PLC Self-triggering in GEV

PLC programming in GEV environment

GEViCAM GigE cameras have GPIO pins to input and output the external or internal timing pulses such as trigger or strobe control. In GigE Vision (GEV) protocol camera models, mode control and GPIO controls are implemented in GenApi using the GenIcam naming convention. With GevApi such as GEV Player, IMAQ, or MIL Intellicam, camera attribute controls are named differently than for iPort protocol models.

Camera hardware and internal firmware are basically the same for GEV and iPort models, but to conform with the GigE Vision standard, GEV must comply with the common requirements. Because GPIO and PLC are unique functions in GEViCAM, PLC descriptions and controls are redefined for GEV models.

GenApi tree for PLC related controls

The following demonstrates this for the GEV Player of Pleora SDK 2.3.3.
The GenApi tree is common to and almost identical for all application software providers and appears like Fig. 1.
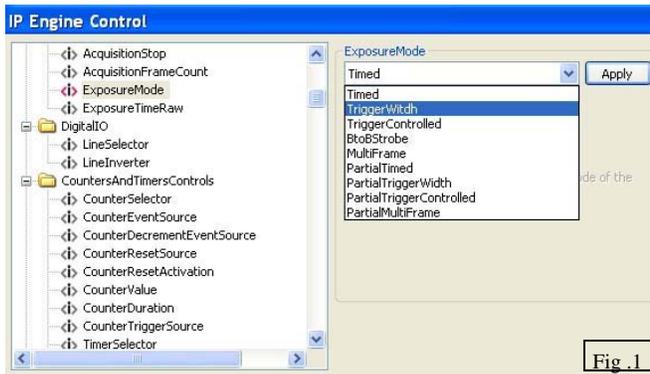

Fig .1

Camera Operation Modes

Camera Exposure and Trigger modes are listed in ExposureMode.

"Timed" is the normal continuous mode with shutter control activated and does not require trigger pulse input.

"TriggerWidth" is async pulse width control.

"TriggerControlled" is async trigger mode and programmable shutter speed.

"BtoBStrobe" is back to back strobe mode.

"MultiFrame" is 3 image capture with one trigger (ITS mode).

"PartialXxxx" is the same functions with partial scan mode.

All trigger modes except Timed and PartialTimed require an external or internal trigger.

Internal Software Triggering

With the PLC function, repetitive internal triggering for various camera functions can be controlled.

One of the most versatile application is using the pulse-width control function.

To perform this software triggering, go to LineSelector in DigitalIO and select PLCInput. DirectTTL is the default.
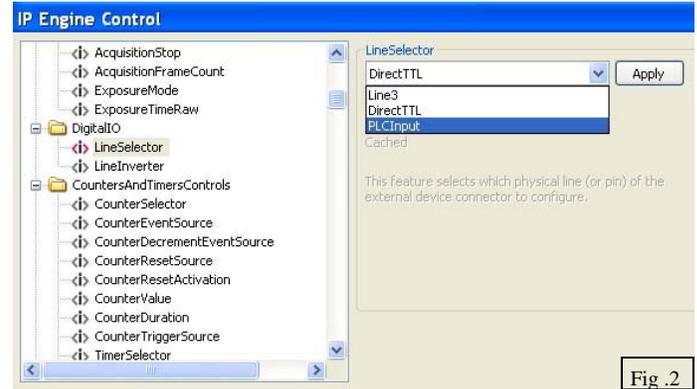

Fig .2

Next, select Timer in CounterTimerControls.

In Timer control, set the values of TimerDurationRaw and TimerDelayRaw. The duration defines the pulse Hi and delay defines pulse Lo. One negative going trigger pulse period is Delay + Duration. (Example: Duration=4096, Delay=1024.
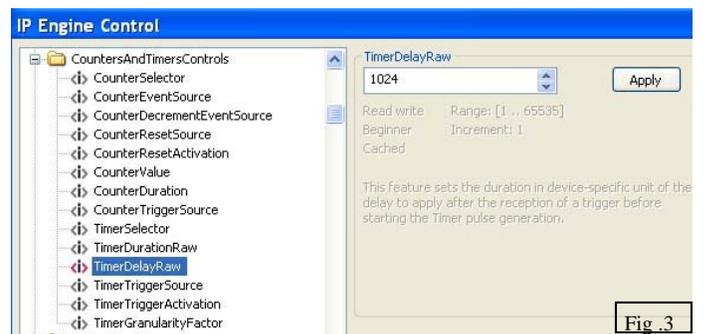

Fig .3

Next, select TimerTriggerSource. In this case we chose "Continuous" to demonstrate triggered modes.

Then, select an appropriate value for TimerGranulaityFactor. 1 count is 3.03ns. So granularity 33 makes 1µs and in the above example. Duration becomes 4ms and Delay is 1ms.
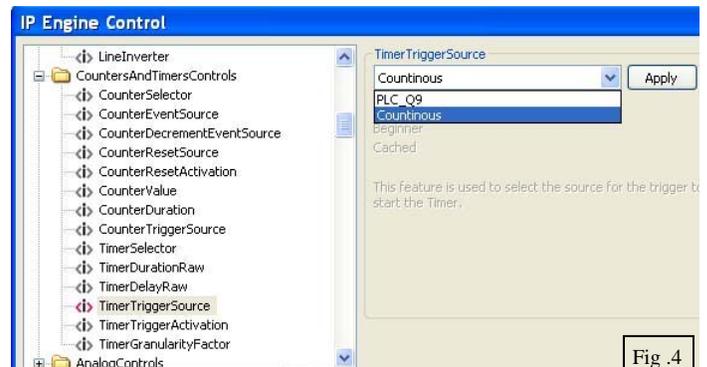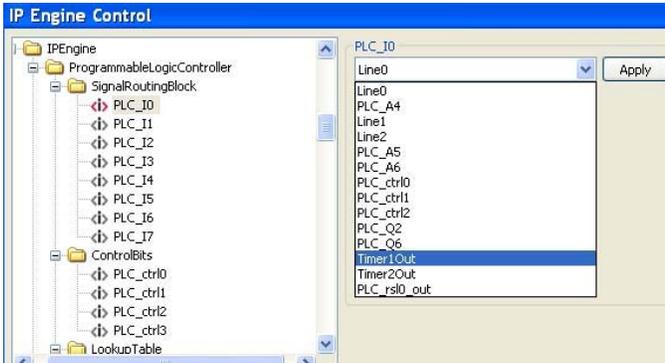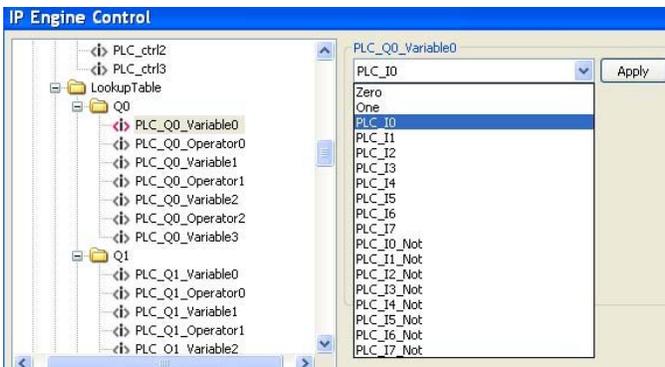

Fig .4

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PLC Self-triggering in GEV (page 2)

PLC LUT

The PLC Lookup Table is listed in the SignalRoutingBlock of ProgrammableLogicController. This is an advanced feature controlled by GEV.


Open PLC_I0 and select Timer1Out, which was programmed previously. Next, use LUT to set PLC_Q0 to PLC_I0.

This selection connects the timer1 output to Trigger input inside camera and enables to use of the timer to generate repetitive pulses to maintain triggering with the programmed duration.

Next, the internal pulse can be monitored by connecting to the Strobe output.
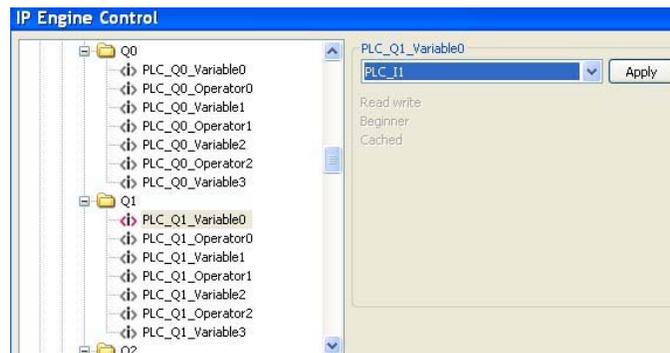

PLC_Q1 is connected to GPIO pin #3 and if PLC_I1 is

selected (Q1=I1), the internal strobe signal is output. If PLC_I0 is selected (Q1=I0), the pulse from the Timer1 is output to allow monitoring of the timer function.

Try it.
To confirm that the PLC programming succeeds, set ExposureMode to TriggerWidth while image is displayed. If the programming of the PLC has been done properly, you will see live but different image brightness. If PLC is not done properly, image will be frozen. Make
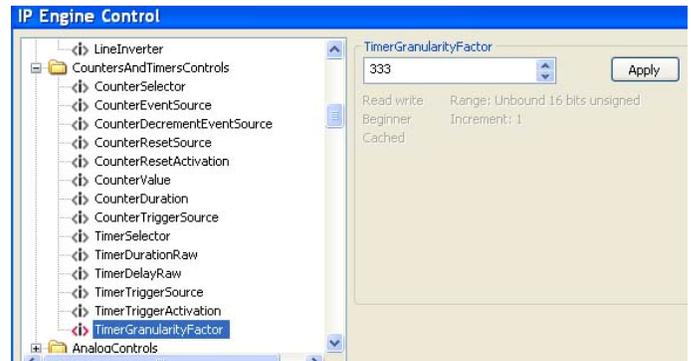
sure DigitalIO selection (=PLC), TimerSource (=Continuous), PLC_Q0 = PLC_I0.

Once the timer output is functioning, you can change TimerGranularityFactor to change the pulse delay and duration. The delay portion is pulse width to control the exposure. The image will change in the brightness accordingly.

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