Mightex CCD Spectrometer Combined with 405nm Laser

Yu-Yang Lee (RA) and Yu-Ming Chang (PI) CCMS, NTU Mar. 11, 2011

Specification and Calibration of Mightex CCD Spectrometer

Specification

- 1. Grating has groove density of 600g/mm; Blazed at 500nm.
- 2. Visible region: 425-815nm
- 3. Spectrum line width of CAL-2000: 0.63±0.048nm
- 4. Accuracy: ~0.06nm

Calibration Procedure

- 1. Input CAL-2000 calibration light source
- 2. Compare the spectrum with the one in the last page.
- 3. Record peak locations in relative pixel (pixel number subtracted by 1824)
- 4. Fit the data points with 2nd order curve



Statically Analysis of Spectral Linewidth and Accuracy

• Spectral Linewidth

Accuracy of Spectrometer

Peak Location (nm)	FWHM (nm)	Theoretical Peak	Reading Peak	Difference (nm)		
/35.8/	0.74	435.84	435.852	0.012		
546.06	0.62	546.06	546.068	0.008		
576.96	0.63	576.96	576.983	0.023		
579.07	0.59	579.07	578.976	-0.094		
696 54	0.58	696.54	696.503	-0.037		
706 72	0.58	706.72	706.770	0.050		
714 70	0.56	714.7	714.860	0.160		
727.29	0.50	727.29	727.232	-0.058		
738 /0	0.55	738.4	738.398	-0.002		
750.40	0.01	750.39	750.417	0.027		
750.39	0.01	751.46	751.477	0.017		
751.40	0.08	763.51	763.446	-0.064		
763.51	0.64	772.42	772.358	-0.062		
772.42	0.64	794.82	794.860	0.040		
794.82	0.64	800.62	800.659	0.039		
810.37	0.68	801.48	801.393	-0.087		
811.53	0.68	810.37	810.431	0.061		
Average(nm)	0.63	811.53	811.521	-0.009		
Standard Deviation (nm)	0.048	Standard Dev	Standard Deviation (nm)			

Spectrum of CAL-2000 Detected by Mightex CCD Spectrometer



Recalibration for Adjusting Visible Range

Specification and Calibration of Mightex CCD Spectrometer

Specification

- 1. Grating has groove density of 600g/mm; Blazed at 500nm.
- 2. Visible region: 410-800nm
- 3. Spectrum line width of CAL-2000: 0.963±0.119nm
- 4. Accuracy: ~0.152nm

Calibration Procedure

- 1. Input CAL-2000 calibration light source
- 2. Compare the spectrum with the one in the last page.
- 3. Record peak locations in relative pixel (pixel number subtracted by 1824)
- 4. Fit the data points with 2nd order curve



Statically Analysis of Spectral Linewidth and Accuracy

• Spectral Linewidth

Accuracy of Spectrometer

Peak Location (nm)	FWHM (nm)	Theoretical Peak Location (nm)	Reading Peak Location (nm)	Difference (nm)	
435.84	1.228	435.84	435.848	0.008	
546.06	0.98	546.06	546.045	-0.015	
576.96	1	576.96	576.984	0.024	
579.07	1	579.07	579.059	-0.011	
696.54	0.84	696.54	696.307	-0.233	
727 29	0.93	706.72	707.040	0.320	
738 /0	0.84	727.29	727.339	0.049	
762 51	1.02	738.4	738.463	0.063	
705.51	1.02	750.39	750.333	-0.057	
772.42	0.97	763.51	763.299	-0.211	
794.82	0.82	772.42	772.291	-0.129	
Average(nm)	0.963	794.82	794.984	0.164	
Standard Deviation (nm)	0.119	Standard Dev	Standard Deviation (nm)		

Spectrum of CAL-2000 Detected by Mightex CCD Spectrometer



Some Notice when Building Executable File

Adjusting Formatting – Part I

- Set position of the origin of VI
- 1. This is the origin.
- 2. Link property node to "Pane"
- 3. Set "origin" to (0,0). After runing the

"origin" will be seized to the blue point,

the left-up corner of the front panel.









Adjusting Formatting – Part II

- Match size of the front panel to that of the target monitor.
- 1. Read the resolution of the target monitor



Adjusting Formatting – Part II

 Set front panel bounds and the input numbers are pixel numbers of every screen. (it would be better to set the upper bound to 50 because that is the space that the tool bar roughly needs)



Adjusting Formatting – Part III

- After running, the size of the front panel will be confined to specified range.
- Do the modification and alignment.

Build Executable File (.exe)

- 1. Install right-version runtime engine in the target computer
- 2. Tools \rightarrow Build Executable...
- 3. Set file name and directory, and press build

🔁 Mie	ntex CCD 031111Modified	for acer aspire one.vi Front Panel *						_					_
2	t <u>V</u> iew <u>P</u> roject <u>O</u> perate	<u>Iools W</u> indow <u>H</u> elp					CCD (tex CCD 031111Modified for acer aspire one Properties					
۷.	☆ 관 ● Ⅱ 14pt Appl	Measurement & Automation Explorer Instrumentation	•			2 3	3.,	otion	Applica	ation Inform	ation		
M	ghtex CCD 70000 - 65000 - 55000 - 55000 - 55000 - 55000 - 55000 - 55000 - 55000 - 55000 - 55000 - 55000 - 55000 - 55000 - 55000 - 550	Instrumentation MathScript Window Compare Profile Security User Name Pluid Executable Convert Build Script Source Control LLB Manager LLB Manager LLB Manager Shared Variable Find VIs on Disk Prepare Example VIs for NI Example Finder Remote Panal Connection Manager Web Publishing Tool SignalExpress Advanced Qptions	0311 , , , , , , , , , , , , ,	ModuleNo: TCN-1304-U Fitting function:	SenialNo: 13-090608-004	Plot 0 10 10 10 10 10 10 10 10 10 10 10 10 1	ton Inform Source Files Destinations Source File Settings Icon Advanced Additional Exclusic Run. Time Languag Preview	ation	Applict Build specification name Mighex CCD 031111-Modified for acer aspire one Target filename Mighex CCD for 405nm have exe pplication destination directory Ceptoruments and Settings/LEE YU YANGV#[fff/For Version Information Version Information Version Information Major Minor Fix Build 1 0 0 0 0 Auto increment Product name Mighex CCD 031111-Modified for acer aspire on Legal copyright Copyright 2011 CCMS Company name CCMS Internal name Mightex CCD 031111-Modified for acer aspire on	405 nm laser n se			
Spe (f)	o Interval (ms) R	Full Scale Conce Scale Conce Scale Conce Scale Conce Scale Conce Scale Conce C	Boxcar Monit	or Acquisition Backgroun Correction	nd Auto A Scale	STOP				Build	OK (Cancel H	elp

After Building Executable File

- In this transformation, labview would drop necessarily SDK or DLL files sometimes. Please check all the function in the target computer.
- Of course, don't forget the drivers.