

PI Software Resources

Ensuring your productivity



Instrumentation today

- To the user, Instruments are “peripherals”
 - Software resources must prioritize quick implementation and fast productivity
 - Software should support user’s choice of platform (OS, interface, application or programming environment)
 - Advanced capabilities must be readily accessible
 - Compatibility with popular third-party applications is expected

■ PI software resources:

- An integral part of our architecture— not an afterthought
- PI’s *General Command Set* (GCS) provides interoperability across OS, interface, application and programming environment choices
- GCS’ consistency across PI’s products facilitates choice and freedom down the road. Change controllers and OSeS without extensive recoding. Select USB, RS-232, GPIB, TCP/IP and analog interfacing— no change to code!
- PI compatibility with 3rd-party applications like μ Manager, MetaMorph and ImagePro ensures plug-and-play productivity



PI: Ensuring your Productivity

■ Instant Productivity in Microscopy

- μ Manager, MetaMorph and ImagePro all support PI's GCS controllers
 - Your choice of motorized or piezo precision positioners for Z and transverse positioning
 - Plug and play support

■ Quick time-to-market for text-based programming

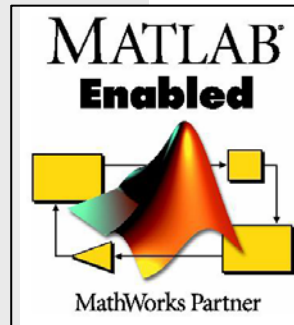
- Robust, debugged .dll (Windows) and .lib (Linux)
 - Error-handling, communications and termination formalities are automatic
 - Interface-independent implementation
 - GCS means your code is easily portable across PI controllers

■ Industry-leading LabVIEW libraries

- Versatile, fully-featured, well-documented
- Controller-, platform- and interface-independent (including analog controls!)
- Extensive examples

■ Easy-to-Use GUI Setup/Optimize/Analysis Utilities

- Point-and-click setup
- Automatic self-configuration to factory default parameters
- Easy customization and optimization



```

int main()
{
    int i;
    int ConnectPos = 1;
    int BaudRate = 115200;
    double dPositions[2];
    char sAxis[] = "1 2";

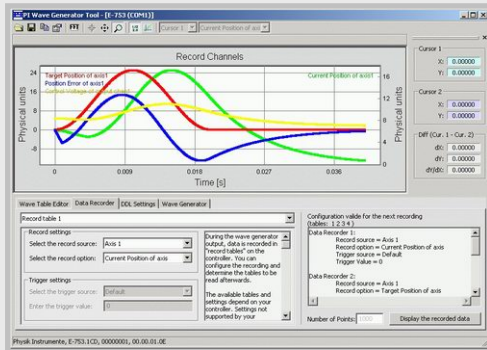
    // Connect the controller using e.g. RS232
    iE7XX_Connect(Rx232)ConnectPos, iBaudRate);

    // Send the E7XX_gPOS() to query the position of axis 1 and 2
    E7XX_gPOS(iE, sAxis, dPositions, 2);

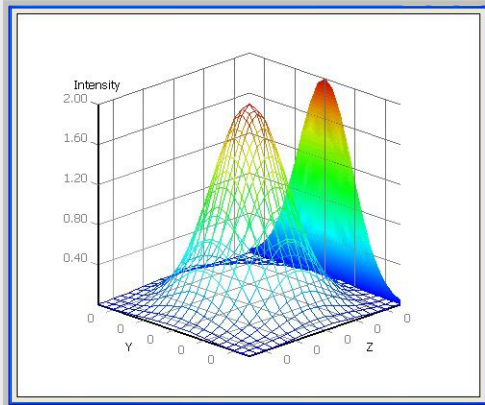
    // Do your programming sequences with the positions stored
    // in the array dPositions
    ...

    // Close the connection to the controller.
    E7XX_CloseConnection(iE);
}
  
```

PI Host Software



Complex and simple waveform generation

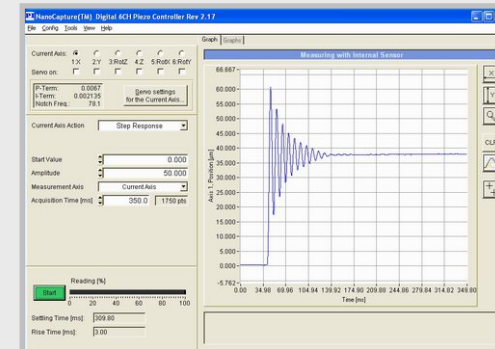


Special routines, eg. for auto alignment available

Moving the NanoWorld | www.pi.ws

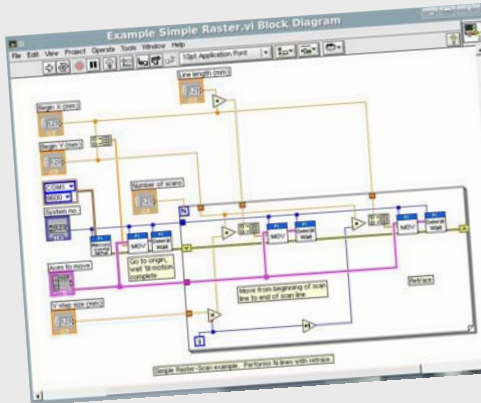


Automation tasks without programming

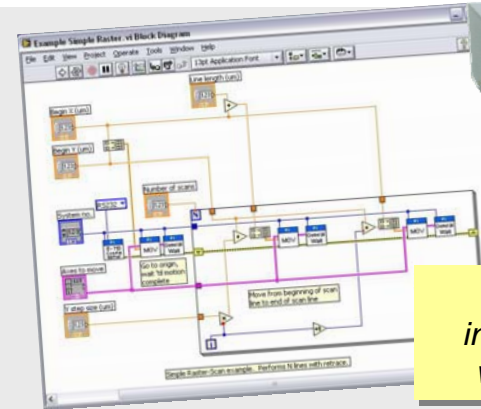


Software-based system optimization

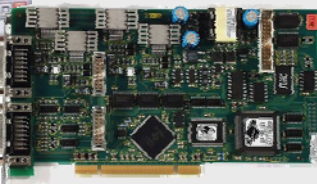
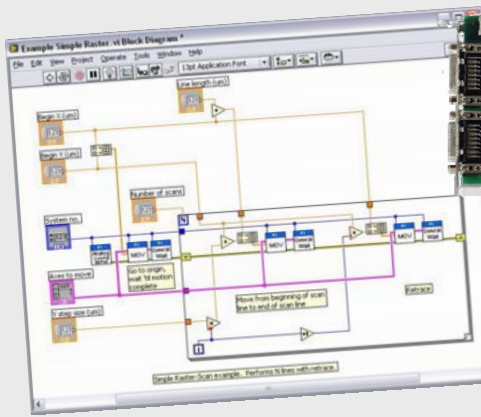
Example: Platform/Interface/OS Independence



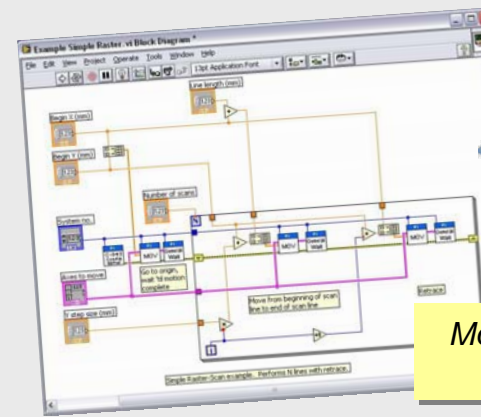
Piezo Nanopositioning in LabVIEW on Windows over RS-232



Piezo Nanopositioning in LabVIEW on Windows with NI analog I/O card



Motorized Micropositioning in LabVIEW on Windows over PCI



Motorized Micropositioning in LabVIEW on Linux

...PI's GCS implementation is consistent across platforms, interfaces and products

Rich, Detailed documentation ensures your productivity

PI LabVIEW Drivers

3.3. C843_Configuration_

This VI performs a full settings and stage reference Context Help menu sequence. After the successful run correct parameters first:

- > C-843 version: TRUE version.
- > Board No.: must match default.
- > System No.: 1 in a reference mode (or warnings)
- > "Use dialog to define stages after starting appear and you must For axes without a mechanical setup).
- > If not, which axes which limit switch have no reference!
- > If all axes are to be
- > Whether the final p



Release 3.6.1

C-843 GCS DLL (Windows Library) Software Manual

close the connection to the specified controller and the communications functions are listed below:

```
int C843_FUNC_DECL C843_Connect (const int Board
BOOL C843_FUNC_DECL C843_IsConnected (const i
void C843_FUNC_DECL C843_CloseConnection (con
int C843_FUNC_DECL C843_GetError (const int id)
BOOL C843_FUNC_DECL C843_SetErrorCheck (con
BOOL C843_FUNC_DECL C843_TranslateError (int
```

4.2. Stage Setup

The C-843 GCS library cannot determine which must be configured at startup. Call C843_CS1() (p.16) to setup the connector (p.26) you can find out which stages are current (p.26) will always return 2 or 4 stages, depending (2- or 4-channel version), unconfigured stage "NOSTAGE", C843_Q8AI() (p.29) will always configured stages. If you use PI stages, call which stages the library already knows about:

```
BOOL C843_FUNC_DECL C843_CS1 (const int
BOOL C843_FUNC_DECL C843_Q8AI (const int
BOOL C843_FUNC_DECL C843_Q8ST (const int
BOOL C843_FUNC_DECL C843_SAI (const int
BOOL C843_FUNC_DECL C843_Q8AI (const int
BOOL C843_FUNC_DECL C843_Q8ST (const int
```

```
The following example shows how to connect to a controller. A typical initialization routine (char stages[1024]; int len; // connect to the C-843 int * C843_Connect(); if (C843_Connect() != 0) return FALSE; // initialize all configured stages if (C843_CS1(0) != "NOSTAGE") return FALSE; // the output should be "140025M" printf("q8AI: returned \"%s\"", C843_Q8AI(0)); // we want to connect two M-11 and a M-11.120 to the configured stages. "0611,1000" if (C843_CS1(1) != "124") return FALSE; if (C843_CS1(2) != "0611,1000") return FALSE; // the output should be "12" printf("q8AI: returned \"%s\"", C843_Q8AI(1)); // we want to connect two M-11 and a M-11.120 to the configured stages. "0611,1000" if (C843_CS1(2) != "124") return FALSE; // the output should be "12" printf("q8AI: returned \"%s\"", C843_Q8AI(2)); // all axes for all axes // all axes should will address all configured axes if (C843_CS1(0) != "NOSTAGE") return FALSE;
```

Release 3.2.0

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MS112E Software Manual
C-843 GCS DLL
Windows Library Reference
Release 3.2.0
Date: 2008-03-20

This document describes software for use with the following products:

- C-843.21 Motor Controller Card (PCI), 2 motor axes
- C-843.41 Motor Controller Card (PCI), 4 motor axes



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```
TRUE if successful, FALSE otherwise

BOOL C843_FUNC_DECL C843_OpenPIStagesEditDialog (const int id)
Opens a dialog to look at the PIStages.dat file, which contains the stages defined by PI. No changes can be made to this file.
Arguments:
id: ID of controller
Returns:
TRUE if successful, FALSE, if the buffer was too small to store the message
```

Release 3.2.0

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MS 89E Software Manual
C-843 LabVIEW Driver Library
Release: 3.6.1 Date: 2006-03-02

This document describes software for use with the following product(s):

- C-843.x1 DC-Motor Controller Card (PCI)



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Conclusion

- Software is the face of instrumentation to the user. **We get that.**
 - **Minimize time** to adoption and adaptation
 - Facilitate multi-axis and coarse/fine implementations
 - **Make it easy** to change hardware
 - **Keep it safe** and stable with tested factory defaults for every stage
 - Provide a **deep toolbox** of **open-source** building-blocks
 - Support popular platforms and 3rd-party applications
 - Be interface- and OS-agnostic
 - Be our own software customer for building systems and demonstrations.

- No motion control company has a deeper commitment to your productivity
 - PI's 10-person software team: a significant investment in your success today
 - PI's global applications support resources ensure your success down the road.