HORIBA
Scientific

Bringing multi-channel data-acquisition to LabVIEW™

Custom Spectroscopy Solutions

Introduction

LabVIEW™ provides an interface in which the user may integrate different instrumentation into a single control program, as well as automate measurements and perform post-processing of data. Generally, LabVIEW™ offerings have been instrument-driven, however it is advantageous to develop software programs designed for specific applications.

New programming

In working towards the goal of providing complete application-based spectroscopy packages, some preliminary programming must be carried out. For a spectroscopic experiment where a monochromator with a single-channel detector is used, creating a software program is relatively straightforward. A beginning and end wavelength are specified by the user along with a step-size; acquisitions are carried out at each step.

A scenario with a multi-channel detector is much more complex. Ideally, the user specifies a beginning and end wavelength, and the software determines the center wavelength positions and carries out the post-acquisition stitching of the data. The difficulty lies in creating a generic piece of code that can cope with many different monochromators and CCDs. A LabVIEW™ package has now been developed that employs the software development kit (SDK) to couple HORIBA Scientific's monochromators and multi-channel detectors seamlessly.

The front panel of the newly developed LabVIEW™ code is pictured in Figure 1. The main tab labeled
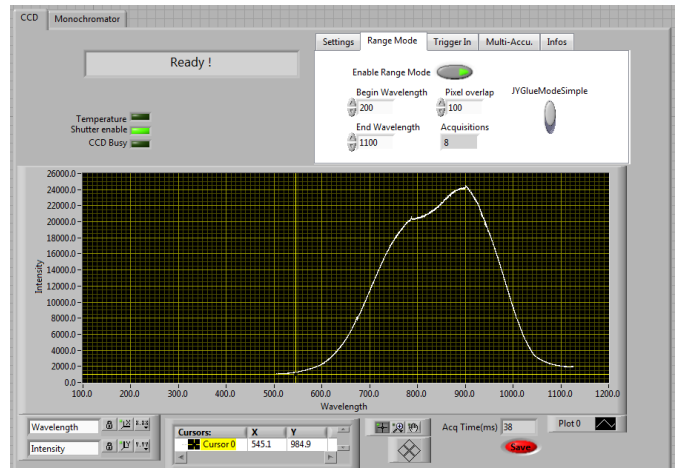

Figure 1. LabVIEW™ program for multi-channel data-acquisition. Note the two tabs to control the CCD and the monochromator.
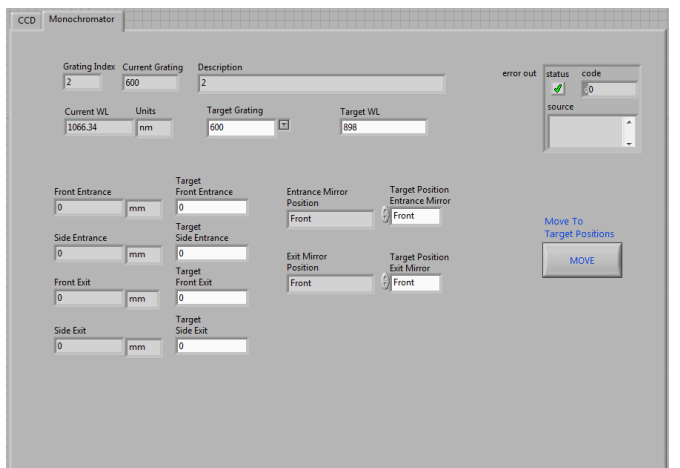

Figure 2. LabVIEW™ program for multi-channel data-acquisition, showing the Monochromator tab.

"CCD" gives the user control over all CCD experimental parameters (ADC, gains, triggering, etc.) and displays final experimental results. The secondary

tab labeled "Monochromator" provides the user with access to all of the monochromator parameters (slit widths, mirror positions, gratings, etc.), as seen in Fig. 2.

To enable monochromator scanning and stitching of CCD data, the user activates the "Enable Range Mode" radio button and sets the experimental parameters (begin wavelength, end wavelength, pixel overlap, and gluing type). The integration time, ADC rate, and gain are set in the "Settings" tab. Once all the parameters are set, a click on the "Setup" button sends the settings to the CCD, followed by pressing the "Acquire" button to begin the acquisition. The software then calculates the center-wavelength positions of the monochromator, acquires data from the CCD, and stitches the resulting data together. Figure 3 shows a spectrum of a tungsten-halogen lamp that was recorded on an iHR550 with a 600 groove/mm grating blazed at 1000 nm, plus Syncerity open-electrode 1024 × 256 CCD, using the new LabVIEW™ multi-channel data-acquisition code. The total range covered 450 to 1100 nm, the pixel overlap was set to 100 pixels, and the gluing mode was set to simple. The resulting spectrum shows a smooth, broad emission spectrum typical of a tungsten-halogen lamp.

Conclusions

This new multichannel-acquisition LabVIEW™ software provides a starting point to a complete spectroscopic solution, shifting the focus away from instrument specifications towards a wide variety of applications. The CCD-gluing procedure described above can now be incorporated into any number of software pro-
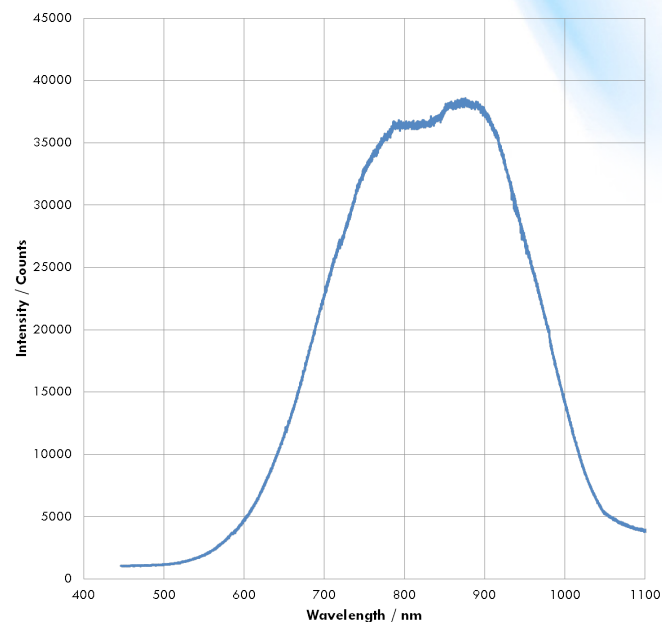

Figure 3. Spectrum from a tungsten-halogen lamp, acquired and automatically stitched together using the program illustrated in Figs. 1 and 2.

grams tailored to specific types of experiments such as photoluminescence, photoreflectance, absorbance/transmittance and IQE/EQE measurements.

LabVIEW™ is a trademark of National Instruments.

info-sci@horiba.com
www.horiba.com/scientific

USA: +1 732 494 8660	**France:** +33 (0)1 64 54 13 00	**Germany:** +49 (0)89 4623 17-0
UK: +44 (0)20 8204 8142	**Italy:** +39 0 2 5760 3050	**Japan:** +81 (0)3 38618231
Spain: +34 91 490 23 34	**China:** +86 (0)10 8567 9966	**Brazil:** +55 11 5545 1540
Other Countries: +33 (0)1 64 54 13 00		

Explore the future   Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific   HORIBA