Synchronous Snapshots Application Note

In many instances you need to take synchronous snapshots from multiple cameras. There are two primary ways you can do this. The two methods are Software Triggering and Hardware Triggering.

Software Triggering

To capture snapshots from multiple cameras all you need to do is call LucamTakeSynchronousSnapshots(). Before you call this function you need to setup which cameras you want to take synchronous snapshots from. This is done by calling LucamEnableSynchronousSnapshots(). Once you have completed taking all the snapshots you wish to take, a call to LucamDisableSynchronousSnapshots() will tear down the synchronous snapshot mode.

To setup for synchronous snapshots you start by providing one LUCAM_SNAPSHOT for each camera you wish to acquire a snapshot. Then you create an array of LUCAM_SNAPSHOT structure pointers and copy the memory address of each LUCAM_SNAPSHOT structure you defined earlier into the array members.

Next, you create an array to hold the handles for all the open cameras you wish to acquire snapshots. Again, copy these handles into the array members so that the camera handles are at the same array index as its corresponding LUCAM_SNAPSHOT structure in the structure pointer array.

Once you have completed all the LUCAM_SNAPSHOT structures, created the appropriate structure pointer array and camera handle array you can call LucamEnableSynchronousSnapshots() to setup the synchronous snapshot mode. If this call is successful you can now call LucamTakeSynchronousSnapshots() to capture the first set of synchronous snapshots. You need to allocate memory large enough to hold all the captured images that will be taken. This memory must be contiguous or the API will fail when accessing this buffer. Upon completion of the call to LucamTakeSynchronousSnapshots() the buffer will contain the images from all the cameras that were requested during the setup. The images will be glued together in the buffer provided. You can determine the start of each buffer from the parameters you provided (width, height and pixel depth) in the respective LUCAM_SNAPSHOT structures.

You can call LucamTakeSynchornousSnapshots() as many times as needed to acquire synchronous images. Call LucamDisableSynchronousSnapshots() to tear down the synchronous snapshot mode and run the cameras normally.

Hardware Triggering

The advantage to using the hardware to trigger the capture of synchronous snapshots is that there will be less delay between the capture of images from each camera. When using the Software Triggering, the LuCam API triggers the acquisition of each image in sequence. This causes a slight delay between the start of the image capture on the first camera and on the last camera. Another advantage to this method is the ability to use a hardware event to trigger the start of the acquisition of all the snapshots.

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Lumenera Corporation
7 Capella Crt
Ottawa, ON, Canada
K2E 8A7

www.lumenera.com
(613) 736 - 4077

The disadvantage to this method is its complexity to setup all the cameras and to propagate the trigger event through all the cameras.

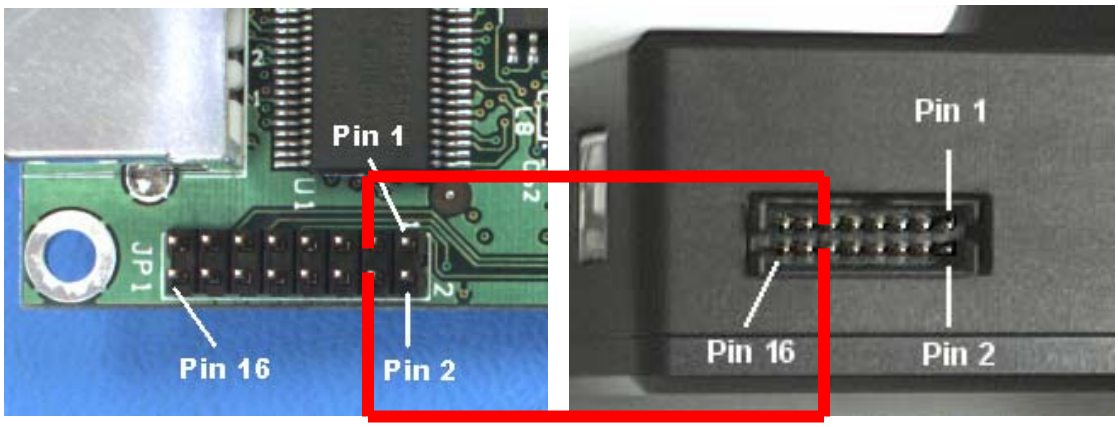
Camera Hardware Setup

The best way to describe the camera setup is as a Master-Slave relationship. You will designate one camera as the Master in the system and all the other cameras as its Slaves.

The Master camera will be the one that will trigger all the other cameras to start acquisition of the image. This method will take advantage of the secondary functions of the camera's GPIOs.

The Slave cameras will be the ones that will be triggered by the Master to start the acquisition of the image.

The first step is to create a cable that will connect to pins 3 and 4 of the Master camera's GPIO port to all the Slave cameras' pins 9 and 10 respectively (as shown in the figure below).



Master Camera **Slave Camera**

If you are connecting more than one Slave camera you may want to make a simple circuit that will split the signal from the Master camera and go to all the Slave cameras. Otherwise, you can daisy-chain the cameras by connecting each Slave Camera's pins 3-4 to the next Slave camera's pins 9 and 10. This will introduce some propagation delay in the acquisition of the snapshots that may be undesirable in some applications.

To setup the Master camera to receive a hardware event as a trigger for the synchronous capture of snapshots, connect the trigger signal to pin 9 of the Master camera and the Ground return of the trigger signal to pin 10.

Lumenera Corporation
7 Capella Crt
Ottawa, ON, Canada
K2E 8A7

www.lumenera.com
(613) 736 - 4077

Camera Software Setup

The camera software should be setup as if it was using a software trigger (see Software Triggering section above). The difference here is that you will need to enable the useHwTrigger in the LUCAM_SNAPSHOT structure on all the Slave cameras and enable the useStrobe on the Master camera.

If you have setup the cameras to daisy-chain the trigger you will also need to enable the useHwTrigger in the LUCAM_SNAPSHOT structure for all the Slave cameras.

If you have a hardware event that will trigger the acquisition of all the snapshots you will also need to enable the useHWTrigger on the Master camera.

Once you have setup the LUCAM_SNAPSHOT structures for all the cameras with the appropriate settings for useHwTrigger and useStrobe for all the cameras you can take snapshots as was described in the Software Triggering section above.

Lumenera Corporation
7 Capella Crt
Ottawa, ON, Canada
K2E 8A7

www.lumenera.com
(613) 736 - 4077