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 well 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.
Low-Cost Single-Channel Color or Monochrome Image Acquisition

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.

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical for 25 °C unless otherwise noted:</td>
<td></td>
</tr>
<tr>
<td>Available Formats</td>
<td></td>
</tr>
<tr>
<td>RS-170, NTSC</td>
<td>25 frames/s interlaced</td>
</tr>
<tr>
<td>CCIR-601, PAL</td>
<td>25 frames/s interlaced</td>
</tr>
<tr>
<td>Video Input</td>
<td></td>
</tr>
<tr>
<td>Quantity</td>
<td>1 monochrome or color</td>
</tr>
<tr>
<td>Video 0</td>
<td>Single-ended (BNC)</td>
</tr>
<tr>
<td>Input impedance</td>
<td>75 Ω</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>Typical 20 MHz (-3dB)</td>
</tr>
<tr>
<td>Input full-scale range</td>
<td>2 LSBrms maximum</td>
</tr>
<tr>
<td>A/D Conversion</td>
<td></td>
</tr>
<tr>
<td>Gray levels</td>
<td>256 (8 bits)</td>
</tr>
<tr>
<td>DNL</td>
<td>±1 LSB maximum</td>
</tr>
<tr>
<td>RMS noise</td>
<td>&lt;0.5 LSB rms</td>
</tr>
<tr>
<td>SNR</td>
<td>Typical 48 dB</td>
</tr>
<tr>
<td>External Synchronization and Trigger Signals</td>
<td></td>
</tr>
<tr>
<td>Trigger sense</td>
<td>TTL</td>
</tr>
<tr>
<td>Trigger polarity</td>
<td>Programmable (positive of negative)</td>
</tr>
<tr>
<td>Minimum detectable pulse width</td>
<td>20 ns</td>
</tr>
</tbody>
</table>

VH (TTL) ............................................... 2 V
VL (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

Ordering Information
NI PCI-1405 ..................................................... 778838-01
Includes NI-IMAQ software and 2 m IMAQ-BNC-1 cable
NI Services and Support

NI has the services and support to meet your needs around the globe and through the application life cycle – from planning and development through deployment and ongoing maintenance. We offer services and service levels to meet customer requirements in research, design, validation, and manufacturing. Visit ni.com/services.

Training and Certification

NI training is the fastest, most certain route to productivity with our products. NI training can shorten your learning curve, save development time, and reduce maintenance costs over the application life cycle. We schedule instructor-led courses in cities worldwide, or we can hold a course at your facility. We also offer a professional certification program that identifies individuals who have high levels of skill and knowledge on using NI products. Visit ni.com/training.

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Hardware Services

NI Factory Installation Services

NI Factory Installation Services (FIS) is the fastest and easiest way to use your PXI or PXI/SCXI™ combination systems right out of the box. Trained NI technicians install the software and hardware and configure the system to your specifications. NI extends the standard warranty by one year on hardware components (controllers, chassis, modules) purchased with FIS. To use FIS, simply configure your system online with ni.com/pxiadvisor.

Calibration Services

NI recognizes the need to maintain properly calibrated devices for high-accuracy measurements. We provide manual calibration procedures, services to recalibrate your products, and automated calibration software specifically designed for use by metrology laboratories. Visit ni.com/calibration.

Repair and Extended Warranty

NI provides complete repair services for our products. Express repair and advance replacement services are also available. We offer extended warranties to help you meet project life-cycle requirements. Visit ni.com/services.