

Procedure to Double the Frame-rate of two Chronos Cameras

In this application document you can find instructions to increase the frame-rate of Chronos cameras by 2 fold.

1. You will need:

1. Two Chronos cameras, it is better if they are the same type and model, i.e 1.4, monochrome
2. 2 lenses of the same type is preferred
3. A device that provides an external signal to the cameras, with a minimum of two channels, i.e., a function generator, BNC, or data acquisition card
4. A signal that triggers the external signal device
5. 2 BNC cables

2. Procedure

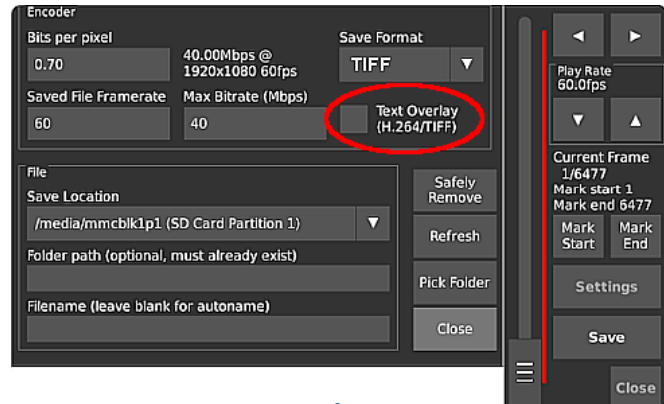
1. Send a TTL signal into each channel of the function generator.
2. Connect a BNC cable from the function generator's channel 1 to camera 1 and one more from the function generator's channel 2 to camera 2.
3. Set the frequency of channels 1 and 2 to the desired frequency. In this case we set it to 1,000 Hz.
4. Set the duty cycle of each channel, this defines the exposure time of each camera.
5. Set channel 2 delayed with respect to channel 1 by $\frac{1}{2}$ the interframe time, in our test is 500 μ s.
6. Set the cameras' frame-rate to a frame rate higher than the function generator's output frequency.
7. In both cameras 1 and 2 go to the "Trigger/IO Settings" menu. In the IO 1 BNC area select **Shutter gating**.
8. Adjust the camera focus and scene such that each camera has approximately the same field of view. Also, make sure the object of interest appears on each camera's screen at approximately the same position.

IO 1 (BNC)			
Threshold 2.50	<input type="radio"/> Record End Trigger	<input type="radio"/> None	<input type="radio"/> Frame Sync Output
<input type="radio"/> Toggle	<input type="radio"/> Exposure Trigger	<input type="checkbox"/> Debounce	<input type="checkbox"/> 20mA Pullup
	<input checked="" type="radio"/> Shutter Gating	<input type="checkbox"/> Invert	<input type="checkbox"/> 1mA Pullup
IO 2			
Threshold 2.50	<input type="radio"/> Record End Trigger	<input checked="" type="radio"/> None	<input type="radio"/> Frame Sync Output
	<input type="radio"/> Exposure Trigger	<input type="checkbox"/> Debounce	<input type="checkbox"/> 20mA Pullup
	<input type="radio"/> Shutter Gating	<input type="checkbox"/> Invert	
Input 3 (Isolated)		<input checked="" type="radio"/> None	
	<input type="radio"/> Record End Trigger	<input type="checkbox"/> Debounce	
	<input type="radio"/> Exposure Trigger	<input type="checkbox"/> Invert	
	<input type="radio"/> Shutter Gating		
		IO1: Hi IO2: Lo In3: Lo	<input type="button" value="OK"/>
		<input type="button" value="Apply"/>	<input type="button" value="Cancel"/>

For Reference

2. Procedure - Continuation

9. Set the illumination for each camera. It is more convenient if both cameras are the same type, for instance 1.4 or 2.1 and either monochrome or color. In this way it is easier to have similar intensity of the scene and resolution.
10. When everything is ready, press the record button of each camera. The cameras will start recording once the signal from each channel of the function generator is sent to the cameras.
11. Save the image as TIFF, go to **Settings** and select **TIFF**.
12. Suppress the time stamp from the camera, it will be different after the images of the two cameras are put together. Go to **Settings** and deselect **Text Overlay**.
13. View the videos recorded from each camera
14. Each camera records the files with the same numbering, starting from 0 to n in increments of 1. Thus you need to rename the images recorded.
15. The images from camera 1 need to be saved as Frame001, Frame003, Frame005, etc. and those from camera 2 as Frame002, Frame004, Frame006, etc.
16. You can visit the following site: <https://pynative.com/python-rename-file/>. It provides scripts that show you how to rename files in a folder automatically. It is especially useful if you need to rename a large amount of them.
17. You may need to adjust the image intensity of the videos or the position where the object of interest is located in the image so they appear as if they are from the same recording.
18. Once the files are sequentially numbered and placed in the same folder they can be opened and seen as a single video.



For Reference