XIA PIXIE-4 LabVIEW Control Software Development

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1. Introduction

The enclosed Pixie-4 control software in LabVIEW was developed with National Instruments^{TM} LabVIEW 8.2. It hasn't been tested with other earlier versions of LabVIEW, so compatibility with those versions can't be guaranteed at this time.

The Pixie-4 LabVIEW control software was built upon the Dynamic Link Library (DLL) that was modified from the general Pixie-4 C-Library code. A special layer of wrapper was added to the Pixie-4 DLL so that LabVIEW can make direct calls to it.

We describe below the wrapper functions that were called by the LabVIEW Virtual Instruments (VIs), and then talk about the VIs that can be used to control the Pixie-4 modules.

2. Pixie-4 C-Library Wrapper Functions

There are currently 15 wrapper functions built into the Pixie-4 DLL. They are shown in the table below.

Function Name	Intended Usage
Pixie_Download_FileNames	Download file names from the host to the DLL
Pixie_Boot_Modules	Boot all the Pixie modules in the system
Pixie_Adjust_DCOffsets	Adjust DC-offsets in one Pixie-4 module
Pixie_Acquire_ADCWaveforms	Acquire untriggered ADC waveforms from one Pixie-4 module
Pixie_Start_MCARun	Start or resume MCA run in all Pixie-4 modules
Pixie_Start_ListModeRun	Start or resume list mode run in all Pixie-4 modules
Pixie_Check_RunStatus	Check run status in one Pixie-4 module
Pixie_Stop_Run	Stop data acquisition run in all Pixie-4 modules
Pixie_Read_MCAHistograms	Read MCA histograms from the external memory in one Pixie-4 module
Pixie_Save_MCAHistograms	Read MCA histograms from the external memory in all Pixie modules and save the histograms to a file in binary format
Pixie_Save_ListModeData	Read list mode data from the external memory in all Pixie modules and save it to a file in binary format
Pixie_Save_Settings	Read DSP parameters from all Pixie modules and save these parameters to a file in binary format
Pixie_Write_User_Par	Write user parameter values to one Pixie-4 module
Pixie_Read_User_Par	Read user parameter values from one Pixie-4 module
Pixie_Read_ListModeData	Parse and read list mode data from a list mode data file

Table 1: Pixie-4 C-Library wrapper functions that were built into the Pixie-4 DLL.

3. Pixie-4 LabVIEW VIs

A total of 8 VIs were created to control the Pixie-4 modules using the wrapper functions described above. They are listed below in the order of potential usage, i.e. Pixie4Boot.vi should be called first to initialize all modules before other VIs can be used.

VI Name	Intended Usage	Wrapper Functions Called
Pixie4Boot.vi	Download configuration file names from the host to the DLL and boot all the Pixie modules in the system	Pixie_Download_FileNames, Pixie_Boot_Modules
Pixie4ADCTraces.vi	Adjust DC-offsets in one Pixie-4 module and acquire untriggered ADC waveforms from one Pixie-4 module either in single-mode or continuously	Pixie_Adjust_DCOffsets, Pixie_Acquire_ADCWaveforms
Pixie4SetUserPar.vi	Write user parameter values to one Pixie-4 module or upload user parameters from one Pixie-4 module	Pixie_Write_User_Par, Pixie_Read_User_Par
Pixie4SaveDSPParToFile.vi	Read DSP parameters from all Pixie modules and save these parameters to a file in binary format	Pixie_Save_Settings
Pixie4DAQ.vi	Start or resume either MCA run or list mode run in all Pixie-4 modules, and then check the run status until it is finished before reading out the run data and save them to files on the hard disk	Pixie_Start_MCARun, Pixie_Start_ListModeRun, Pixie_Check_RunStatus, Pixie_Save_MCAHistograms, Pixie_Save_ListModeData
Pixie4MCA.vi	Read MCA histograms from the external memory in one Pixie-4 module and then display them in one graph	Pixie_Read_MCAHistograms
Pixie4PulseShape.vi	Parse and read list mode data from a list mode data file that is already stored on the hard disk	Pixie_Read_ListModeData
Pixie4ReadRunStatistics.vi	Read run statistics from one Pixie-4 module and then display them on the VI	Pixie_Read_User_Par

Table 1: Pixie-4 LabVIEW VIs that were built upon the Pixie-4 DLL.