Camera Frame Rates

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Revision:	8/28/15

We are finding that the frame rate that we are able to obtain from some cameras depends on the computer to which it is attached. The USB webcams do not appear to be as susceptible to this variation, but the 1394 (FireWire) cameras are. Below are the results of an experiment done with an AVT Marlin F131b camera on two different computers. In each case we were measuring a laser beam profile with the smallest exposure time possible (11µs). The 5000 images were read into a Matlab script through a COM interface to the device. The average frame rate was determined by dividing the number of frames by the amount of time the test took to run.

Frame Size	HP Pavilion D4100Y (fps)	Dell Vostro 200 (fps)
64x64	396	1138 ± 6
128x128	315	721 ± 2
100x100	-	882 ± 3

In the two computers we used for this testing we clearly saw a very large variation in the frame rate performance. This is probably due to a variety of hardware differences between the computers including processer speed, memory speed, quality of the FireWire interface, and maybe operating system (32-bit Vista on the Dell vs 32-bit XP Pro on the HP). We do not have enough data to determine which of these factors is the most important, but will update this note as we get more information. If speed matters to you on an experiment, we recommend that you get the highest quality computer interface you can afford.

UPDATE: Frame Rate Testing within the AOS Adaptive Optics Software

We recently completed some additional frame rate testing inside the AOS adaptive optics software version 1.8.7. The results of this testing are shown in the table below. We considered binning and non-binning frames. We considered only square frames with the top left corner at (0,0). We considered acquisition only and acquisition and normal centroiding with slope calculations. We considered triggering with an internal PCIe 6259 card and without triggering.

In general, we found that triggering dropped the frame rate by a factor of about two. On-camera binning did increase the frame rate for the smaller frames, but had less of an impact for larger frames.

Update: More Measurements

We are continuing to update this application note as we experiment more on different cameras.   Since the original writing, the Manta F131b has been discontinued.

Additional Frame Rate Testing

From the AOS Software – Marlin F131b

Triggering	Square Frame Size (Pixels):	No Binning (1280 x 1024)				2-Axis 2-Pixel Binning (640 x 512)			
	Type	64	100	200	300	64	100	200	300
Triggering	Type	(fps)	(fps)	(fps)	(fps)	(fps)	(fps)	(fps)	(fps)
None	Acquisition Only	1300	665	178	119		1107	266	127
None	Acq. With Centroiding		664	174	80		627		
Triggered - NI 6259 P0.2	Acquisition Only	611	329	110	54	613			54
Triggered - NI 6259 P0.2	Acq. With Centroiding	624	303	105	51	617			50

From Matlab using the testCam1394.m Script

Triggering	Square Frame Size (Pixels):	No Binning (1280 x 1024)			
	Type	64	100	200	300
Triggering	Type	(fps)	(fps)	(fps)	(fps)
None	Acquisition Only	549	491	240	103
Triggered - NI 6259 P0.2	Acquisition Only	348	229	118	80

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Measured Acquisition Rate – Vimba Viewer Software v1.3.1- Untriggered – Minimum Exposure

Camera	64x64	128x128	256x256	64xFull Width	Full Resolution
Prosilica GE680C	1121	664	366	1121 (640pix)	205 (640x480 pix)
Mako G419B	731	393	203	730 (2048 pix)	26 (2048x2048)