

Sentech Power Plus GigE Vision Camera

User configurable FPGA (XILINX) sample code

Sensor Technology Co., Ltd

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(Revisions)

Rev	Date	Changes	Note
1.00	2010/05/13	New document	
1.01	2010/08/06	Update	
		Change the camera name	
1.02	2010/09/10	Update	
		Add the frame memory function	
1.03	2010/10/01	Update	
		Change the block diagram of the sample code	
1.04	2010/12/03	Update	
		Change the register information for the sample codes	
1.05	2011/05/19	Update	
		Add the user configurable FPGA enable command	
1.06	2011/09/12	Update	
		Add the information for "Binalize"	
1.07	2012/01/30	Update	
		Change the register information for the sample codes	

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Sentech provides following sample codes for the user configurable FPGA (XILINX) of the Sentech Power Plus GigE Vision camera.

Binalize and calculate center of gravity

Edge detection

Frame memory function

Please use StCamGigEWare_OpDemo software for check these sample codes for user configurable FPGA (XILINX).

Index

1. Block diagram of the sample codes	4
2. Sample codes information	4
3. StCamGigEWare_OpDemo software installation and start up	5
4. Sample codes evaluation with StCamGigEWare_OpDemo	6
5. UART communications and the register information for sample codes	. 15



1. Block diagram of the sample codes



2. Sample codes information

2.1 Binalize and calculate center of gravity

Binalize the image.

Split the four areas for the binalized image. Display the number of the white pixels for each area.

Split the four areas for the binalized image. Calculate and display the center of gravity of the white pixels. for each area.

When Split screen function is on, binalize processes for the left half of the original image.

2.2 Edge detection

Edge detection.

When Split screen function is on, edge detection processes for the left half of the original image.

2.3 Frame memory function

Get the still image, 4x digital zoom for the live and still image and slide show.

Get the still image when select "ON (Still image)" for the "Still image mode".

Wen select "ON" for the "4x zoom and slide show", split sixteen areas, 4x digital zoom for each area and slide show the image.

Change the 4x digital zoom image each two seconds.

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3. StCamGigEWare_OpDemo software installation and start up

StGigE-Pacakge has to be install before install StCamGigEWare_OpDemo software.

- 3.1 Install StCamGigEWare_OpDemo software using StCamGigEWare_OpDemo.exe installer.
- 3.2 Select "Start" (of Windows) "Sentech" "StGigE-Package" "StCamGigEWare_OpDemo" "StCamGigEWare_OpDemo" to start StCamGigEWare_OpDemo software.



4. Sample codes evaluation with StCamGigEWare_OpDemo

- 4.1 Binalize and calculate center of gravity
 - 1) Select "OP Setting" under "Option" in the menu.



2) Select the image data and I/O setting in "Data setting" window.

Image: StCamGigEWare_OpDemo[] Image: StCamGigEWare_OpDemo[]			
Data setting Image processing			
Image data			
Sentech FPGA->User FPGA	CCD data 🔹		
Process after User FPGA->Sentech FPGA	No process(No data from User FPGA) 👻		
Output signal			
Output0(Pin No.3)	Sentech FPGA		
Output1(Pin No.4)	Sentech FPGA		
Output2(Pin No.5)	Sentech FPGA		
Output3(Pin No.6)	Sentech FPGA		
Output4(Pin No.7)	Sentech FPGA 👻		
JTAG connection	Disable 👻		
User FPGA Enable	Disable 🗸		
	OK		

A) Select which processed image data send from Sentech FPGA to user configurable FPGA at "Sentech FPGA -> User FPGA".

Color camera:

Data selection	Color camera
CCD data	CCD data
White banlance processed data	White banlance processed data
White balance and gamma processed data	White balance and gamma processed data

Data selection	Monochrome camera
CCD data	CCD data
White banlance processed data	CCD data
White balance and gamma processed data	Gamma processed data



B) Select which process is apply to the image data after send back from user configurable FPGA to Sentech FPGA at "User FPGA -> Sentech FPGA".

Color camera:

Process selection	Color camera
No process (No data from User FPGA)	No process (No data from User FPGA)
White balance, gamma and color interpolation	White balance, gamma and color interpolation
Gamma and color interpolation	Gamma and color interpolation
Color interpolation	Color interpolation

Monochrome camera:

Process selection	Color camera
No process (No data from User FPGA)	No process (No data from User FPGA)
White balance, gamma and color interpolation	Gamma processing
Gamma and color interpolation	Gamma processing
Color interpolation	No process (Data from User FPGA)

3) Select "Enable" at "User FPGA Enable" in "Data setting" window.

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Data setting Image processing			
Image data			
Sentech FPGA->User FPGA	CCD data 🔹		
Process after User FPGA->Sentech FPGA	No process(No data from User FPGA) 👻		
Output signal			
Output0(Pin No.3)	Sentech FPGA		
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Output2(Pin No.5)	Sentech FPGA 🔹		
Output3(Pin No.6)	Sentech FPGA 🔹		
Output4(Pin No.7)	Sentech FPGA 👻		
JTAG connection	Disable		
User FPGA Enable	Disable 👻		
	OK		



3) Select "Binalize" for "Image processing mode" in "Image processing" window.



Adjust "Binalize Threshold" for the binalize and calculate center of gravity processing.

Display information:

Total area of the white pixels (white pixels / 1,000),

X center of the gravity of the white pixel in the image,

Y center of the gravity of the white pixel in the image

The left half original image, which is before processing binalize and calculate center of gravity, and the binalize and calculate center of gravity processed image are appeared when select "ON" for "Split screen function" in "Image processing" window.





- 4.2 Edge detection
 - 1) Sellect "OP Setting" under "Option" in the menu.



2) Select the image data and I/O setting in "Data setting" window.

Image: StCamGigEWare_OpDemo[] Image: StCamGigEWare_OpDemo[]			
Data setting Image processing			
Image data			
Sentech FPGA->User FPGA	CCD data 🔹		
Process after User FPGA->Sentech FPGA	No process(No data from User FPGA) 👻		
Output signal			
Output0(Pin No.3)	Sentech FPGA		
Output 1(Pin No.4)	Sentech FPGA		
Output2(Pin No.5)	Sentech FPGA 👻		
Output8(Pin No.6)	Sentech FPGA 👻		
Output4(Pin No.7)	Sentech FPGA 👻		
JTAG connection	Disable 🗸		
User FPGA Enable	Disable 👻		
	ОК		

A) Select which processed image data send from Sentech FPGA to user configurable FPGA at "Sentech FPGA -> User FPGA".

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CCD data	CCD data
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White balance and gamma processed data	White balance and gamma processed data

Data selection	Monochrome camera
CCD data	CCD data
White banlance processed data	CCD data
White balance and gamma processed data	Gamma processed data



B) Select which process is apply to the image data after send back from user configurable FPGA to Sentech FPGA at "User FPGA -> Sentech FPGA".

Color camera:

Process selection	Color camera
No process (No data from User FPGA)	No process (No data from User FPGA)
White balance, gamma and color interpolation	White balance, gamma and color interpolation
Gamma and color interpolation	Gamma and color interpolation
Color interpolation	Color interpolation

Process selection	Color camera
No process (No data from User FPGA)	No process (No data from User FPGA)
White balance, gamma and color interpolation	Gamma processing
Gamma and color interpolation	Gamma processing
Color interpolation	No process (Data from User FPGA)



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3) Select "Edge detection" for "Image processing mode" in "Image processing" window.

Adjust "Edge detection level" for the edge detection processing.

The left half original image, which is before processing the edge detection, and the edge detection processed image are appeared when select "ON" for "Split screen function" in "Image processing" window.

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- 4.3 Frame memory function
 - 1) Sellect "OP Setting" under "Option" in the menu.



2) Select the image data and I/O setting in "Data setting" window.

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Data setting Image processing			
Image data			
Sentech FPGA->User FPGA	CCD data 🔹		
Process after User FPGA->Sentech FPGA	No process(No data from User FPGA) 🔹		
Output signal			
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Output2(Pin No.5)	Sentech FPGA 🔹		
Output3(Pin No.6)	Sentech FPGA 👻		
Output4(Pin No.7)	Sentech FPGA 👻		
JTAG connection	Disable 👻		
User FPGA Enable	Disable 🔹		
	ОК		

A) Select which processed image data send from Sentech FPGA to user configurable FPGA at "Sentech FPGA -> User FPGA".

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Data selection	Color camera
CCD data	CCD data
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White balance and gamma processed data	White balance and gamma processed data

Data selection	Monochrome camera
CCD data	CCD data
White banlance processed data	CCD data
White balance and gamma processed data	Gamma processed data



B) Select which process is apply to the image data after send back from user configurable FPGA to Sentech FPGA at "User FPGA -> Sentech FPGA".

Color camera:

Process selection	Color camera
No process (No data from User FPGA)	No process (No data from User FPGA)
White balance, gamma and color interpolation	White balance, gamma and color interpolation
Gamma and color interpolation	Gamma and color interpolation
Color interpolation	Color interpolation

Process selection	Color camera
No process (No data from User FPGA)	No process (No data from User FPGA)
White balance, gamma and color interpolation	Gamma processing
Gamma and color interpolation	Gamma processing
Color interpolation	No process (Data from User FPGA)





3) Select "Frame memory function" for "Image processing mode" in "Image processing" window.

Get the still image when select "ON (Still image)" for the "Still image mode".

Wen select "ON" for the "4x zoom and slide show", split sixteen areas, 4x digital zoom for each area and slide show, which is the image change each two seconds.





5. UART communications and the register information for sample codes

5.1 UART communication setting

Baud rate:	115200bps
Data bit:	8bit
Parity:	None
Stop bit:	1bit
Flow control:	None

5.2 Register information for the sample codes

Comma	and No.	Function	Value
DEC	HEX	1	
0	0H	Image processing mode	0: No image process
			1: Binalize and calculate center of gravity
			2: Edge detection
			3: Frame memory function
1	1H	Split screen function	0: OFF 1: ON
2	2H	Binalize threshold (Lower 8bit)	Range of threshold: 0 to4095
3	3H	Binalize threshold (Upper 4bit)	1
4	4H	Gain of detect edge	Range of gain: 0 to 255
5	5H	Resolution and	7 to 4bit: 0: STC-GE/GEC202OX
		COLOR / BW selection	1: STC-GE/GEC152OX
			2: STC-GE/GEC83OX
			3: STC-GE/GEC33OX
			5: STC-GE/GEC133OX
			DO NOT use other settings
			3 to 1bit: Please set as 000
			Obit: 0: B/W 1: COLOR
6	6H	I/O pots output control	7bit: Not using (MSB)
			6bit: Not using
			5bit: Not using
			4bit: OUT5 0: OFF 1: ON
			3bit: OUT4 0: OFF 1: ON
			2bit: OUT3 0: OFF 1: ON
			1bit: OUT2 0: OFF 1: ON
			Obit: OUT1 0: OFF 1: ON (LSB)
7	7H	Still image mode	0: OFF (Live image) 1: ON (Still image)
8	8H	4x zoom and slide show	0: OFF 1: ON



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