

IMAGE-BASED AUTO-TRIGGER

INTRODUCTION:

An innovative new feature from Vision Research called Image-Based Auto-Trigger may be installed on your Phantom camera. This feature allows the user to trigger the camera from motion detected in the live image. The camera may also provide an external trigger signal based on the Image-Based Auto-Trigger to be used for synchronizing multiple Phantom cameras.

The Image-Based Auto Trigger feature may be available via an on-camera user interface, Phantom application software, or 3rd party software using camera control protocols.

WARNING:

The Image-Based Auto-Trigger feature should never be used in applications where missed or false triggers cannot be tolerated or where a false trigger could cause harm to people or property.

The hardware signaling available in some Image-Based Auto-Trigger modes should be used only to synchronize multiple Phantom cameras together and should never be used to trigger or control any other external device or event.

CONSEQUENCES RESULTING FROM SYSTEM FAILURE, FALSE TRIGGERING OR MISUSE OF THIS FEATURE ARE THE SOLE RESPONSIBILITY OF THE USER.

GENERAL OPERATION:

The Image-Based Auto-Trigger feature allows selected Phantom camera models, (Miro eX 2 (optional), Miro eX 4, and soon the "newer" v-Series cameras, to trigger themselves when the image changes in a selectable region of the frame. For the v-Series implementation, there will also be a mode which allows this feature to generate a hardware trigger signal for multi-camera installations.

A few user definable parameters allow the auto-trigger behavior to be adjusted to operating conditions, filtering out unintended triggers due to vibration, changes in illumination, slow-moving shadows, etc.

The Auto-Trigger operation begins by the user selecting a rectangular area within the image, similar to the region used for auto-exposure, the Auto-Trigger region.

As each frame is captured, the image in the Auto-Trigger region is compared to an earlier copy of the same region that has been stored in a dedicated memory. After the comparison is made, the image in memory is updated to the current image, to be used in the future.

The result of the comparison determines if a trigger is generated. A pixel being compared is considered "active" if its level has changed, (brightened or darkened), by more than a preset threshold. The number of active pixels for a given frame is counted, and if it exceeds a set number, a trigger is generated. The required number of active pixels is specified as a percentage of the area of the Auto-Trigger region.

When an Auto-Trigger condition is detected, the Auto-Trigger signal of the camera is pulled low. The Auto-Trigger signal is available on pin N of the capture connector.

IMAGE-BASED AUTO-TRIGGER OPERATING MODES:

Several operating modes are possible for the Image-Based Auto-Trigger system:

MODE	FUNCTIONAL DESCRIPTION
Mode 0	Image-Based Auto-Trigger is disabled.
Mode 1	Camera will drive both the auto-trigger and trigger itself when an auto-trigger is detected. If the auto-trigger signal is pulled low by an external device, the camera will be triggered.
Mode 2	<p>The image changes are analyzed, and when an auto-trigger condition has been detected, the auto-trigger signal will be pulled low, as in Mode 1, however the camera will not trigger itself. An external device pulling the auto-trigger signal low will not trigger the camera either.</p> <p>Mode 2 is useful when external control of the auto-trigger is desired, for instance, it is required that the auto-trigger feature is disabled for some know transient event). The auto-trigger signal from the camera will be routed through some external device and back into the trigger input of the camera.</p>

MULTI-CAMERA IMAGE-BASED AUTO-TRIGGER:

When multiple cameras are used to capture an event, it is usually desirable to trigger all cameras simultaneously. This can be achieved in two basic ways:

OPTION	DESCRIPTION	SETUP
Option 1	All the cameras will be triggered when either of the cameras detects an auto-trigger event.	<ol style="list-style-type: none"> 1. Set all cameras to Mode 1. 2. Connect the auto-trigger signal of all cameras together.
Option 2	When the primary camera detects an auto-trigger event it will trigger itself and simultaneously trigger all of the secondary cameras.	<ol style="list-style-type: none"> 1. Set Primary camera to Mode 1. 2. Set all secondary cameras to Mode 0, (auto-trigger disabled). 3. Connect auto-trigger signal of the primary camera to the trigger inputs of the secondary cameras.

STEP-BY-STEP PROCEDURE :

The following procedure describes the steps necessary to configure Image-Based Auto-Trigger via the “Touch-Sensitive” LCD of a Phantom Miro 2, Miro eX2, Miro 4, or Miro eX4 camera:

1. Access the Power Off Display Screen
2. From the Power Off Display Screen gently tap directly on the ATRIG field to open the Image-Based Auto-Trigger Display Screen.
3. In the Image-Based Auto-Trigger Display Screen select the desired Image-Based Auto-Trigger parameters, including:

- a. Auto-Trigger Region

The Auto-Trigger Region allows the uses the center point of a user selectable region of the image, based on the image resolution setting. Selectable regions include:

- Center
- Top Left quadrant
- Top Right quadrant
- Bottom Left quadrant
- Bottom Right quadrant
- Custom Region (presently uses same region as the Center option, however it will be user definable region in the future. This region will be definable via the Phantom Camera Control Software interface.
- Full Screen

See Image-Based Auto-Trigger Region Tables for region center point details.

- b. Sensitivity

The Sensitivity parameter defines both the:

- Area - the percentage of the auto-trigger region that must be active in order for an auto-trigger event to be generated. A typical percentage value is 10.
- Threshold - the amount a pixel value must change in order to be counted as an active pixel for auto-trigger purposes. A value of 100 would require a change of approximately half of the full swing of the camera. A typical threshold setting would be 10.

A larger sensitivity setting means a lower area and threshold.

See Image-Based Auto-Trigger Sensitivity Tables for selectable area and threshold settings.

- c. Update

The Update or Speed, Selector defines the number of frames between updates of the auto-trigger reference memory. A value larger than 1 allows the trigger to activate on slower events.

Image changes are evaluated over a time interval of auto-trigger speed/frame rate.

A larger update number will make the trigger slower as it will compare image over more frames.

See Image-Based Auto-Trigger Sensitivity Tables for selectable speed settings.

- d. Enable

Ensure the Image-Based Auto-Trigger is set to enabled.

IMAGE-BASED AUTO-TRIGGER REGION TABLES

X and Y define the center of the auto-trigger region, relative to the center of the image size. H specifies the height of the auto-trigger region. If zero the height will be either 1/4 of the image height, or 16 pixels, whichever is larger. W specifies the width of the auto-trigger region. If zero the width will be either 1/4 of the image width, or 128 pixels, whichever is larger.

AUTO-TRIGGER REGION BASED ON 800 x 600 IMAGE RESOLUTION				
VARIABLES	X	Y	H	W
CENTER	0	0	0	0
TOP LEFT	-200	-150	400	300
TOP RIGHT	200	-150	400	300
BOTTOM LEFT	-200	150	400	300
BOTTOM RIGHT	200	150	400	300
CUSTOM REGION	0	0	0	0
FULL SCREEN	0	0	800	600

AUTO-TRIGGER REGION BASED ON 640 x 480 IMAGE RESOLUTION				
VARIABLES	X	Y	H	W
CENTER	0	0	0	0
TOP LEFT	-160	-120	320	240
TOP RIGHT	160	-120	320	240
BOTTOM LEFT	-160	120	320	240
BOTTOM RIGHT	160	120	320	240
CUSTOM REGION	0	0	0	0
FULL SCREEN	0	0	640	480

AUTO-TRIGGER REGION BASED ON 512 x 384 IMAGE RESOLUTION				
VARIABLES	X	Y	H	W
CENTER	0	0	0	0
TOP LEFT	-128	-96	256	192
TOP RIGHT	128	-96	256	192
BOTTOM LEFT	-128	96	256	192
BOTTOM RIGHT	128	96	256	192
CUSTOM REGION	0	0	0	0
FULL SCREEN	0	0	512	384

AUTO-TRIGGER REGION BASED ON 320 x 240 IMAGE RESOLUTION				
VARIABLES	X	Y	H	W
CENTER	0	0	0	0
TOP LEFT	-80	-60	160	120
TOP RIGHT	80	-60	160	120
BOTTOM LEFT	-80	60	160	120
BOTTOM RIGHT	80	60	160	120
CUSTOM REGION	0	0	0	0
FULL SCREEN	0	0	320	240

AUTO-TRIGGER REGION BASED ON 256 x 192 IMAGE RESOLUTION				
VARIABLES	X	Y	H	W
CENTER	0	0	0	0
TOP LEFT	-64	-48	128	96
TOP RIGHT	64	-48	128	96
BOTTOM LEFT	-64	48	128	96
BOTTOM RIGHT	64	48	128	96
CUSTOM REGION	0	0	0	0
FULL SCREEN	0	0	256	192

IMAGE-BASED AUTO-TRIGGER SENSITIVITY TABLE

SENSITIVITY SETTING	REQUIRED ACTIVE AREA PERCENTAGE	PIXEL VALUE CHANGE THRESHOLD
1	50	20
2	10	20
3	5	10
4	2	10
5	1	10
CUSTOM	10	20

IMAGE-BASED AUTO-TRIGGER UPDATE TABLE

UPDATE	SPEED (Number of Frames Between Updates)
1	1
2	2
5	5
10	10
20	20
50	50
100	100
CUSTOM	1