

pco.camera plug-in for ImageJ

Version 1.04

User's Guide

September 2011



Introduction

One of the greatest features of pco.camera is its built-in memory, which makes it possible for image recording to be independent of the computer system and controlling software. In that sense, the time performance of the software as well as its residing operating system may have very little impact on many time critical applications. Low cost or even free software at the slower side may well achieve the same purpose as those faster and expensive counterparts.

ImageJ, among other free software, has its distinguished extensibility and many add-on plugins to choose from to configure your software environment. Taking the advantage of open source and conveniently built-in compiler, you can easily customize many of the plugins to your specific needs. The sources are open, so are the possibilities.

This ImageJ plugin for pco.camera is created with the very principle that gives you the freedom of exploring the camera's full capabilities without the burden of cost. The plugin incorporates almost all the features of the camera, allowing user to record in real-time and access live images or after recording.

Features:

- 1) 16 bit gray
- 2) Binning up to 2x8 and external trigger
- 3) ROI granularity to per pixel
- 4) 5 predefined methods of CamRam segmentation
- 5) Adjustable pixel rates
- 6) Double Analog-Digital Converters

System Requirements

ImageJ is platform independent but not all its plugins. Any plugin that involves calling of Native Interface/APIs is platform specific. This plugin of pco.camera is written for Microsoft Windows, targeting Windows 2000 and XP only. A separate version for Macintosh system may also be available in the near future.

Components required by the plugin:

- 1) pco.camera firewire driver
- 2) ImageJ version 1.30 or later

These items are available for download from

<http://www.cookecorp.com/techsupp/ftp.htm>

and

<http://rsb.info.nih.gov/ij/>

Please read instructions in each package for installation details of these components. You should also install CamWare to test the driver, library match, physical connections as well as basic operations.

Installation of Plugin

Assuming you have pco.camera driver and ImageJ installed on your computer. To install pco.camera plugin, you need to place all files contained in the zip-file into the ImageJ plugin folder under a new folder called 'pco', e.g. 'c:\Program files\ImageJ\plugins\pco'. In case you use other interfaces than firewire you have to place the additional driver dlls into the newly created folder. These dlls are:

for Matrox-interface:

- sc2_cl_mtx.dll
- clsermtx.dll
- mtxclsermil.dll

for Silicon Software Me III-interface:

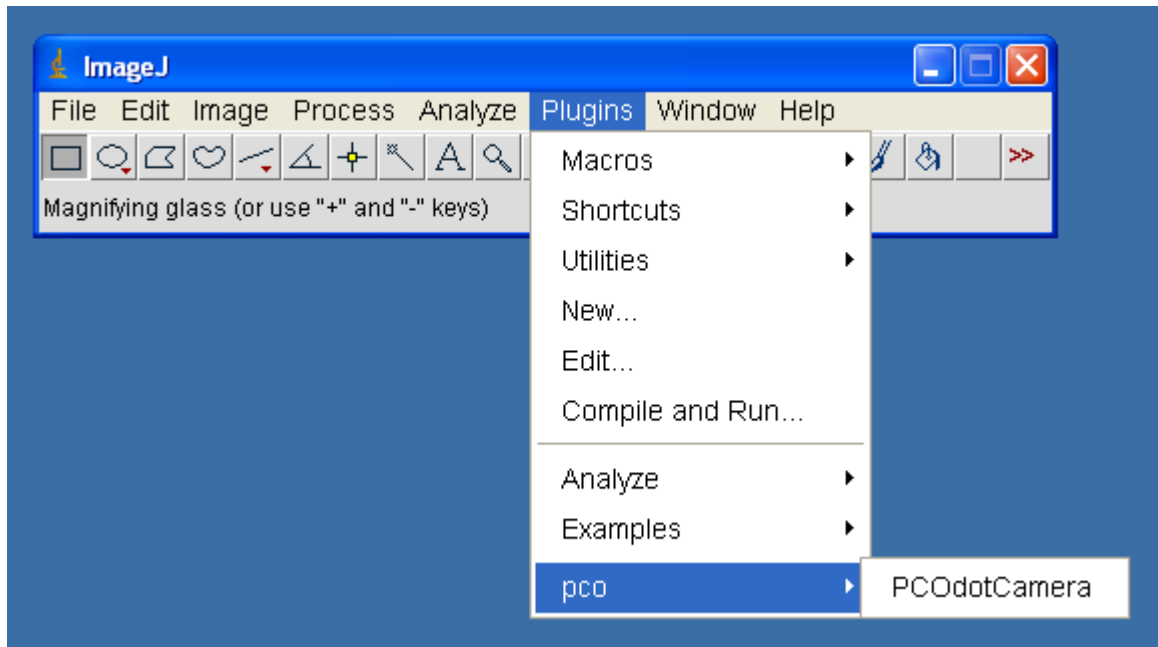
- sc2_cl_me3.dll

and for National Instruments-interface:

- sc2_cl_nat.dll

All the files can be found inside the Camware installation folder.

You are ready to load the plug-in from ImageJ, as listed under menu “plugins” in the name of “pco-pcodotcamera”

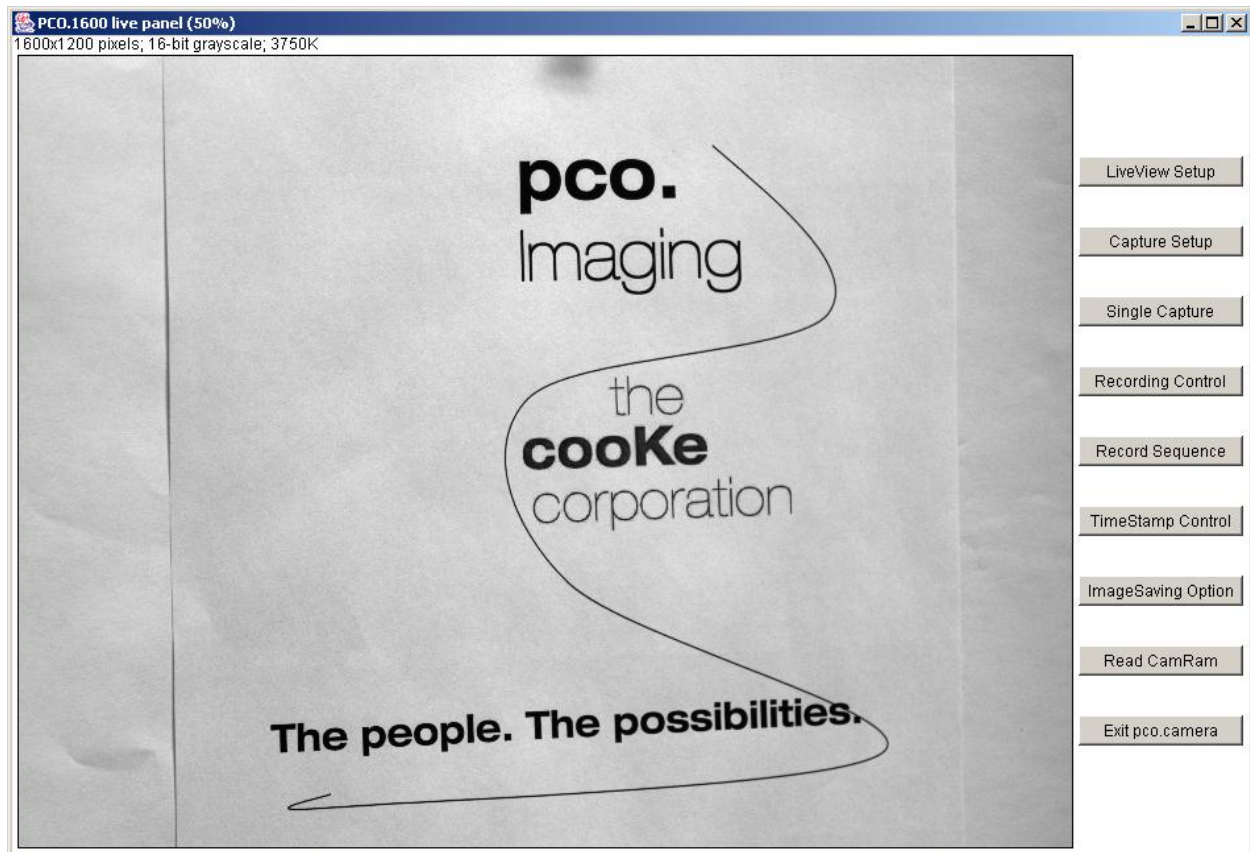


Control and Commands:

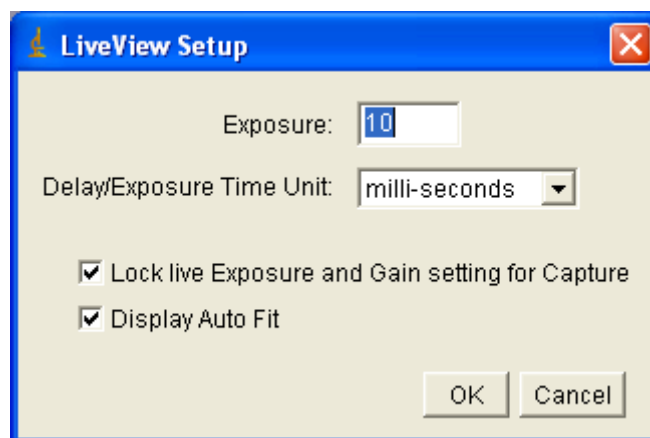
Depending on the camera type and built-in features, the command menu and the user interface may vary from camera to camera, The following illustration is based on pco.1600 camera type. The functional description is general to all if applicable.

When invoked, pco.camera runs live view with default exposure 30 ms and display is autofit with IJ's lookup table.

The pco.camera plugin maintains two separate settings for “Liveview” and “Single Capture/Record Sequence” respectively. Liveview uses the whole CamRam as a single segment and runs in auto-trigger mode only; the user control of liveview is limited to adjustment of exposure. However, you can access and control almost all the camera features through “capture setup”. When you run “single capture” or “record sequence”, the “capture setup” applies. Effectively, “capture setup” is the camera control window for your acquisition and recording.



- Live View Setup:
This command activates Live view and accepts user input for liveview control.

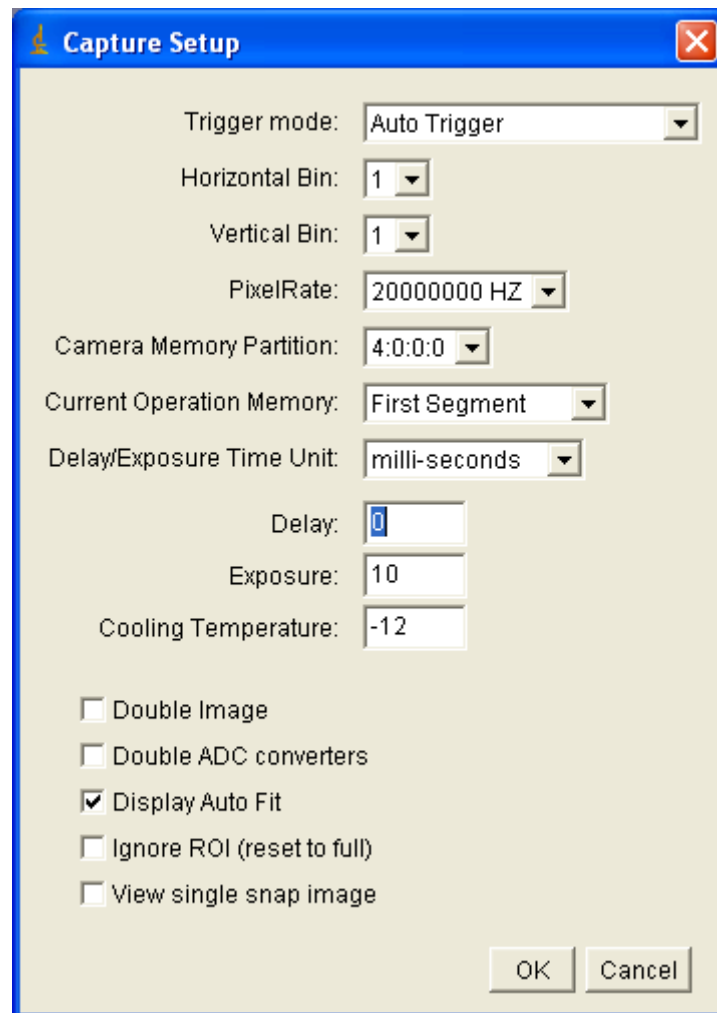


User can control exposure and lock the exposure time for capture by validating its checkbox. By checking “Display Auto Fit”, the images are automatically adjusted for display purpose.

Exiting from this dialogbox with “OK” accepts new setting and activates liveview with the new setting; “Cancel” remains the earlier setting.

- Capture Setup

This panel controls the camera setting for Capture Image and Record Sequence.

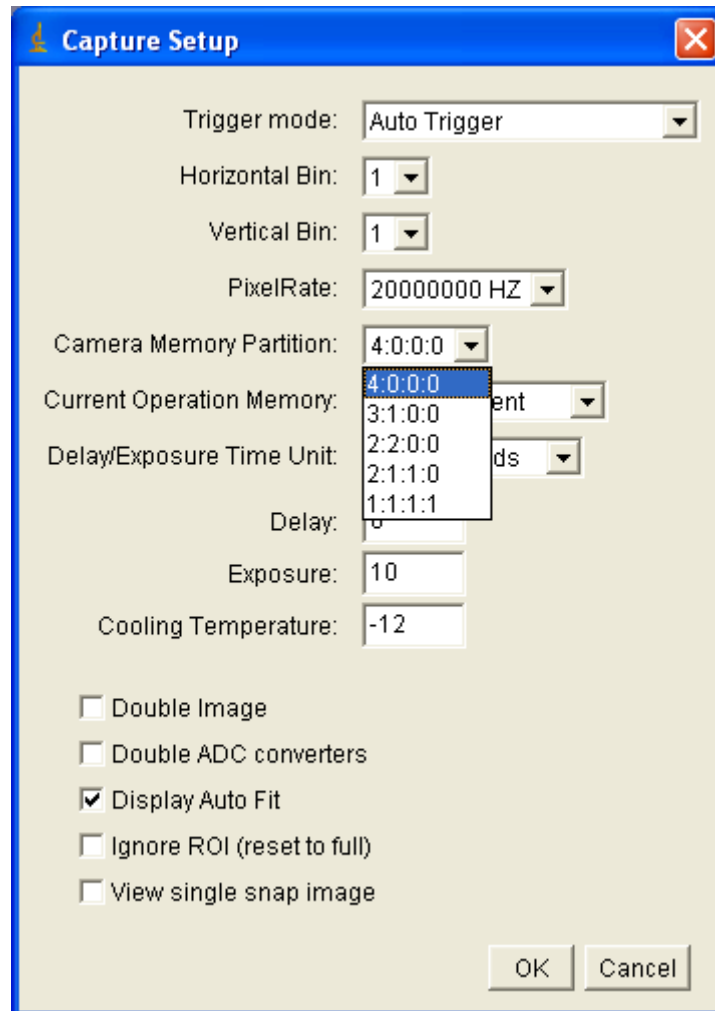


All 4 trigger modes are available (as defined in camera operation manual). When “auto-trigger” is set, “single

capture” or “record sequence” will initiate the continuous recording in CamRam. Users must distinguish CamRam recording and disk recording in this context. “record sequence” refers to the disk recording of image files. While you record images as files, many more images can be saved into CamRam for you to load later on.

Calling "Single Capture" or "Record Sequence" terminates live view if running, and captures one single image or a sequence image respectively. “Read CamRam” (which will be described later in detail) stops CamRam recording when needed.

There are 5 predefined CamRam segmentations, each digit representing the proportion of total memory for that particular segment.

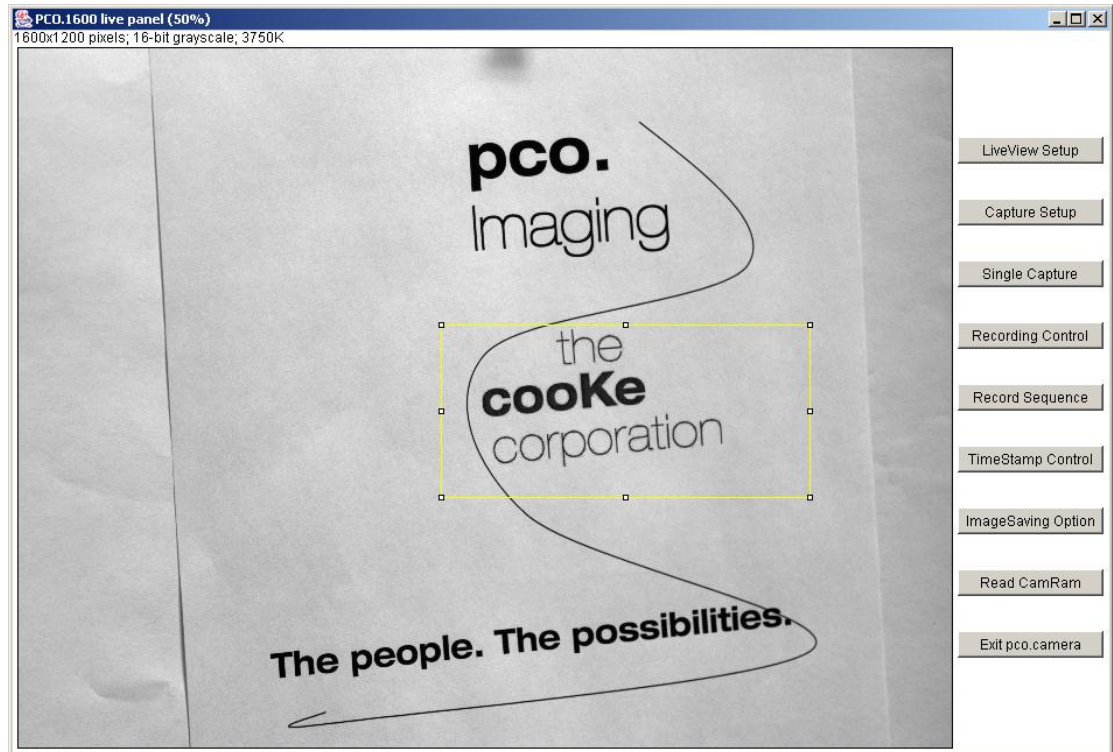


As illustrated in the following diagram, a method of 4:0:0:0 has CamRam unified as a single piece in the “First Segment”; while

1:1:1:1 requests the equal partitioning of CamRam into four segments. “Current Operation Memory” is where you switch between segments. You can record in one segment with one setting and switch to another for something different. All the images recorded in different segments are retained until you request a different segmentation method through “Camera Memory Partition”. CamRam re-partitioning erases all the previous contents.

The delay and exposure time can be set in milliseconds, microseconds or nanoseconds. The definition ranges under each unit is defined in camera operation manual. The delay controls the CamRam recording pace in “auto-trigger” mode, which may also, has an impact on disk recording.

Image Region of Interest is set through mouse-draw action. You can drag and draw on the liveview screen and the ROI selected is remembered and applied to “Single Capture” or “Record Sequence” in combination with other settings. “Ignore ROI” resets the ROI to full resolution.

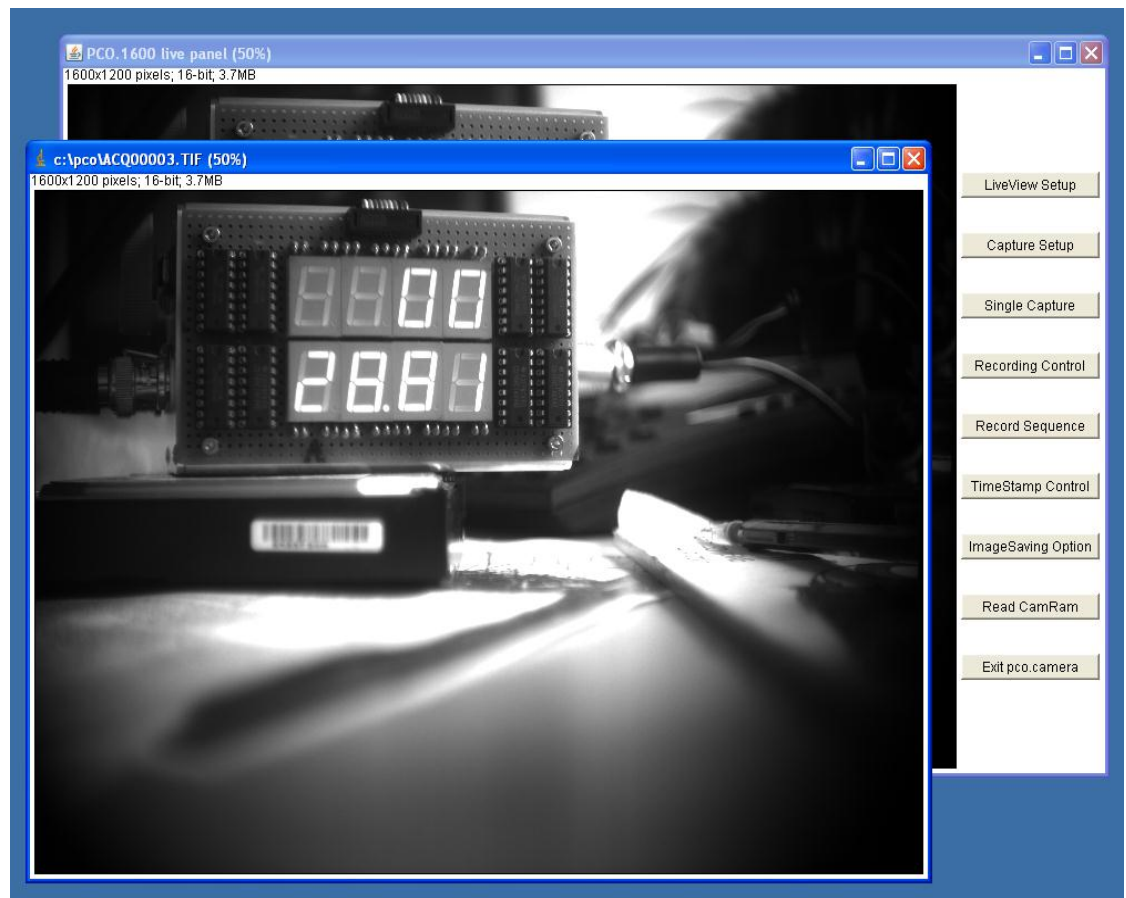


Please note that ROI is defined on the full-resolution. You can only drag on the liveview panel. You can bin and ROI, but you can not cut ROI on a binned image. Whenever you need to bin

a small area, you should set ROI on a full-res image and then setup binning following the ROI operation. The opposite direction is not supported.

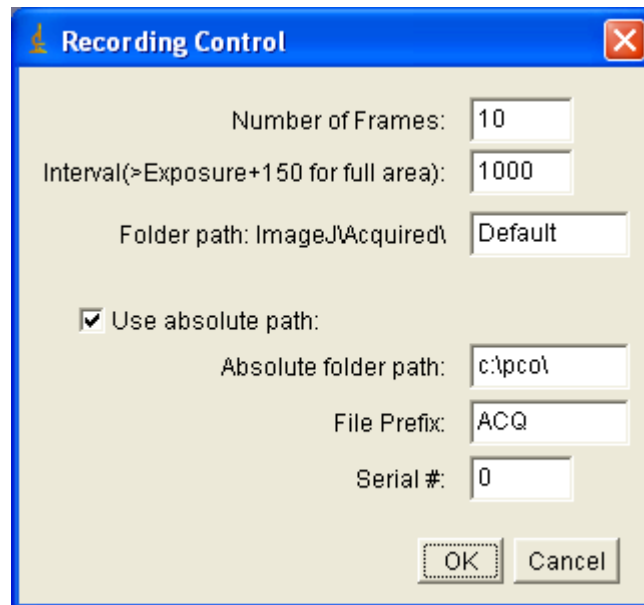
- Single Capture:

The command is issued to capture a single image with the current “Capture Setup” and ROI (if set). The image is displayed in a separate panel and saved accordingly. When operated in “auto-trigger” mode, this action also triggers the continuous CamRam recording in the operation segment. The recording can be stopped by calling “Read CamRam”.



- Recording Control

Sets the disk recording pace and file name serials, refer to ImageSavingOptions for file naming.



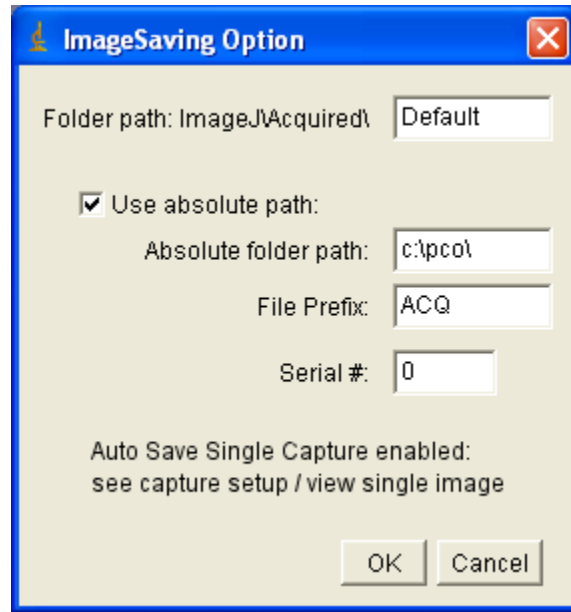
- Time Stamp Control

This interface allows you to timestamp your image. The fonts of the text are controlled by definitions inside Java code. You can change the definition and recompile for different fonts or size.



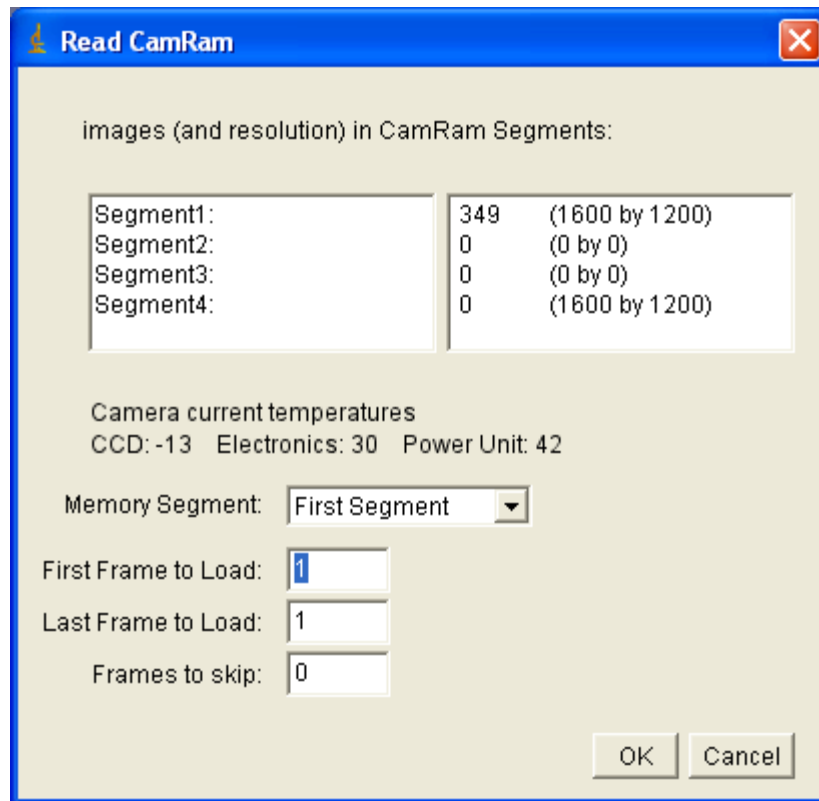
- ImageSavingOptions

Choose the path and file name for single image saving, a file is such named as ACQ0001.TIF for the example, with a prefix and 4 digits. The Serial # specifies the starting number. The number is incremented with each saved image.



- Read CamRam

The images recorded in CamRam can be retrieved through this interface. The table lists image counts and resolution in each segment. You can select to read out a number of existing images (must be valid numbers less or equal to the count) and skip a fixed number of frames. For example, if you set 1, 10, 2 for the three numbers in sequence, you would read out frames 1, 4, 7, 10. The images loaded can be directly saved as controlled by "ImageSavingOptions"

The image shows a Windows-style dialog box titled "Read CamRam". It has a blue title bar with a close button in the top right corner. The main area is light beige. At the top, it says "images (and resolution) in CamRam Segments:". Below this is a table with four rows. The first row shows "Segment1:" with values "349" and "(1600 by 1200)". The next three rows show "Segment2:", "Segment3:", and "Segment4:" all with values "0" and "(0 by 0)". Below the table, it says "Camera current temperatures" followed by "CCD: -13 Electronics: 30 Power Unit: 42". Then there is a "Memory Segment:" label followed by a dropdown menu showing "First Segment". Below that are three input fields: "First Frame to Load:" with the value "1", "Last Frame to Load:" with the value "1", and "Frames to skip:" with the value "0". At the bottom right are "OK" and "Cancel" buttons.

Segment	Count	Resolution
Segment1:	349	(1600 by 1200)
Segment2:	0	(0 by 0)
Segment3:	0	(0 by 0)
Segment4:	0	(1600 by 1200)

Camera current temperatures
CCD: -13 Electronics: 30 Power Unit: 42

Memory Segment:

First Frame to Load:

Last Frame to Load:

Frames to skip:

Any comments, questions and suggestions? Email: info@cookecorp.com, We will do our best to accommodate your needs. Enjoy the success of Imaging with ImageJ and pco.camera.