Technical Application Note TAN2008011

Working with Embedded Image Information
Revised November 23, 2010

1.1. Subject

Technical Application Note (TAN2008011): Working with Embedded Image Information

1.2. Applicable Product(s)

- **All IEEE-1394, USB and GigE Vision Imaging Products**

1.3. Application Note Description

The purpose of this Technical Application Note is to illustrate how to embed image metadata directly into an image using the FRAME_INFO firmware register 0x12F8H.

1.4. Understanding Embedded Image Information

The FRAME_INFO register 0x12F8H allows you to embed frame-specific information into the first several pixels of each image. Raw image data in these pixels is replaced with the image metadata you specify.

Depending on the camera model and firmware version, the metadata can include any or all of the following values:

- Image timestamp
- Gain CSR
- Shutter Value
- Brightness CSR
- Exposure CSR
- White Balance CSR
- Frame Counter
- Strobe Pattern Counter
- GPIO Pin State
- Region of Interest (ROI) Position

The first byte of image metadata starts at pixel 0,0 (column 0, row 0) and continues along the first row of pixels ([1,0], [2,0], and so on). Each piece of metadata takes up one quadlet (4 bytes) of the image. So, when the camera is operating in an 8-bit/pixel mode, such as Y8, four pixels are used for one quadlet, or piece of metadata. Embedding a particular quadlet is controlled by a bit in the register. To embed a quadlet, turn its bit to 1. To turn off embedding, turn the bit to 0.

The following table outlines which bits of FRAME_INFO register 0x12F8H control which quadlets of metadata.

Field	Bit	Description	Frame-Specific Information (in Quadlets)
Presence_Inq	[0]	Presence of this feature 0: N/A 1: Available	
	[1-21]	Reserved	
Insert_Info	22	Display image-specific information 0: Off 1: On	Region of Interest (ROI) position
	23		GPIO Pin State
	24		Strobe Pattern Counter
	25		Frame Counter
	26		White Balance CSR
	27		Exposure CSR
	28		Brightness CSR
	29		Shutter Value
	30		Gain CSR
	31		Timestamp

Table 1: Bit Configuration of Register 0x12F8h

Note that quadlets appear in the image pixels in reverse order from the bits that control them. So, setting all bits to 'ON' (a write of 800003FFh) would result in the following embedded image configuration in an 8 bit/pixel-formatted image:

pixel[0,0] = first byte of Timestamp data
pixel[1,0] = second byte of Timestamp data
… **…**
pixel[4,0] = first byte of Gain data
… **…**
pixel[24,0] = first byte of Frame Counter data
… and so on…

Similarly, if you set only bits 26 (White Balance), 28 (Brightness) and 30 (Gain) to 'ON', only the quadlets associated with those features would appear, and the configuration would be as follows:

pixel[0,0] = first byte of Gain data
pixel[1,0] = second byte of Gain data
… **…**
pixel[4,0] = first byte of Brightness data
… …
pixel[8,0] = first byte of White Balance data
…
Pixel[11,0] = last byte of White Balance data

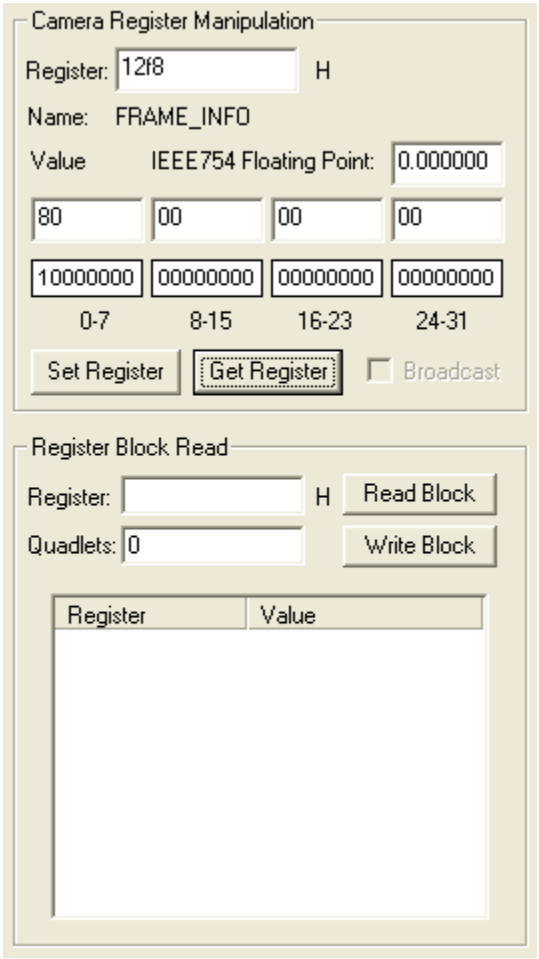
1.5. Working with Embedded Image Information

1.5.1. Using FlyCap Demo to Embed Image Metadata

You can use the FlyCap Demo program included with the FlyCapture SDK to configure the camera for embedding image metadata.

To embed image metadata

1. Using the "Registers" interface, get FRAME_INFO register 0x12F8H. If bit 0 is set to 1, the embedded information feature is present. By default, bits 22 – 31 are set to 0, indicating no image-specific information is embedded.



2. Change any or all of bits 22 – 31 to 1, depending on the metadata you want to embed, and which bits are supported by your camera. For more information, consult the *Point Grey Digital Camera Register Reference*. For example, to embed Exposure and Brightness quadlets, set bits 27 and 28 to 1.
3. Click **Set Register**.
4. To turn off embedding, change the bits to 0, and click **Set Register**.

1.5.2. Using the FlyCapture API to Embed Timestamp Information

The `flycaptureSetImageTimestamping` function can be used to embed Timestamp information. Other quadlets can be embedded by using `flycaptureSetCameraRegister`. For more information, refer to the *FlyCapture SDK Help*.

1.6. Reading Embedded Image Data

Most quadlets simply embed the control and status register (CSR) values associated with the feature. For information about how to interpret Timestamp and Region of Interest position, refer to the *Point Grey Digital Camera Register Reference*.

If you are using a color camera that performs Bayer color processing on the PC, you must extract embedded image values from the non-color processed (raw) image in order for the data to be valid.

1.7. Additional Downloads and Support

Access more Technical Application Notes on the web at www.ptgrey.com/support/downloads.

Point Grey Research Inc. endeavors to provide the highest level of technical support possible to our customers. Most support resources can be accessed through the Product Support section of our website: www.ptgrey.com/support.

Creating a Customer Login Account

The first step in accessing our technical support resources is to obtain a Customer Login Account. This requires a valid name, e-mail address, and camera serial number. To apply for a Customer Login Account go to www.ptgrey.com/support/downloads/.

Knowledge Base

Our on-line knowledge base at www.ptgrey.com/support/kb/ contains answers to some of the most common support questions. It is constantly updated, expanded, and refined to ensure that our customers have access to the latest information.

Product Downloads

Customers with a Customer Login Account can access the latest software and firmware for their cameras from our downloads site at www.ptgrey.com/support/downloads. We encourage our customers to keep their software and firmware up-to-date by downloading and installing the latest versions.

Contacting Technical Support

Before contacting Technical Support, have you:

1. *Read the product documentation and user manual?*
2. *Searched the Knowledge Base?*
3. *Downloaded and installed the latest version of software and/or firmware?*

If you have done all the above and still can't find an answer to your question, contact our Technical Support team at www.ptgrey.com/support/contact/.