FlatCaptureNow

Purpose

FlatCaptureNow is a control program that connects to TheSkyX Professional Edition and directs it to take a set of flat frames. It's designed to use at the end of your imaging session and does not have any "delayed start" options. I usually initiate the acquisition and then leave it running while I am closing up the observatory and putting other things away.

The program is designed to take multiple frames for each combination of filter and binning you used in your session. For example, a session might be to capture "32 flats each of 1x1 Luminance and 2x2 Red, Green, and Blue".

You also need a flat light source for flat frame acquisition and the program can slew your scope to point to it if it is in a fixed location.

The exposure time for a flat is selected to generate a given average brightness across the frame. This value, measured in ADUs, can be found online for your camera, and is usually about 30% of the camera's "full well depth". I use 25,000 ADUs for my QSI583. FlatCaptureNow manages the exposure time automatically, given the ADU target you want to achieve.

Initial Set-Up

The first time you run FlatCaptureNow, enter the Preferences menu and define the default settings that are used every time you set up a new Flats plan.

- Define the default number of frames you would like to take for each filter. (This, and all settings, is just a default and can be changed in each individual plan.)
- Indicate whether you use a filter wheel. If so, list what filters are in the slots. Give each filter a unique name. The filter names are used in the captured file names, so they can contain only letters and digits. Uncheck "Use" for filter slots you don't have or don't use.
- Define what binning settings you will ever use. There are 3 levels for each binning. "Default" means it will be included, with the default frame count, in each new plan. "Available" means it will be in the plan, with the number of frames initialized to zero, so you can take frames at that setting but won't get any as a default. "Off" means it won't show up in the plan at all.
- Define the default target ADUs you want, and how close (as a percentage) the program should try to get to this value before a frame is accepted. 10% is probably fine, but generally use 5% because I enjoy watching the program search for good exposures.

- If your light source is in a fixed location, record that location and indicate if you'd like the scope to slew to it. The easiest way to record the location is to point the telescope with TheSkyX and then click "Read Scope".
- Define where TheSkyX is running. You get more functionality if you run FlatCaptureNow on the same computer where TheSkyX is running, but it can run elsewhere on your network if desired.

FlatCaptureNow remembers what exposure lengths worked well from previous sessions and uses them as first estimates for new sessions, to speed up finding the right exposure. If, for some reason, these remembered exposures become inappropriate – such as replacing your light source – the "Reset Time Estimates" button will cause them to be recalculated next time. You don't have to do this – the program will adjust anyway; it will just take a little longer.

Normal Use

To create a new flat frames acquisition plan, start the program to get an empty plan window, or select File/New. The plan will be initialized from the defaults you established in Preferences and can be adjusted from there. Once defined, your flat frames plan can be saved to disk for easy reuse.

The bottom half of the plan window is a matrix of all filters and binnings you have selected, and the number of frames that will be taken of each of those. Click on a cell to type a different number.

If you turn on the "Slew to light source" checkbox, the scope will slew to your light source when you click "proceed". You can do an immediate Slew with the Slew button for testing or adjustment.

Where the bias frames go: If FlatCaptureNow is running on a different computer from TheSkyX, you can't control where the frames are saved from FlatCaptureNow. That is controlled on TheSkyX's computer, using TheSkyX's AutoSave button. If FlatCaptureNow and TheSkyX are running on the same computer, then you can select "local folder" and use the Set button to define the folder where the flat frames go.

In both cases, the destination folder ***must already exist*** before you click Proceed. TheSkyX's interface can't create the folder and you will get an error if it doesn't exist. So if you are using the "TheSkyX Autosave" option, ensure TheSkyX is pointing to an existing folder. Don't select TheSkyX's "create date-based subfolders" option, because those folders don't already exist and the attempt to save frames will fail.

FlatCaptureNow does not interact with your camera's temperature controls, so the camera's cooler should already be on and at the target temperature. (Since I usually do this process at the end of the imaging run, the camera is already in this state.)

When the plan is ready, click Proceed and these steps will happen:

- A progress window appears showing all the frames that will be taken and where you are in the plan.
- The scope slews to your light source if that option is selected.
- The program asks TheSkyX to take sample bias frames (without saving them) to time downloads.
- The program asks TheSkyX to take all the frames listed in the plan. It will find an exposure that generates the desired average ADU level, and then continue to refine the exposure as acquisition proceeds. If the light conditions change and the frames become too dark or too light, bad frames will be rejected, and the exposure will continue to adjust to get the frames back in the desired range. In future runs of the plan, the exposures that worked well last time will be used for the initial trial exposures.