Resonon Shadow Instrument Software

Requirements (draft) 23 May 2012

Some definitions of data types (see earlier work, posted on web site):
http://data.moby.mlml.calstate.edu/mobyuncert/characterization/characterization.html
Background is what we get with the CCD camera closed (CCD setting is "disable closed"; the camera shutter is closed during "acquisitions")
Dark is what we get with the CCD shutter operating normally but with the fiber optic coupled channels "lens capped". With the present configuration (Romack input bundle), Dark is made by capping the ends of the fibers. In the final configuration (foreoptic, fiber/beamsplitter/fiber/shutter/fiber) this could mean we cap the entire system at the foreoptic or close the shutter.
Ambient is what we get with the CCD shutter operating normally, the fibers or optical system uncapped, but the light source is blocked – either the lamp is off or the sphere lamp is shuttered or there is an on axis baffle of some sort. An input fiber connected to a LED stability source with the source off is Ambient datatype.
Light is with the CCD shutter operating normally, the fibers or optical systems uncapped, and a light source is on.
Set is a collection of associated images (dark/light/dark or light/dark/light)
Sequence is a collection of Sets which, for example, have different datatypes

1, Follow Kaiser 2D example. See Steph's email to me Feb 23, 2012

2, Implement the following improvements (Not Prioritized; Not all necessary?)
1) save data as binary files to conserve space
2) option to save full image or binned data, with user input to track definition
3) if we bin the data and toss the full image, we need to save certain data so as to determine we have not saturated at a few pixels; Mark suggested Min (center of track), min (at each track top and bottom edge), max and median pixel ADU
4) operates both Pixis cameras simultaneously, sync'd (we might as well do this now so we can speed up the characterization and prepare for field work)
5) each track should have a configuration set by a configuration file. binning will need to be variable (Mark, did you mean on-chip binning?)
6) binning should have on chip and off chip (e.g. on the full image) options
7) real time (after an acquisition) of ADUs at a pixel(s) of user choice, for all 14 inputs
8) acquisition and read out of the two thermistor channels per spec
9) CCD camera settings, pull down, but default at typical values.
10) panel to open/close shutters. These shutters are used to select operational channels, e.g. when the number of inputs is less than 14 or we are doing cross talk characterizations. the status of the shutter for each channel needs to be recorded.
11) panel for ancillary data. environmental temperature comes to mind. A/D and DIO units
12) a warning light comes on when out of spec, e.g. saturation
13) an indicator of instrument ready, e.g. after a predefined warm up interval, or CCD has reached temperature, etc

14) marker (TTL pulse) to flag bad data in real time
15) real time processing to flag outliers based on stdev's
16) when set complete, immediately plot ratios so we can see what is happening
17) ability to input notes on cloud coverage, other ancillary data
18) correct for keystoning when we have full images
19) set/choose number of darks, lights in a Set and number of Sets in a Sequence

3, define the configuration files

Email Steph to Carol, Feb 23, 2012

Attached are the programs used in the Kiaser 2-D experiment and one data file. I had to change all the exe files to bak files and added an _xx to some other files extension so gmail would send them. Otherwise gmail would not send them. So just rename any bak files to exe and remove the _xx from any other files.

The dat files are full images of darks and lites. I think we need to be able to create full image files but it would also be nice it we could create files with just the tracks in them. Below is the description of the file header. I think this is the correct header info but I got this from a different data set so there might be a few changes.

Steph

ASCII file format and processing
Steve wrote a LabView script to take data with the Kaiser. The data are in ASCII with a header
which contains ...
Line 1 Example Oahu-12 Description CRUISE
2 20deg 16' LATITUDE
3 -157deg 53 LONGITUDE
4 MLML OL420 SOURCE
5 Comment: One Comments
6 6/10/2007 Date (MM/DD/YYYY)
7 8:50:10 PM Time
8 10.16 Temp
9 0.200 Integration time (s)
10 3 Number of lites
11 1 Number of darks
12 1 Type of scan (1 = means one set of each, 0 means darks and lites taken continuously)
13 6 Number of tracks
14 111111 Which track is on
The data starts with a single number on a line 15. If the number is -1 then the following 256
lines are dark scans. After reading in the 256 lines the next single number is read, if it is a -11
then the following 256 lines are lite scans. This continues until the end of the file is reached.
The first row in the 256 lines is bad and is marked as NaN for all scans.