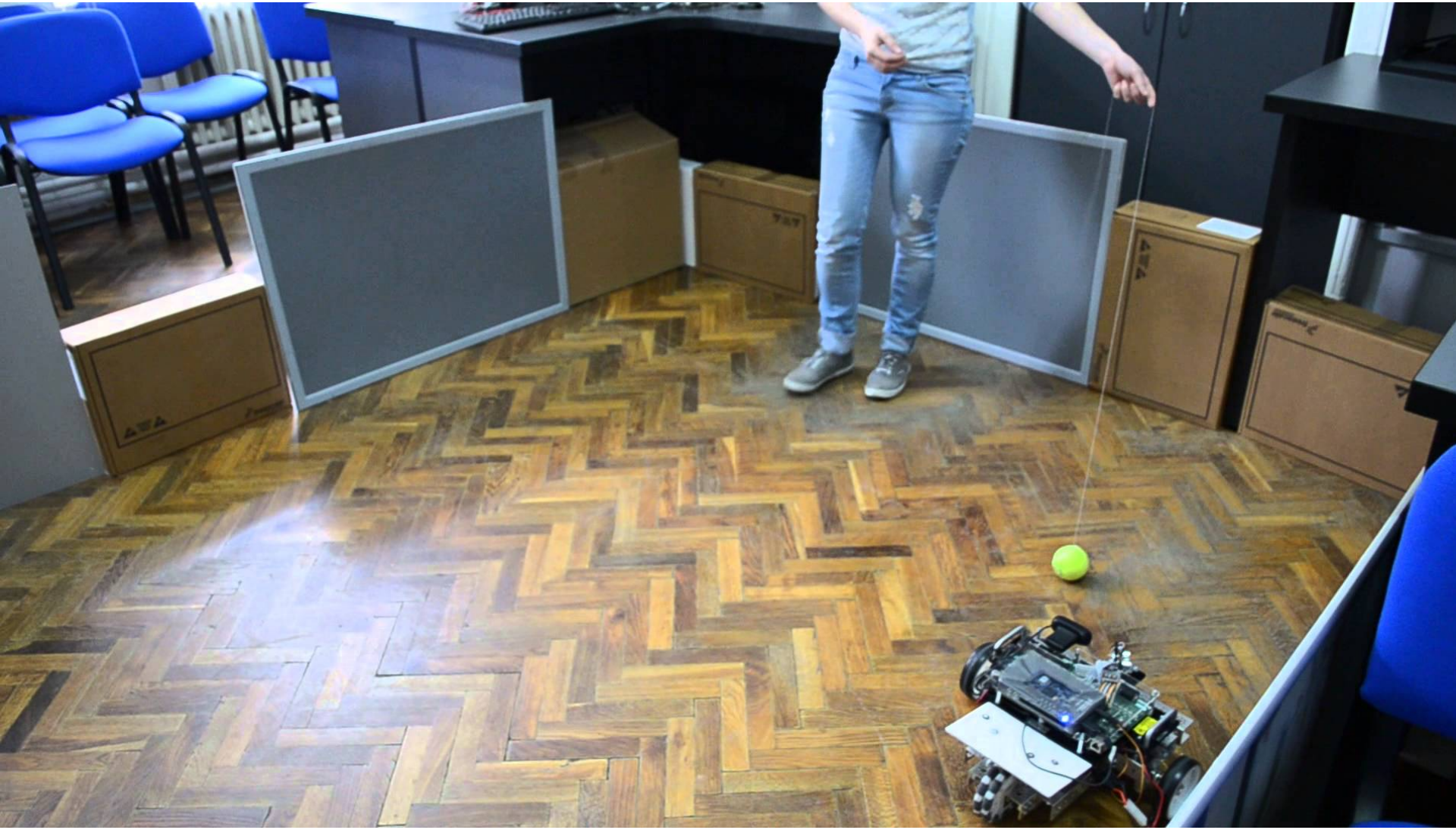

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Zveme Vás na **NIDays 2015,** největší konferenci National Instruments v České republice, Praha, 15.10. 2015

NIDays
WORLDWIDE GRAPHICAL SYSTEM DESIGN

NIDays 2015

Nejnovější technologie a trendy v navrhování, testování a řízení

Registrace

NIDays 2015

Nejnovější technologie a trendy v navrhování, testování a řízení.

Datum a čas

15. 10. 2015, 8:30-18:00

Místo

Aquapalace Hotel Prague

Více informací a registrace: czech.ni.com/nidays

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Comments or Questions?

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radim.stefan@ni.com