	Subject: Sync. acquisition from 4 Teli 8550i on the mvTITAN-RGB/G4	Created	Last change
		28.07.03	28.01.04
Application Note	Project:	Camera integration	Version 1.1

Goal

4 Teli 8550i shall be connected to the mvTITAN-RGB/G4. Synchronized images shall be acquired from all 4 cameras in parallel.

Imprint

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This document requires the general knowledge of the usage and the technical data of the used frame grabber, camera and application.

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Connection

In order to be able to acquire images from all 4 cameras in parallel with the mvTITAN-RGB/G4 the cameras have to be synchronized with respect to the start of the image(VD) and the start of the line(VD). This can be achieved by one of the two following methods:

mvTITAN-RGB/G4 synchronizes all cameras

This is the recommended method of synchronization, because here the complete control can be managed by the frame grabber and therefore all events can be controlled by the software.

Pin assignment:

mvTITAN-RGB/G4			camera 1	camera 2	camera 3	camera 4
pin	signal		signal	signal	signal	signal
2	video in 1 (PAL 1)	←	video out			
3	video in 2 (PAL 2)	←		video out		
4	video in 3 (PAL 3)	←			video out	
5	video in 4 (PAL 4)	←				video out
19 or. 24	Gpout 0 or. VD out	→	VD / trig In	VD / trig In	VD / trig In	VD / trig In
26	HD out	→	HD In	HD In	HD In	HD In

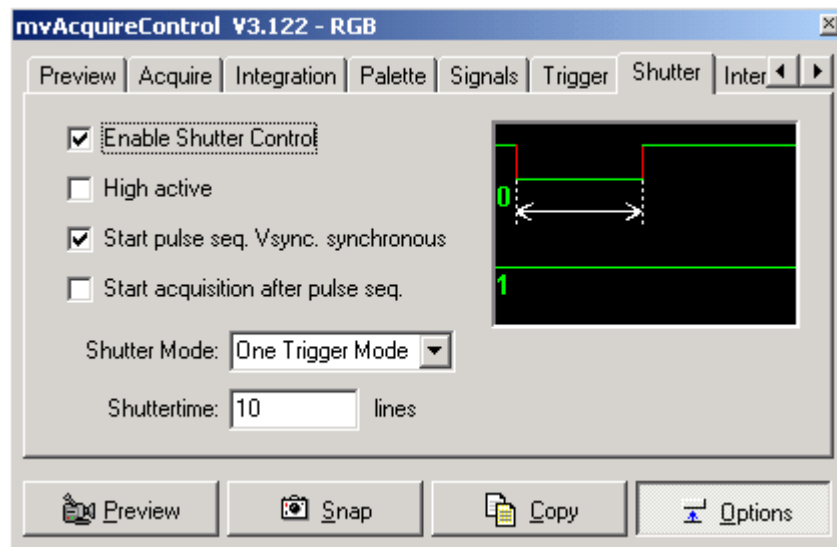
For this way of connecting the signals it is required, that the cameras can operate in a mode, which makes external synchronization possible. In addition to that the camera has to transmit image start and line start signals within the video signal. If this is not the case, the *VD out* and *HD out* outputs of the mvTITAN-RGB/G4 have to be connected with the *VD in* and *HD in* inputs of the mvTITAN-RGB/G4 as well, but for the Teli 8550i this is not necessary, as this camera transmits these information

Operation

All 4 cameras expect an *image start* and a *line start* signal, which both will be generated by the mvTITAN-RGB/G4. The *line start* signal is generated on the mvTITAN-RGB/G4 once with a pre-defined frequency and pulse width and will be generated continuously from that time on. The *frame start* signal can either be generated the same way, which would mean, that this signal as well is generated continuously from the point of definition with a fixed frequency, or an external trigger signal can be used as to generate this signal each time a trigger event is detected.

If the *image start* signal shall be transmitted continuously the pin *VD out* has to be used. For the externally triggered mode one of the digital I/O pins has to be used. In this case it is recommended to use the *GPout 0* pin as in this case the shutter control of the mvAcquireControl can be used to control the image acquisition. For the Teli 8550i the basic setup of the shutter control would look like in the following picture:

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In this mode the *image start* signal will be generated on the *GPout 0* pin.

Cameras synchronized externally(master-slave-approach)


When using this method one camera generates the *image start* and a *line start* signal (master camera). These signals are connected with the HD- and VD-inputs of the other cameras (slave cameras). In this case there is no possibility to control the image acquisition via the frame grabber.

Pin assignment:

mvTITAN-RGB/G4			camera 1	camera 2	camera 3	camera 4
pin	signal		signal	signal	signal	signal
2	video in 1 (PAL 1)	←	video out			
3	video in 2 (PAL 2)	←		video out		
4	video in 3 (PAL 3)	←			video out	
5	video in 4 (PAL 4)	←				video out

Operation

The master camera generates the necessary start signals. These signals are used by all the slave cameras. The mvTITAN-RGB/G4 acquires the image data transmitted from the cameras, but has no possibility to influence the way the image data is generated.

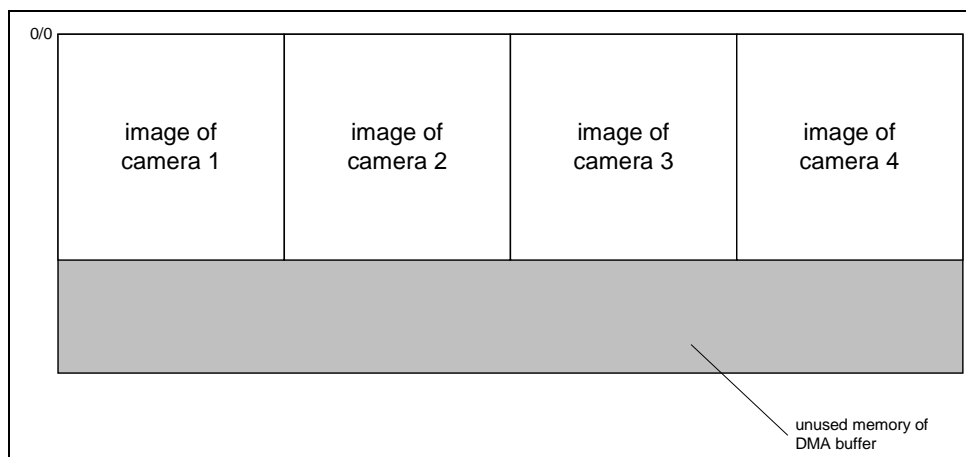
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Programming

To operate the mvTITAN-RGB/G4 in a mode, where it is possible to acquire images from more than one camera in parallel special colour modes must be used:

- COL_G2 -> for the acquisition from 2 inputs in parallel
- COL_G3 -> for the acquisition from 3 inputs in parallel
- COL_G4 -> for the acquisition from 4 inputs in parallel

The images will be stored beside each other in the frame grabbers DMA memory. The following picture illustrates how the data would be stored, if colour mode COL_G4 would be used:



The video mode, which has to be used depends on the used cameras. This setting has no influence on the number of inputs to acquire in parallel from.

The input channels can be selected from 1 to 2 in colour mode COL_Gx, where channel 1 represents the RGB input 1:

- channel 1 -> image data will be acquired from the upper connector (J9)
- channel 2 -> image data will be acquired from the lower connector (J11)


Depending on the video input pin which has the sync. information in it's signal, the correct sync. input has to be selected. In most applications each video signals contain sync. signals (HD&VD). In this case the sync. input can be set to 1 (J9) or 5 (J11).

When some kind of variable scan method is used (HD & VD information is not in the video signal but on separate pins) the sync. input pin is not relevant.

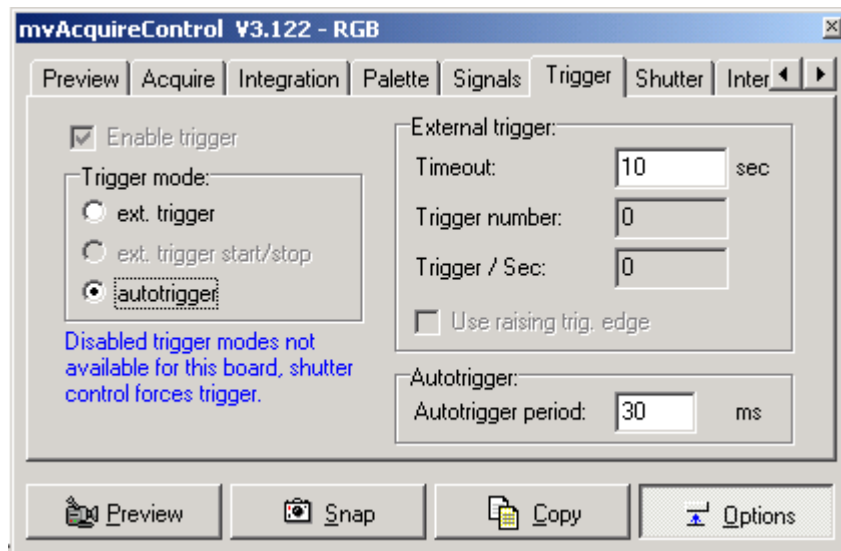
When the cameras are synchronized from the mvTITAN-RGB/G4 the frame grabber has to be instructed to generate the necessary HD and VD signals:

- The HD signal is generated by calling the function *mvDefDisplayMode()* either from the application or from the INI file.
- The VD signal can either be generated by the function *mvDefDisplayMode()* (VD out pin) or by defining a pulse sequence with the function *mvDefPulseSeq()* as it is done by the shutter control in the mvAcquireControl on the GPout-pin.

Generating the VD signal by the use of a pulse sequence (or the shutter control in the mvAcquireControl) has one major advantage: The VD signal output can be controlled either by the calling application or by an external signal. There are several ways to control the VD signal:

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- Single creation of the signal via software by making use of the function *mvWriteDigIOBit* (*dev, 15,1*);
- Periodically creation of the signal by making use of the auto trigger. Here the frequency can be defined with the function *mvSetTriggerPeriod()*. In the mvAcquireControl this can be achieved by using the auto trigger mode on the trigger tab. As the Teli 8550i can transmit up to 30 full frames per sec. in non interlaced mode, the trigger period has been chosen close to 1/30 sec.:



- Generation of the signal synchronous to the external trigger signal, which must be connected to the external trigger input of the mvTITAN-RGB/G4. This can be activated by using the function *mvSelExtTrig*(*dev, 1*);


A more detailed description of the mentioned functions can be found in the frame grabbers manual of the mvTITAN-RGB/G4.

Function mvDefDisplayMode

Syntax: void mvDefDisplayMode (DEV_T FAR* dev, WORD mode, CHAR* name, WORD type, WORD xvisi, WORD yvisi, WORD xtotal, WORD ytotal, WORD xstart, WORD ystart, WORD hsync, WORD vsync, WORD pol, WORD vid, WORD gain, WORD hFreq)

Description of the function:

Using the function *mvDefDisplayMode* (..) sync. signals can be generated, which will be put out to the HD out and VD out pins of the frame grabber. The generated signals can be used for the synchronization of cameras.

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Parameter:

dev:	device-handle
mode	Currently not supported
name	Currently not supported
type	Currently not supported
xvisi	0 for camera synchronization
yvisi	0 for camera synchronization
xtotal	Overall pixel per line
yttotal	Overall lines per frame
xstart	Not used for camera synchronization: 0
ystart	Not used for camera synchronization: 0
hsync	HD-pulse width. Low pulse width in pixel
vsync	VD-pulse width. High pulse width in lines
pol	Not used for camera synchronization: 0
vid	Not used for camera synchronization: 0
gain	Not used for camera synchronization: 0
hFreq	Frequency of the line clock signal (HD) in Hz

Return value: void

Sample for the Teli 8550i

This sample has been created for a Teli 8550i camera with a line clock of 15,734 kHz.

```

...
[TITAN]
SetLogDevice "TEST.LOG"

InitBoard
InterpretIni "camdefs.ini" 0L "[CameraDefs]"
SelCamera "CS8550i-NI"
DefDisplayMode 0 NULL 0 0 0 840 262 0 0 10 12 0 0 0 15734
...

```