Fall 2005

VIEWPOINT SYSTEMS

VIEWPOINT SYSTEMS, INC.

Viewpoint News

Viewpoint Upgrades Night Vision Test System

Obsolete GPIB Device Emulated with National Instruments Hardware and LabVIEW Software

Customer: Tobyhanna Army Depot, Tobyhanna, PA

Tobyhanna Army Depot is the largest communications and electronic repair, overhaul, and fabrication facility in the Department of Defense. Tobyhanna has extensive test facilities used to verify the operation of devices used in night vision and anti-intrusion devices, radio and radar systems, telephones, electro-optics and many other areas.

The Challenge

The night vision test facility used a GPIB-based video capture and processing device that had become obsolete. It was critical to replace the unit without downtime. A "black box" approach needed to be taken with the replaced components. The new components needed to be inserted into the system seamlessly—the rest of the system could not be modified. It was necessary for the new hardware to have the same interface (communication protocol, data exchange, etc) as the obsolete hardware. An additional challenge was that the documentation for the original video device was minimal and the original manufacturer was no longer in business. Furthermore, any replacement equipment needed to fit in the same 19" rack space as the original unit.

The Solution

Our job was made somewhat simpler because the video came from a standard RS-170 camera, and we could use a standard frame grabber to acquire the image. We still needed to make the frame grabber appear to be a GPIB device that used the same GPIB messages and commands as the original device. Viewpoint Systems chose to combine this functionality into a single National Instruments (NI) PXI controller and IMAQ frame grabber. The PXI controller provided the GPIB interface. We wrote a LabVIEW application that received GPIB commands and data, parsed these into equivalent functions within LabVIEW and IMAQ, acquired the image, and sent the image data out to the GPIB bus in the proper message format.

A large part of the challenge for this project was deciphering the GPIB traffic in order to understand the command and data structures being passed to and from the host computer. Some documentation was available on the original video unit, but it was incomplete and cryptic. Plus, we were not sure how much of the total command set was required to emulate the original device: it would have been expensive to emulate all the functionality in the video device and we were trying to be cost-effective for Tobyhanna. We decided to capture all bus traffic during several test different steps in which the video unit was involved. An NI GPIB+ card captured these results with the GPIB Analyzer application. We scrutinized these GPIB traces and determined that, indeed, only about half the device commands were actually used in the tests, thus requiring less effort to emulate the functionality of the video unit.

Since any downtime to the test facility needed to be minimized during our upgrade, we developed an emulator for the host computer that allowed us to verify the design of the PXI-video solution. Basically, this host emulator

(Continued on page 3)

National Instruments Training

All classes listed below are held at Viewpoint's Certified Training Center in Rochester. To register go to *www.ni.com/training* or call 585-475-9555. For detailed course descriptions, prerequisites and a complete schedule, go to *www.viewpointUSA.com/training*.

LabVIEW Basics I: Introduction

10/10, 11/14, 12/12 3 days

Covers the fundamentals of LabVIEW programming and constructing simple VIs, building applications involving data acquisition, analysis, and user interface.
$1595

LabVIEW Basics II: Development

10/13, 11/17, 12/15 2 days

Prepares you to design complete, stand-alone applications in LabVIEW and is a logical extension of the LabVIEW Basics I course, aimed at making you successful in creating applications for research, engineering, and testing environments. Covers proper design techniques, implementation of complete LabVIEW solutions, DataSocket technology, advanced file I/O, networked environments, and error handling.**
$1095*

LabVIEW Intermediate I: Successful Development Practices

11/7 3 days

Teaches you structured practices to design, develop, test, and deploy LabVIEW applications. Analyze your application requirements, choose the correct design pattern and data structures for your application, and quickly test your design.**
$1595

LabVIEW Intermediate II: Performance and Connectivity

11/10 2 days

Teaches you memory management and performance-enhancing techniques to maximize application performance. Extend application functionality by leveraging other applications using DLLs, Active X and the Internet.**
$1095*

** 25% discount if scheduled concurrently with Course I*
*** Indicates prerequisite required*

Data Acquisition and Signal Conditioning

Call for dates 3 days

Using LabVIEW, plug-in data acquisition (DAQ) boards, and SCXI signal conditioning hardware, the Data Acquisition and Signal Conditioning course teaches you the fundamentals of PC-based data acquisition and signal conditioning. Get hands-on experience installing and configuring data acquisition hardware and learn to use data acquisition software functions to build your application.**
$1595

TestStand I: Introduction

Call for dates 3 days

Use features provided in the TestStand environment and learn the basics of customizing. Upon completion, develop test applications using built-in tools supplied with TestStand.**
$1795

TestStand II: Customization

Call for dates 2 days

Customize the functionality built into TestStand. Multithreading and multi-UUT testing, advanced reporting techniques, and application program interface (API). Concludes with system design projects.**
$1195*

LabVIEW Machine Vision & Image Processing

10/25 2 days

Learn the fundamentals of machine vision, and locating cameras, lenses, and lighting equipment. Use vision software and hardware to calibrate coordinates and acquire and quantify images.**

Motion Control Fundamentals

10/27 2 days

Learn how to configure a motion acquisition system, develop basic motion trajectories, and create feedback control loops. Identify types of moves and create motion control solutions.**
$1095*

Upcoming Events!

National Instruments Technical Symposium

Thursday, November 3rd
8:00 am – 5:00 pm
Holiday Inn South (Jefferson Road)

National Instruments is once again hosting its annual Technical Symposium designed to give engineers and scientists the opportunity to learn about new virtual instrumentation and innovative technologies. Attend presentations, hands-on sessions. Viewpoint engineers will lead sessions on Advanced Data Acquisition MX. Register for this free symposium at www.ni.com or call 1-800-444-3539.

Automation Technology Day

Tuesday, October 25th
7:30 a.m.- 5:00 p.m.
RIT Inn and Conference Center

Great Lakes Controls is hosting Automation Technology Day, featuring product and technology seminars throughout the day along with a trade show highlighting automation and control vendors showcasing the latest product demonstrations. Look for Viewpoint's booth!

Register via email to sales@glc-ny.com.

Tobyhanna Army Depot

(Continued from page 1)

played back captured GPIB traces to the PXI-video unit, the unit responded to the host emulator, and the emulator verified the response based on expectations from the GPIB trace data. Using this emulator method reduced Viewpoint's installation time at Tobyhanna to a single day.

Technical Highlights

The obsolete GPIB video capture device was replaced with an NI PXI controller and RS-170 frame grabber. LabVIEW code was written to parse the GPIB commands and data from the host computer and respond to these commands with image data captured from the frame grabber. The controller runs Windows XP.

- NI PXI 1042 8 Slot Chassis
- NI PXI-8186 Controller with built-in GPIB controller
- NI LabVIEW software
- NI PXI-1407 Frame Grabber
- NI PCMCIA GPIB+ card
- IMAQ Vision Development Module

Conclusion

In summary, the original GPIB-based video unit was replaced with a COTS (commercial off-the-shelf) PXI controller and frame grabber and emulation software written in LabVIEW. The impact of this upgrade to the test facility was nearly zero. Viewpoint spent only one day onsite to install the upgrade. And, not a single line of code was rewritten on the host computer, which does not even realize that a major system component was replaced.

NI Week 2005

Three engineers from Viewpoint attended this year's NI Week, which is held in Austin, Texas every August. Fred Genett, David Loucks and Tim Dykes joined 2400 people from around the globe to learn the newest in technological innovations from National Instruments.

"NI Week is a must attend event with great technical sessions, hands-on training and demos, whether you're a new LabVIEW user or a 'power' systems integrator", said Dave Loucks. NI hosts a first class event and Austin has a great atmosphere for barbeque, music and networking.

VIEWPOINT SYSTEMS, INC.

800 West Metro Parkway
Rochester, NY 14623

Phone: 585-475-9555
Fax: 585-475-9645
Email: info@viewpointusa.com

Engineered To Work.
Designed to be Right.

www.ViewpointUSA.com

Viewpoint Systems is a highly experienced systems integrator dedicated to delivering high-quality, custom solutions in manufacturing test, processing monitoring, product development, industrial automation, and project management.

Viewpoint's add-on products for LabVIEW make your job easier!

DIO64-PCI/PXI *64 Channel intelligent high-speed Digital I/O* ***MultiCom*** *- Access up to 64 serial ports from LabVIEW for Windows* ***ViewPort*** *- LCD & VFD Displays for LabVIEW Real-Time Systems* ***Peek/Poke*** *- Memory and I/O access from LabVIEW* ***Opto32-128*** *- Low Input Current SCXI opto-isolated digital input board* ***DIO-128*** *- 128 channel high speed digital I/O* ***6K VI Motion Library*** *- Active X Library for Compumotor 6k Controller*