Low-Cost Single-Channel Color or Monochrome Image Acquisition

NI PCI-1405

- Color or monochrome image acquisition
- 1 NTSC, PAL, RS-170, or CCIR input
- Partial image acquisition with onboard programmable region of interest
- Onboard pixel decimation
- Programmable gain and offset
- 1 external trigger/digital I/O line

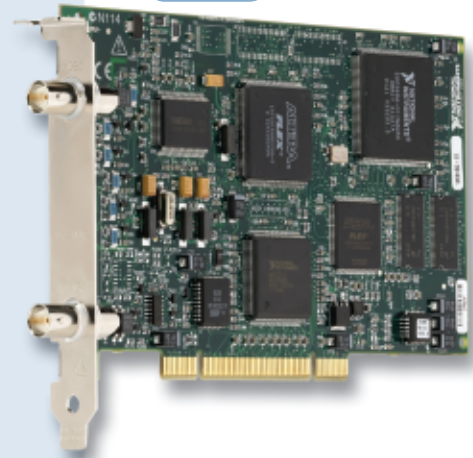### Operating Systems
- Windows 2000/NT/XP

Recommended Software
- LabVIEW
- Measurement Studio
- Vision Development Module
- NI Vision Builder for Automated Inspection

Driver Software (included)
- NI-IMAQ

NEW

Overview

For low-cost analog color image acquisition, National Instruments offers the PCI-1405, which acquires analog video input from standard color or monochrome cameras. The NI PCI-1405 comes with easy-to-use image acquisition driver software which can acquire, save and display images. Unlike multimedia "frame grabbers", the PCI-1405 features increased image processing throughput, such as partial image acquisition with programmable region of interest.

Easy-to-Use Driver Software

National Instruments NI-IMAQ driver level software offers the most comprehensive software interface for image acquisition. NI-IMAQ is included with the PCI-1405 board, as will as NI Measurement & Automation Explorer (MAX) for easy configuration of cameras. Using NI-IMAQ, you can quickly and easily acquire, save, and display images without low-level programming. You can program your image acquisition application in LabVIEW, LabWindows/CVI, and Measurement Studio. In addition, NI-IMAQ controls the PCI-1405 digital I/O line.

Performance Gains with Partial Image Acquisition

The PCI-1405 includes features that improve overall image acquisition and image processing speed. You can choose to acquire only a portion of the image using the onboard programmable ROI (region of interest) feature. You can configure the size of the acquired image using MAX, or use the ROI tools in the NI-IMAQ driver software to transfer only a subset of the image to PC memory for processing. Partial image scanning results in fewer pixels to process. For example, using partial image scanning, you can reduce a 640 by 480 image to a 400 by 400 image and increase your processing speed by operating on 48 percent fewer pixels.

Hardware

PCI Interface

The PCI bus is the electrical interface for the PCI-1405. The National Instruments custom MITE ASIC for interfacing to the PCI bus offers the highest image acquisition performance available. The MITE ASIC can transfer data at a maximum sustained rate of 100 MB/s in master mode to maximize the use of the available PCI bandwidth.

Onboard Memory

The PCI-1405 has 16 MB of onboard memory, useful for temporary storage of images being transferred to the PCI bus.

Trigger and Strobe

You can use the digital I/O line as an input to trigger image acquisition or as an output to control solenoids, solid-state relays, or strobes.

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Programmable Gain and Offset

The PCI-1405 has programmable gain and offset circuitry for optimizing the input signal range.

I/O Connector and Cabling

Two external BNC connectors are used for the video source and digital I/O line. The PCI-1405 is shipped with a 2 m BNC cable.

Color Pattern Matching

Use color pattern matching to locate quickly known reference patterns, or fiducials, in a color image. With color pattern matching, you create a model or template of an object. The search tool first scans the image to match the color distribution, and then scores the match for shape. The score relates to how closely the model matches the pattern found. You should use color pattern matching to locate reference patterns that the color and spatial information in the pattern fully describe. Color can often simplify a monochrome problem by improving contrast or separation.

Ordering Information

NI PCI-1405 778838-01
Includes NI-IMAQ software and 2 m IMAQ-BNC-1 cable

Specifications

Typical for 25 °C unless otherwise noted.

Available Formats

RS-170, NTSC	30 frames/s interlaced
CCIR-601, PAL	25 frames/s interlaced

Video Input

Quantity	1 monochrome or color
Video 0	Single-ended (BNC)
Input impedance	75 Ω
Bandwidth	Typical 20 MHz (-3dB)
Input full-scale range	2 LSBrms maximum

A/D Conversion

Gray levels	256 (8 bits)
DNL	±1 LSB maximum
RMS noise	<0.5 LSB$_{rms}$
SNR	Typical 48 dB

External Synchronization and Trigger Signals

Trigger sense	TTL
Trigger polarity	Programmable (positive of negative)
Minimum detectable pulse width	20 ns

VIH (TTL)	2 V
VIL (TTL)	0.8 V

Pixel Clock

RS-170, NTSC	12.27 MHz ±5%
CCIR, PAL	14.75 MHz ±5%
Pixel jitter	<2 ns
Lock time	<1 frame

PCI Interface

Bus interface	Master, slave
Bus-master performance	132 MB/s (ideal)

Power Requirement

+5 VDC (±5%)	1.25 A
+12 VDC (±5%)	<200 mA

Physical

Dimensions	10.7 by 17.5 cm (4.2 by 6.9 in.)

Environment

Operating temperature	0 to 55 °C
Storage temperature	-20 to 70 °C
Relative humidity	5 to 90%, noncondensing

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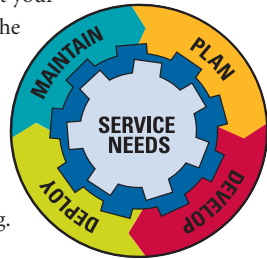
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ni.com • (800) 433-3488

National Instruments • Tel: (512) 683-0100 • Fax: (512) 683-9300 • info@ni.com