

# GCT | Manual

**Version E1**

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# 1 Introduction of GCT

## 1.1 *What is GCT*

The GenICam Control Tool (GCT) is a GUI tool, that helps the user to communicate with cameras which fulfil the GenICam standards.

## 1.2 *Installation of GCT*

The installer is an exe.file which can be downloaded from <https://www.chromasens.de/gct-current>

## 1.3 *System Requirements*

Hardware requirement

- A GenICam-standard camera
- Gigabit ethernet network card
- Gigabit ethernet cable
- Intel Core i7 or higher
- 16GB RAM or higher

Software requirement

- Win 7 or Win10 64 bit operating system
- Driver for Gigabit ethernet network card
- Filter driver from s2i

## 1.4 *Preparation of 10-GigE Adapter*

### 1.4.1 **Preparation of Adapters supported by Intel Driver (Recommended)**

Preparation of 10-Gigabit Ethernet adapter which is supported by Intel driver (for example HPE Ethernet 10Gb 2-port 560SFP+ adapter) can be done with ease as following.

- 1) According to the operating system, install the correspondent intel driver for 10-GigE adapter. If the installation option "NIC-10GigE-Driver Files" is chosen during the installation, then the executable driver files can be found in by default in  
C:\Program Files\Chromasens\GCT\drivers\NIC-10GigE\
  - 2) Start Powershell as administrator, then go to the folder  
"C:\Users\Public\Documents\Chromasens\GCT", run config10GigE.ps1  
If this file cannot be found in the folder, please contact our support via email.
  - 3) According to hint displayed on the screen, enter "y" or "n", to setup for adapters, or create a teaming (namely link aggregation)

```
PS C:\users\Public\Documents\Chromasens\gct> .\config10GigE.ps1
This program configures the 10 GigE network connections.
A teaming can be created optionally if the network interface card is supported by intel driver.
=====
Start IntelNetCmdlets...
IntelNetCmdlets is started.
=====
Detecting existing teaming group(s)
Found following teaming group(s). If you want to setup network interface card for evo-camera, it is recommended to remove existing teaming group.

TeamName      : Gruppe: LAG
TeamMembers   : {HPE Ethernet 10Gb 2-port 560SFP+ Adapter #2, HPE Ethernet 10Gb 2-port 560SFP+ Adapter}
TeamMode      : StaticLinkAggregation
PrimaryAdapter : NotSet
SecondaryAdapter : NotSet

=====
Do you want to remove Gruppe: LAG which contains HPE Ethernet 10Gb 2-port 560SFP+ Adapter #2 HPE Ethernet 10Gb 2-port 560SFP+ Adapter ?
[y/n] Please enter the key 'y' for 'yes', or 'n' for 'no'.
```

If there exists already a teaming (link aggregation), you have to remove it first before starting a new setup. In this case, enter “y”

```
2 10 Gigabit Ethernet connection(s) are found.

InterfaceDescription      Name      Speed Index
-----
HPE Ethernet 10Gb 2-port 560SFP+ Adapter Ethernet 3 10000000000 0
HPE Ethernet 10Gb 2-port 560SFP+ Adapter #2 Ethernet 4 10000000000 1

=====
Do you want to setup for Ethernet 3 ?
[y/n] Please enter the key 'y' for 'yes', or 'n' for 'no'.

Do you want to setup for Ethernet 4 ?
[y/n] Please enter the key 'y' for 'yes', or 'n' for 'no'.
```

The 10-GigE adapter connections will be listed. If only a single connection will be used, then chose one connection to do setup. If a teaming will be used, then do setup for both connections

```
Do you want to create teaming from two 10 GigE network adapters?
[y/n] Please enter the key 'y' for 'yes', or 'n' for 'no'.
```

Then decide if a teaming should be created. If no teaming is needed, then enter “n”. A hint will let you enter an IP address for a single connection. Then the preparation is finished. Otherwise, if a new teaming should be created, then enter “y”.

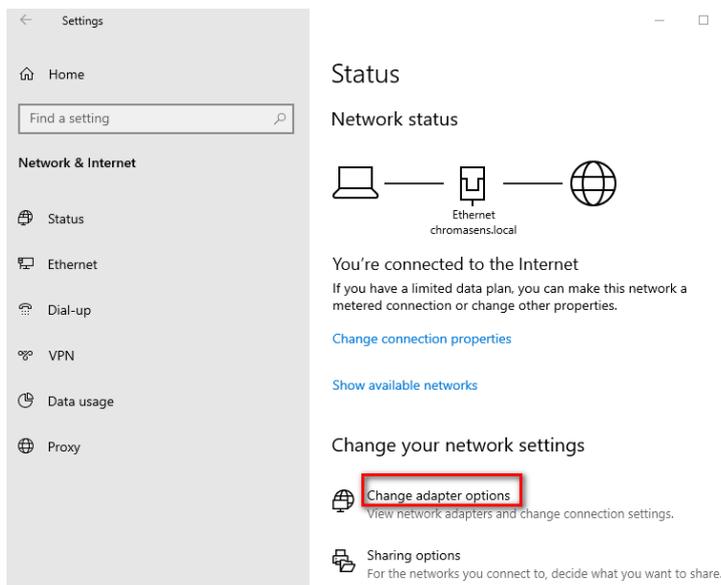
```
Current Available 10 GigE network adapters are displayed as below
=====
InterfaceDescription                               Name           Speed Index
-----
HPE Ethernet 10Gb 2-port 560SFP+ Adapter          Ethernet 3     10000000000  0
HPE Ethernet 10Gb 2-port 560SFP+ Adapter #2      Ethernet 4     10000000000  1
=====
Please enter the index of the first 10 GigE network adapter of the teaming group.
0
Please enter the index of the second 10 GigE network adapter of the teaming group.
1
The two 10 GigE network adapters Ethernet 3 ( HPE Ethernet 10Gb 2-port 560SFP+ Adap
10Gb 2-port 560SFP+ Adapter #2 ) will build a teaming now...
=====
Please enter a name of the teaming, which will be created.
TestTeaming
Please enter the ip address for connection Ethernet 7
The ip address must be set to 169.254.100.xxx. And xxx is not equal 100.
169.254.100.51
```

Then type each index of both connections, give the teaming a name, and at the end enter the IP address for teaming. Now the setup of adapter with teaming is finished.

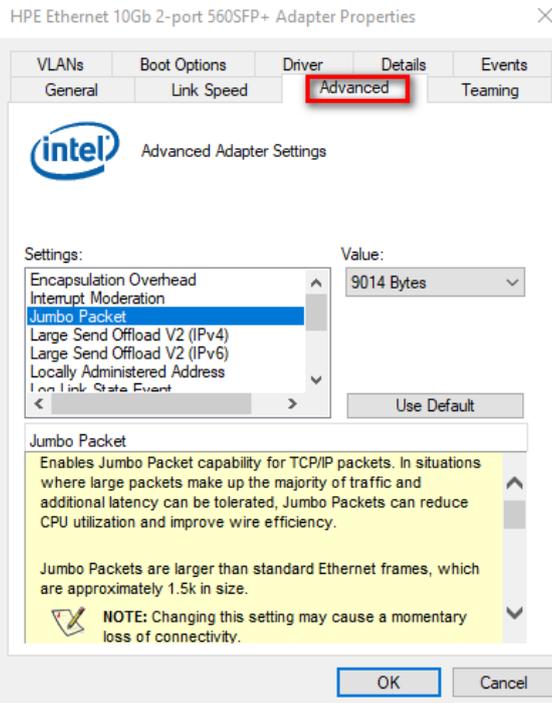
### 1.4.2 Preparation for Adapters not supported by Intel Driver

The preparation depends on the adapter manufacturer. Normally you need to install the driver of your own 10-GigE adapter first, then set parameters with suitable value, and create link aggregation if necessary.

- 1) Click control panel -> network and internet and click “change adapter options”



- 2) Choose one ethernet connection from the Gigabit Ethernet network card, right click and choose “attributes”, to open the attributes window. Click “configure”, choose the tab “advanced”. The displayed parameters can vary and are depending on the adapter.



Set a suitable value for each relevant parameter

Attribute name (English)	Attribute name (German)	value
Interrupt Moderation	Interrupt-Drosselung	enabled
Jumbo packet	Jumbo Packet	9014 Byte
Large-Send-Offload V2(IPv4)	Large-Send-Offload V2(IPv4)	Enabled
Large-Send-Offload V2(IPv6)	Large-Send-Offload V2(IPv6)	Enabled
Direct Cache Access	Direct Cache Access	Enabled
Receive Buffers	Empfangsbuffer	4096
Flow control	Flusssteuerung	Disabled
Interrupt Moderation Rate	Interrupt-Drosselungsrate	Adaptiv
Low Latency Interrupts	Low Latency Interrupts(LLIs)	Disabled
Transmit Buffers	Übertragungspuffer	16384
Rx and Tx from Offloading Options	Rx und Tx von Offload-Optionen	Enabled
Receive Side Scaling	RSS (Empfangseitige Skalierung)	Enabled
RSS queues	RSS-Warteschlangen	2
Log Link State Event	Verbindungsereignis protokollieren	Enabled

3) Install the s2i filter driver **v2.2.1 RC**

If the installation option “s2i Filter Driver v2.2.1RC” is chosen during installation, then the filter driver file can be found under “C:\Program Files\Chromasens\GCT\drivers\s2iFilterDriver”. Currently, only s2i filter driver v2.2.1 RC (or newer) is able to read the dynamical image height in external trigger mode.

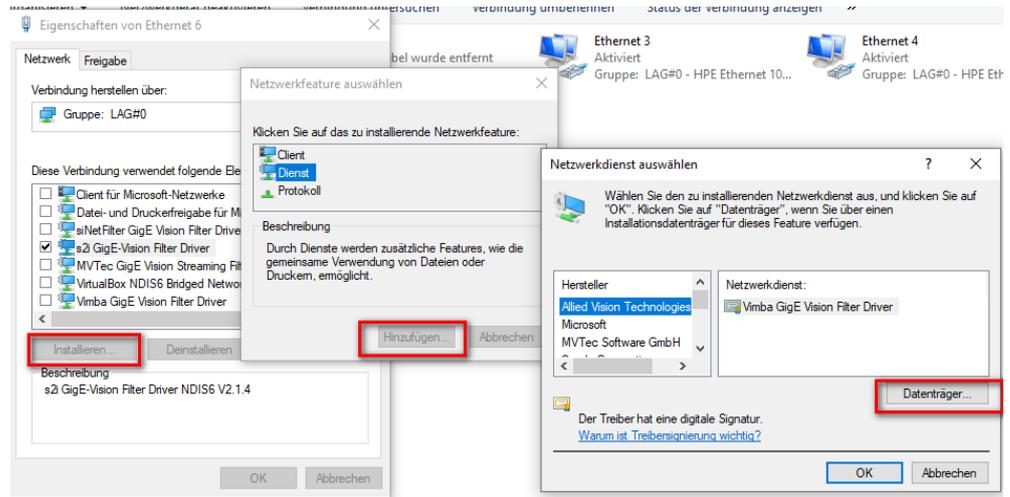
- a) If there was no filter driver from s2i installed before, then start InstallFilterDriver.bat as administrator. And afterwards restart the PC
- b) If there exists already an older filter driver from s2i (for example v2.1.4) then
  - a. please run “UninstallFilterDriver.bat” first
  - b. reboot PC
  - c. delete s2iGEVFilter.sys from c:\windows\system32\drivers manually!
  - d. Run “InstallFilterDriver.bat”
  - e. Restart PC

For more information please refer to the instruction “HowTo\_Install\_Driver\_Windows.pdf” in C:\Program Files\Chromasens\GCT\drivers\s2iFilterDriver

“Secure Boot” has to be disabled in BIOS for win10!

If the filter driver v2.2.1 RC was installed, but an older filter driver v2.1.4 should be reinstalled, in this case

- a. Please run “UninstallFilterDriver.bat” first
- b. Reboot PC
- c. Delete s2iGEVFilter.sys from c:\windows\system32\drivers manually!
- d. In folder c:\windows\INF\ please delete oemXXX.inf and oemXXX.PNF files, which is related to s2i filter driver. There are many oemXXX.inf and oemXXX.PNF files. Please check the content by opening oemXXX.inf. If it is about the s2i filter driver, then delete the corresponding file pair.
- e. Run “InstallFilterDriver.bat”. If this failed, then please add “s2iGEVFilter.inf” file manually!



- f. Restart PC

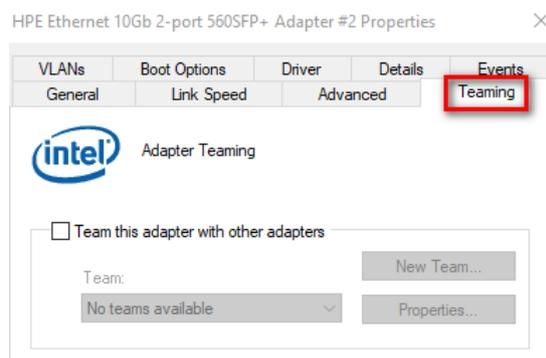
- 4) Now in control panel -> network and release center -> adapter settings, enable each HP 560 SFP-Networkadapter. Right click and choose “Attributes” In the tab “network”, please only enable “s2i GigE-Vision Filter Driver” and “Internetprotocol version 4 (TCP/IPv4)”

- 5) If only one cable is used for image data transfer, then this step can be skipped. But for users who use two cables to connect the camera, teaming of link aggregation group (LAG) has to be set.
  - a. Set parameter values for both connections of the Gigabit Ethernet network card as described in step 2)
  - b. After setting the parameters for both connections, choose one connection, right click and choose “attributes”

Click „configure“ and choose “Teaming” tab. The position of this tab and the teaming wizard can also vary and depend on adapter. If you cannot create a teaming, please contact the adapter manufacturer.

For example, for HPE Ethernet 10Gb 2-port 560SFP+ adapter, the tab of “Teaming” is under Win10 only available if the old driver of Gigabit Ethernet network card is installed. Therefore, we strongly recommend to run powershell script to setup teaming, which is described at the beginning of the chapter. Otherwise, you have to install the old driver “PROWinx64\_win10\_old.exe” first. After configuring the parameters of both ethernet connections of Gigabit Ethernet adapter, create a Teaming from the both connections. In order to activate the teaming, you have to install the new driver “PROWinx64\_win10.exe”. Both driver files have to be installed manually. And the process can be sometimes stressful.

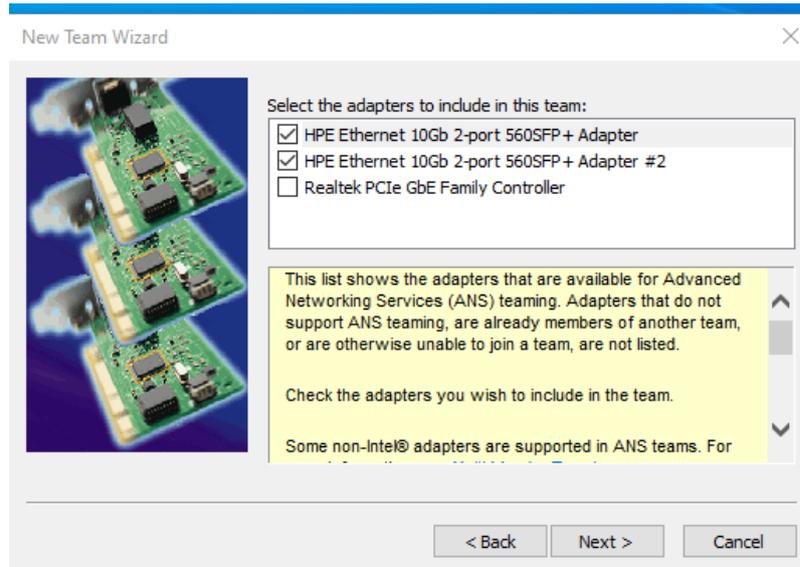
c.



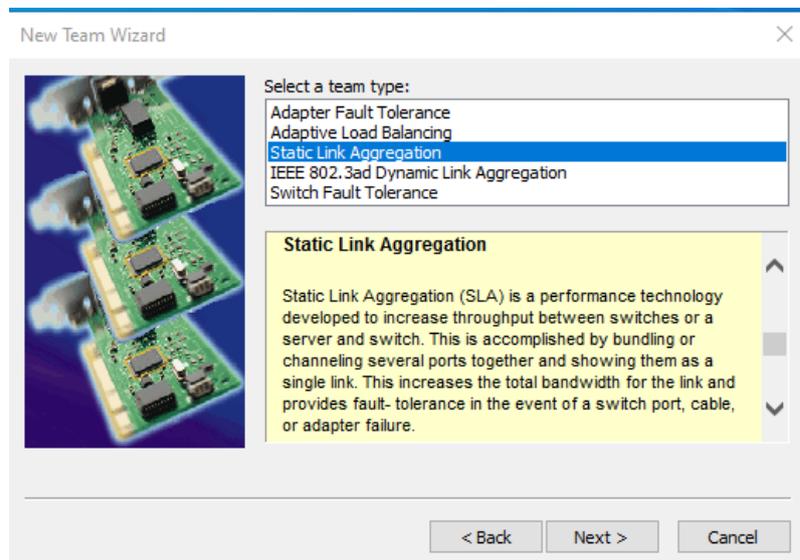
- d. Choose “Team this adapter with other adapters”. (German description: Diesen Adapter einer Gruppe mit anderen Adaptern zuordnen)
- e. Choose “New Team...”, give a name of the LAG (for example “Team EVO”). Click “next”.



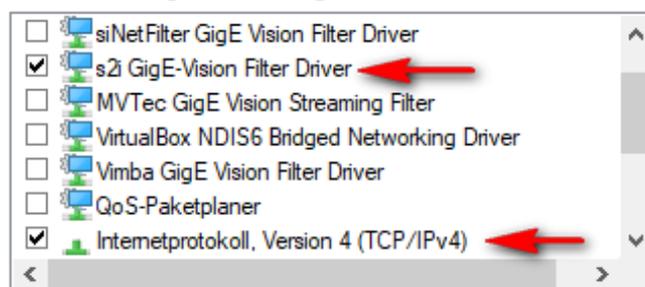
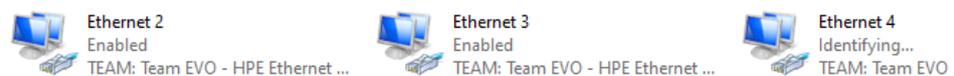
- f. Choose then both connections of HP 560 SFP ethernet adapter and click “next”.



g. Choose “static link aggregation”, click “next” and “finish”



h. A new created ethernet connection “Team EVO” is now created. Please only enable the service “s2i GigE-Vision Filter Driver” and “Internet Protocol version 4 (ICP/IPv4)” for this new created connection



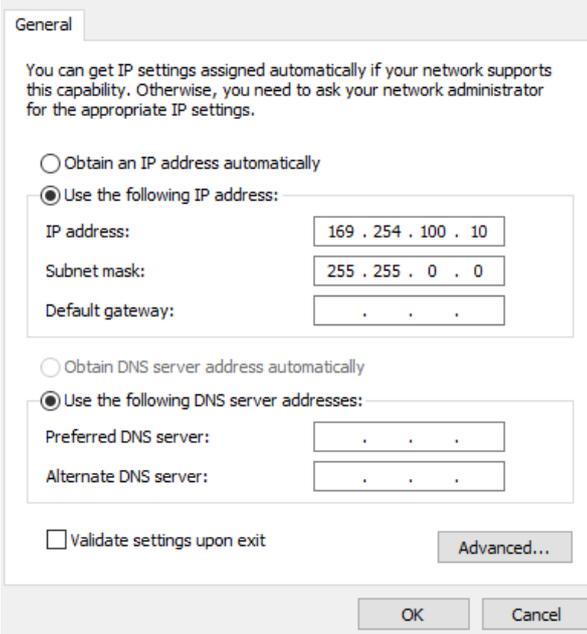
6) Set the IP address

- a. If the user does not use LAG, then right click the only one ethernet connection of Gigabit Ethernet network adapter (HPE Ethernet 10Gb 2-port 560SFP), choose “attributes”
- b. If LAG is used, then right click the connection of LAG, choose “attributes”

Choose tab “network”, then choose “Internet Protocol version 4 (TCP/IPv4)” and click “attributes”

Set IP address 169.254.100.x (x NOT equal 100)

Set subnetmask 255.255.0.0



Internet Protocol Version 4 (TCP/IPv4) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

Obtain an IP address automatically

Use the following IP address:

IP address: 169 . 254 . 100 . 10

Subnet mask: 255 . 255 . 0 . 0

Default gateway: . . .

Obtain DNS server address automatically

Use the following DNS server addresses:

Preferred DNS server: . . .

Alternate DNS server: . . .

Validate settings upon exit

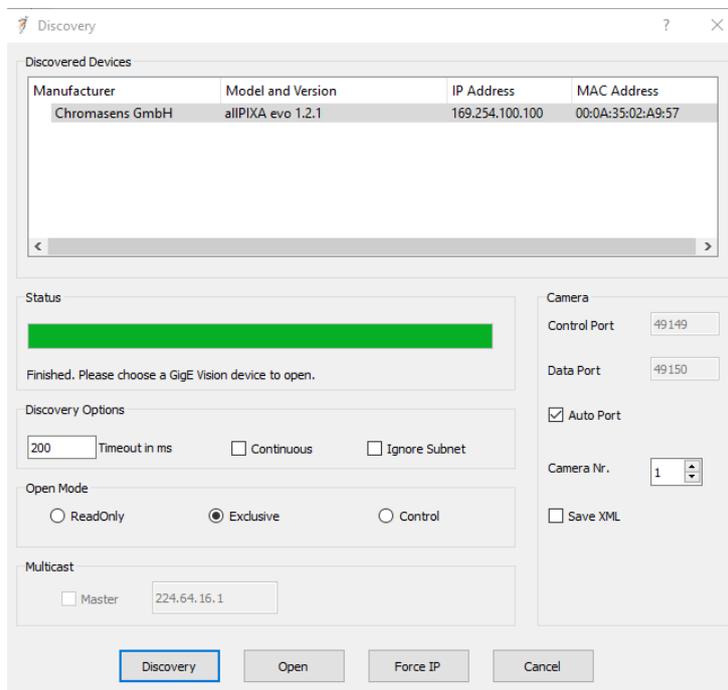
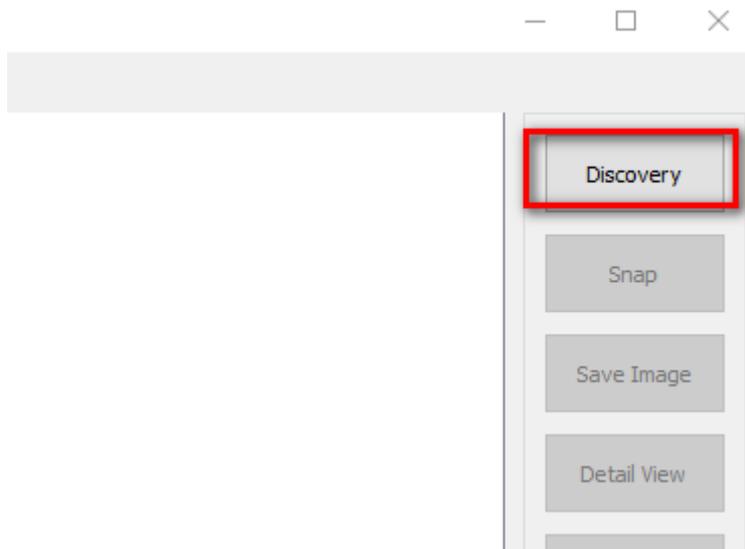
Advanced...

OK Cancel

## 2 Camera Discovery

If a GenICam standard camera is connected with a GigE-Ethernet card correctly and the camera is turned on, then the discovery function in GCT will be able to detect and connect the camera. Only then, further operations can be executed on the camera. Therefore, the camera discovery is the first step to react with the camera.

Click the “Discovery” Button on the upper right corner to detect all the connected cameras and open the option window



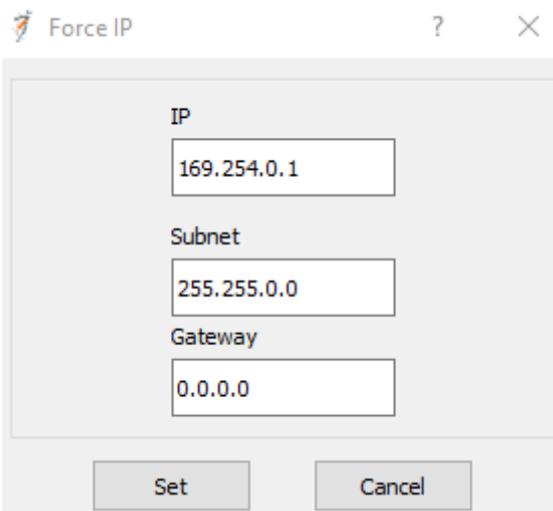
The founded cameras will be listed in the upper area of the option window. Choose the camera and then click “Open” Button below, the connection to the camera will be created in GCT.

There are several options available for the camera discovery.

Option	Default value	Comment
Timeout	200 ms	After xxx milliseconds, if still no camera is found, the discovery process will be stopped and

		return "no camera"
Continuous	Not enabled	If not enabled, then the discovery process will be only executed once. If this option is enabled, then the discovery will be repeated till the user stops it.
Ignore Subnet	Not enabled	If not enabled, the discovery will also detect cameras which lie in subnet. If enabled, the cameras in subnet will be ignored
Open Mode	Exclusive	How the camera should be opened
Camera Nr.	1	The first founded camera will be numbered as 1...the other camaras will be numbered after that, namely 2,3,4...
AutoPort	Enabled	Default port 0 will be used

Additionally, the user have the possibility to force IP by clicking "Force IP" button. In most cases there is no need to do this.



After a camera is detected, click "Open" button to connect the camera in GCT. The content of camera xml file will be displayed in the left area of GCT. The message log in the bottom area will be refreshed.

### **3 Disconnect Camera**

After the camera is connected. The text of “Discovery” button will be switched to “Disconnect”. Click this button again to stop the connection. If the user wants to disconnect the camera which is still grabbing image, it is recommended to stop the grab process completely at first and then click “Disconnect” button.

## 4 Grab the image

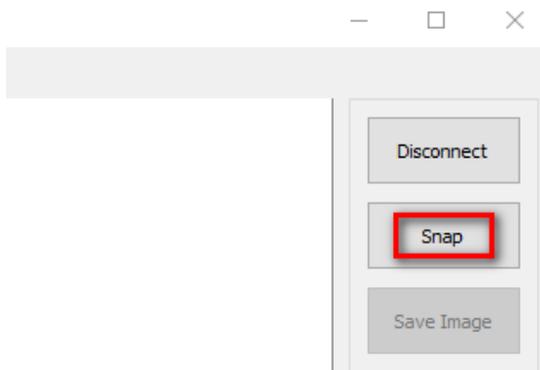
Capturing image is the main function of a camera. There are several parameters which influence the grab process

Parameter	Position	Comment
Use Filter Driver		<p>Default value: not enabled. Recommended: enable this option</p> <p>If “Use Filter Driver” is checked, then the version of filter driver will be displayed on the right side.</p> <p>Quoted from:</p> <p><a href="https://www.stemmer-imaging.com/en/knowledge-base/gige-vision-driver-implementation/">https://www.stemmer-imaging.com/en/knowledge-base/gige-vision-driver-implementation/</a></p> <p>Due to the fact that the GigE Vision standard is a mere protocol description, generic driver implementations are possible. The simplest and most portable solution is to use the operating system IP network stack. This is often referred to as <b>socket driver</b> because all large operating systems provide the socket interface for network access (e.g., Windows Sockets or POSIX Sockets). However, normally this solution offers the poorest performance.</p> <p>Improvements are available by adopting the so-called high-performance or <b>filter drivers</b>. Typical of both driver types is that they bypass the generic operating system network stack to provide better performance by specialized implementation. The driver runs in the operating system kernel and can therefore work on network data with the highest priority. Image data compilation already occurs in the driver and the image as a whole is transferred to the application. Because the network stack is bypassed, less CPU capacity is bound up and data security improves (fewer lost packages) due to the higher CPU priority. Even if the implementation of both driver types is different (driver directly for one network chip or generically for all</p>

		network cards in the Windows filter stack), both offer the same improved performance for the protocol structure of GigE Vision.
Image Width	In xml tree: Image Format Control -> Region Selector -> Width	Ensure that "Region Selector" has the enum value "Region 1"
Image Height	In xml tree: Image Format Control -> Region Selector -> Height	Ensure that "Region Selector" has the enum value "Region 1"
Acquisition Line Time	In xml tree: Acquisition Control -> Acquisition Line Time	Describes the time between current scan line and the next scan line The bigger the line time, the less the scanned rows (slower)
Acquisition Integration Time	In xml tree: Acquisition Control -> Acquisition Integration Time	
Trigger Source	In xml tree: Acquisition Control -> Trigger Selector -> Trigger Source	Default value: Freerun.
Test Pattern (optional, often used to test grab function, or shading )	In xml tree: Image Format Control -> Test Pattern Generator -> Test Pattern  Image Format Control -> Test Pattern Generator -> Test Pattern Value	Default value: off. If test pattern should be used, then you can choose a certain test pattern and its corresponding value

Because the filter driver can improve the data processing, so it is recommended to enable it by capturing large images. After checking the "grab" checkbox, the camera starts to grab process. Unchecking the "grab" again, then the grab process will be stopped.

The grab process will continue grab image (frame) from the camera. If the user only wants to grab one frame, then he can press "Snap" button in the right area.



Possible Reason for "GEV\_TIMEOUT\_ERROR" issue in grab process

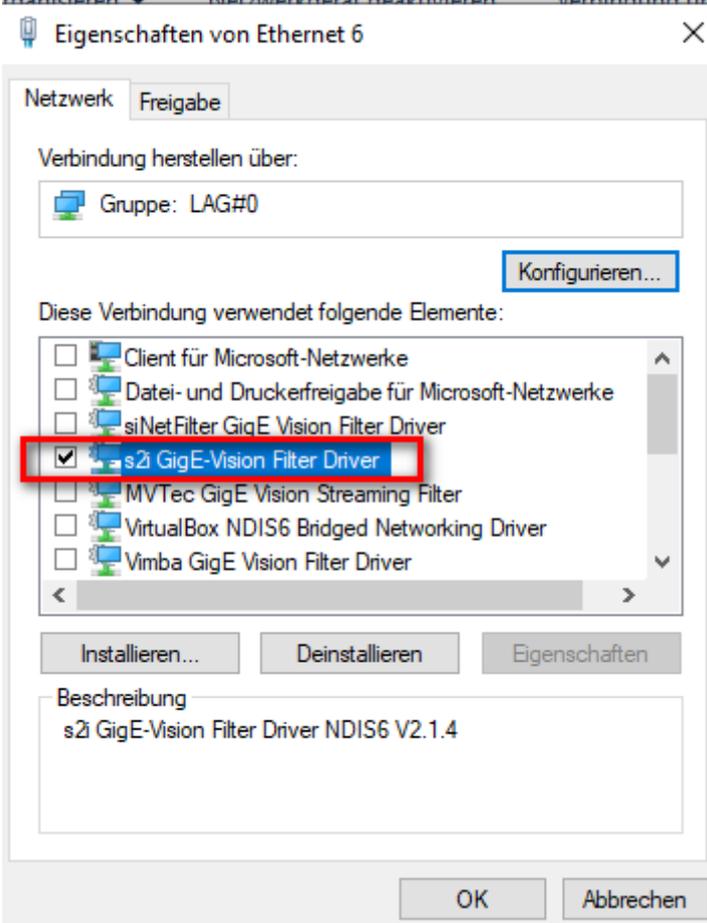
Sometimes during grab process, there comes no image from the camera, and the message log shows "GEV\_TIMEOUT\_ERROR" in the bottom area. It could be caused by

Trigger source: If there is no explicit trigger available and the camera should run under "freerun" mode anyway, but the value of trigger source is not set to "freerun", then GCT will return "GEV\_TIMEOUT\_ERROR" and cannot grab image at all.

- ▼ Acquisition Control
  - Acquisition Mode
  - Acquisition Start
  - Acquisition Stop
  - Acquisition Line Rate
  - Acquisition Line Rate Max
  - Acquisition Line Time
  - Acquisition Line Time Min
  - Acquisition Integration Time
  - Acquisition Integration Time Min
- ▼ Trigger Selector
  - Trigger Mode
  - Trigger Source

Filter driver: GCT is able to use the filter driver which developed by s2i. If the filter driver should be used for the grab process, it should be installed and enabled correctly beforehand in adapter settings.

To check the adapter settings under windows operating system, please go to Start Menu -> Control Panel -> Network and Sharing Center. In the left-hand column, click "Change Adapter Settings". A new screen will open with a list of network connections. Right-click the corresponding GigE Ethernet connection for the camera and choose "Attributes". If link aggregation group (LAG) is used, then right-click the LAG there and choose its attributes. Ensure that s2i GigE-Vision Filter Driver is checked.

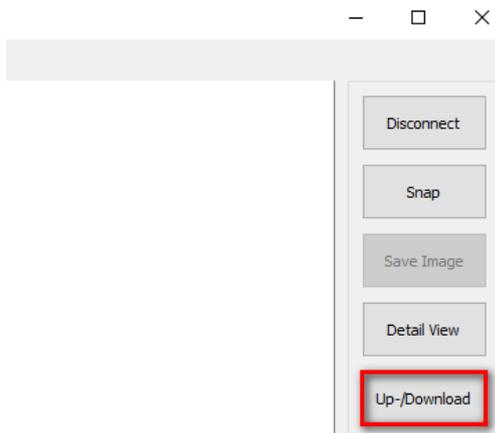


If s2i GigE-Vision filter driver is not checked here, but the user still activates the filter driver during grabbing in GCT, then GCT will also return "GEV\_TIMEOUT\_ERROR"



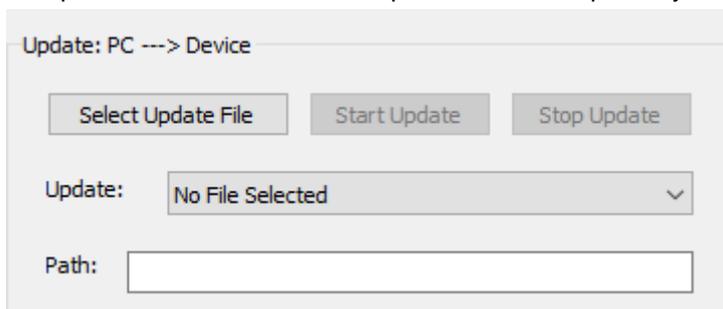
## 5 Update/Download

The firmware of the camera can be updated and downloaded. Currently, the firmware of cameras from Chromasens has following components: application, bitstream, camera xml file, dark reference files (BREF), shading files (SHC), sensor file, gamma lookup table file, user data , package description file. Those files are often packed as a whole zip file and can be downloaded from the website of Chromasens. Update and download firmware can be executed by clicking the “Up-/Download” button. A wizard of update/download will be opened.



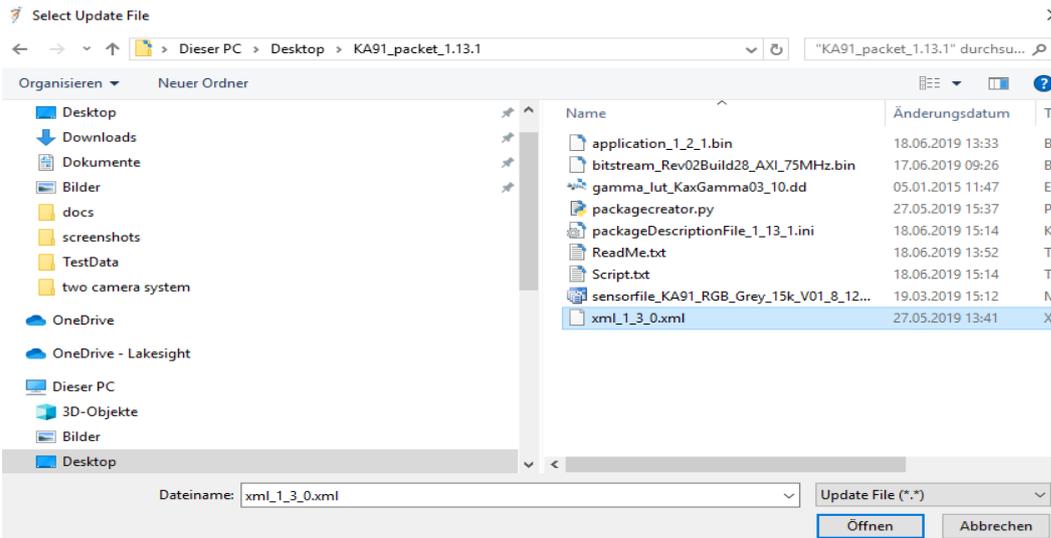
### 5.1 Update Firmware

To update a firmware, each component will be separately transferred into the camera.

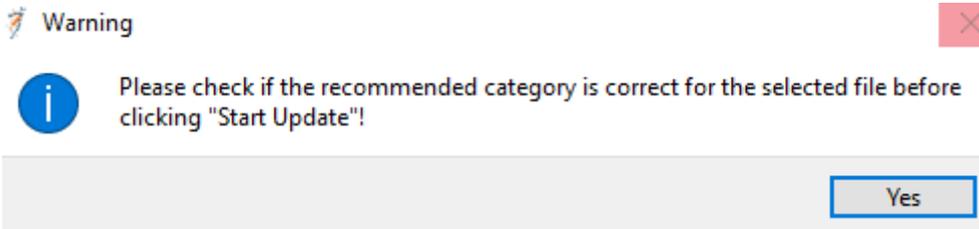


Here is an example how to update a component (for example the camera xml file) of the firmware

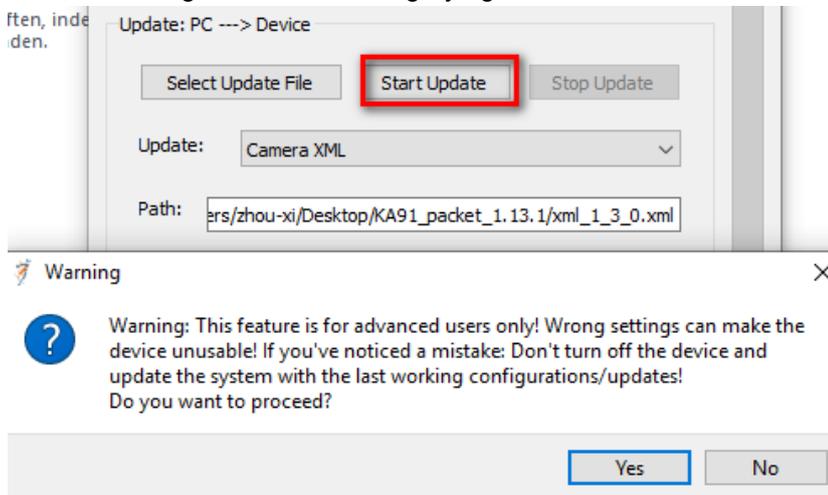
- 1) Click “Select Update File” to open a file dialog
- 2) Choose the correct file which should be updated to the camera. (For example, we choose the camera xml file), then click “Open” button



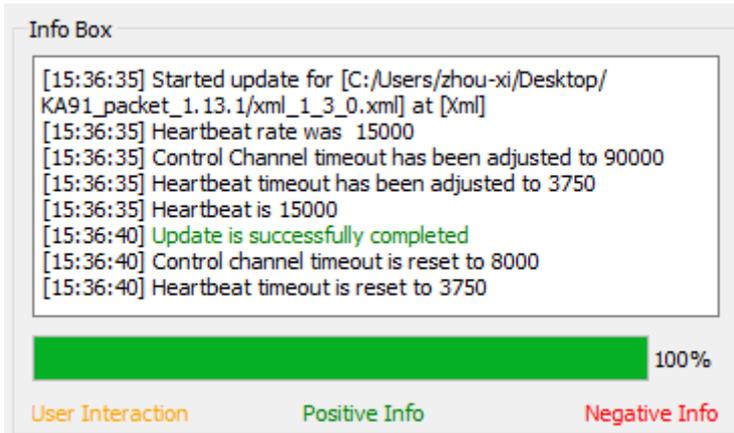
GCT will automatically choose a category for the chosen file. The user will get the first warning to check, if the recommended category is correct.



- 3) If the recommended category is correct, then click "Start Update" button. The user will get a second warning to check the category again. Choose "Yes" to start the update process.



Depending on the file size, the update process can last several seconds to minutes. If the progress bar of the update process reaches 100% and there is no error message in the info box, then the update of a file is done.

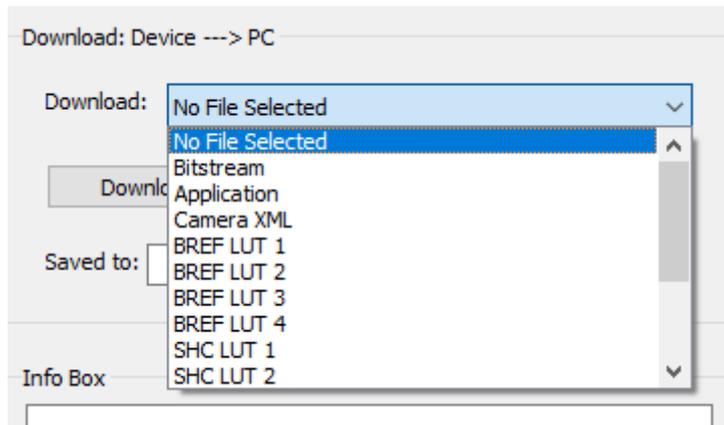


To update the firmware completely, the user needs to update all the components which belong to this firmware.

## 5.2 *Download Firmware Component*

Each component of the firmware can be downloaded from the camera to local PC.

- 1) Choose a category of component which should be downloaded to local PC
- 2) Click “Download to...” button to set the target file path



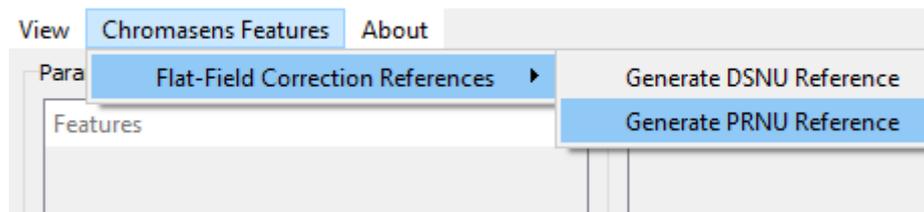
## 6 Shading (PRNU) Wizard

GCT provides the possibility to create a shading file or a dark reference file or a shading file. Shading file.

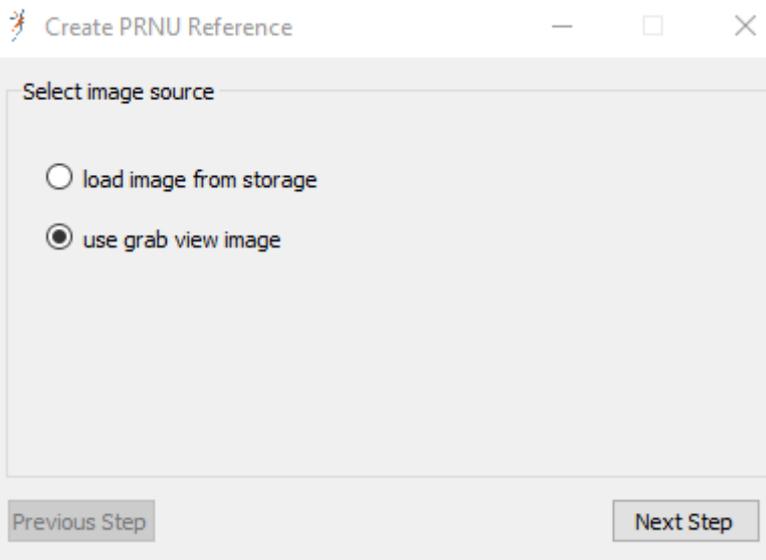
If a shading file should be generated from a grab image

- 1) Prepare a grabbed image in GCT. If the camera is currently connected in GCT, a grabbed image can be obtained from clicking “Snap” button or from checking/unchecking “Grab” checkbox.
- 2) Open shading wizard by clicking “Chromasens Features” menu, then “Flat-Field Correction References” -> “Generate PRNU Reference”. PRNU means photo response non uniformity and is related to shading.

 GenICam Control Tool (GCT) - V.0.19.7



- 3) because a grabbed image is already available, so choose “use grab view image” to open the shading wizard



- 4) set parameters for shading

PRNU Settings

Target Value:

Settings For Average Value

Y-Position:

Height:

Settings For Extrapolation

Enable extrapolation

Left     Right

Left:

Right:

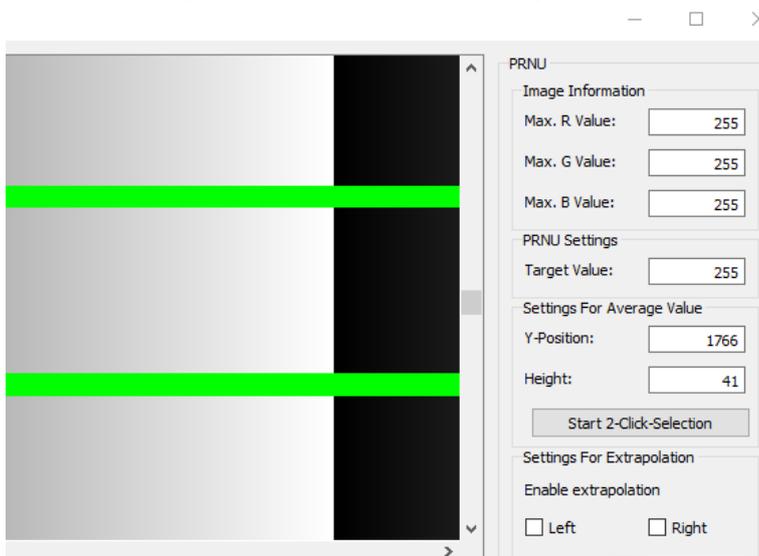
Width:

Target Value: the color value of the white color after shading. It is often set to a certain value in interval [220, 240]

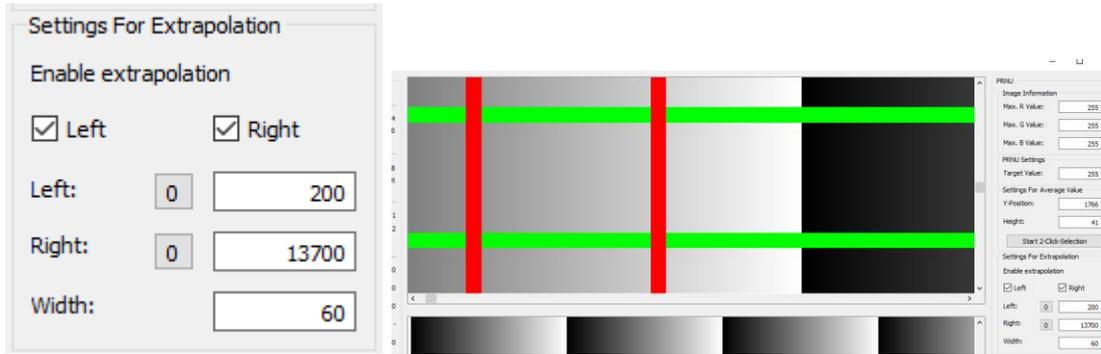
Y-Position: a rectangle region of the grab image will be used to generate the shading data. This value is the upper position of the chosen region.

Height: the height of the chosen rectangle, whose data will be used to generate shading data. If Y-Position is 100, Height is 300, then rectangle region begins with the 101<sup>st</sup> line and ends with 400<sup>th</sup> line, so that this region has 300 lines.

The user has the possibility to mark the upper and bottom lines of the rectangle by clicking the “Start 2-Click-Selection” button and then clicking twice in the grab image in the upper frame. The chosen region will then be marked with green color.



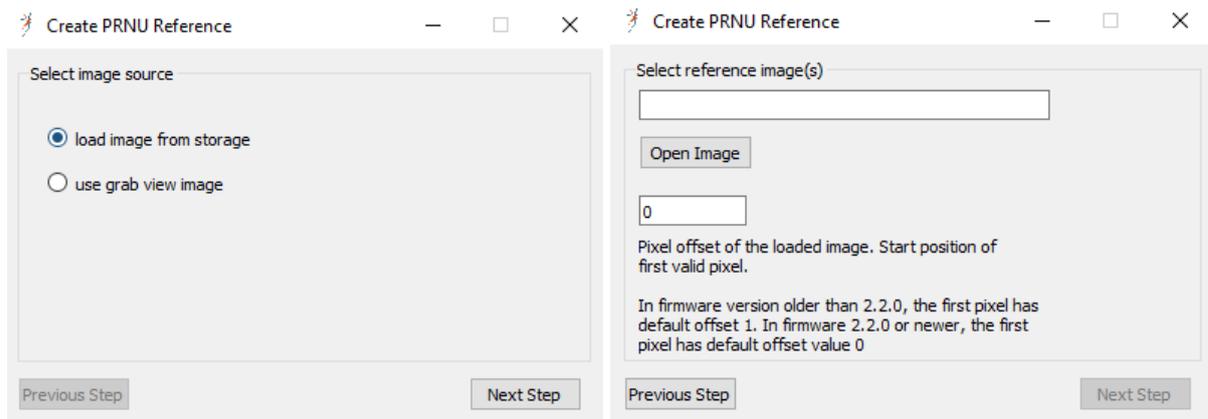
Left and right extrapolation: the following example helps to understand how the extrapolation parameters affects the chosen region and shading data. The checkbox “Left” is checked, means that left extrapolation will be used, the data of region from 200<sup>th</sup> to 259<sup>th</sup> columns will be used and left extrapolated for the region left to 200<sup>th</sup> column. The checkbox “Right” is also checked, means that right extrapolation will be used, the data of region from 13641<sup>th</sup> to 13700<sup>th</sup> columns will be used and right extrapolated for the region right to 13700<sup>th</sup> column. The interpolation areas will be marked as red in the grab image in the upper frame.



- 5) Click “Test PRNU” button to see the preview of shading result.
- 6) Click “Save PRNU File to Local PC” to choose a target file for the generated shading file. The generated file has currently .ka91 as file extension and has 122964 byte for a camera with 15360 pixels. This generated shading file can be uploaded into the camera and activated afterwards

If a shading file should be generated from an existing image file instead of a grab image, then please execute the similar steps like above mentioned from step 2) to 6)

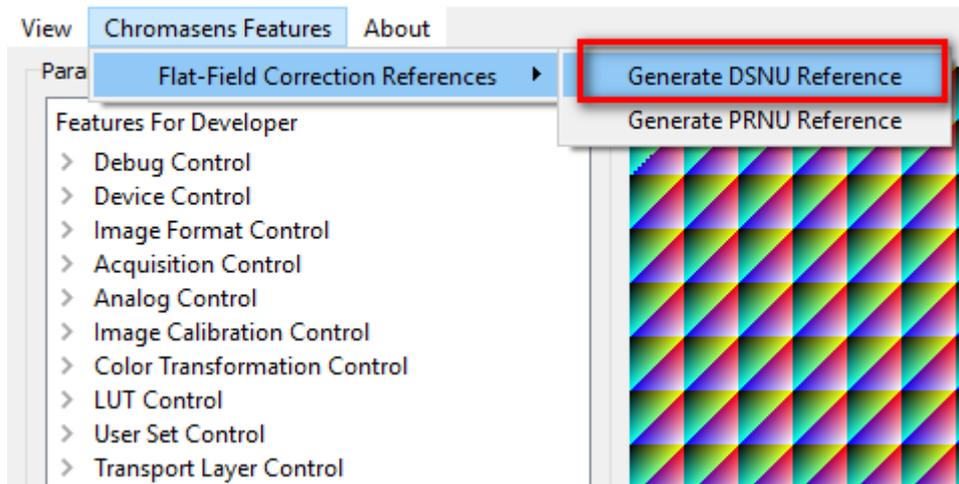
Please notice to choose “load image from storage” in this case. And in the next dialog, please set the correct value of the first valid pixel (pixel offset). If the loaded image comes from a camera, whose first valid pixel begins at the first pixel on its sensor, then in the old firmware (older than 2.2.0), this has the value 1, but in the new firmware (v2.2.0 or newer), this has the value 0.



## 7 Dark Reference (DSNU) Wizard

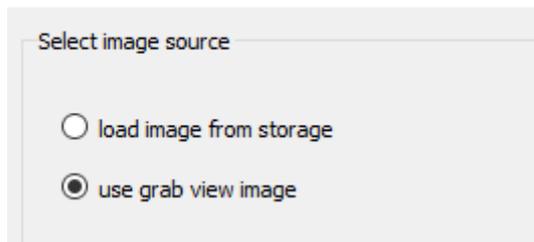
Very similar to the Shading (PRNU) wizard, which is described in the previous chapter, GCT can also generate a dark reference file. To open the wizard, please click “Chromasens Features” -> “Flat-Field Correction References” -> “Generate DSNU Reference”

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To generate a dark reference (DSNU) file from a grab image, please choose “use grab view image”. If the image is to be loaded from PC, please choose “load image from storage”.

Create DSNU Reference



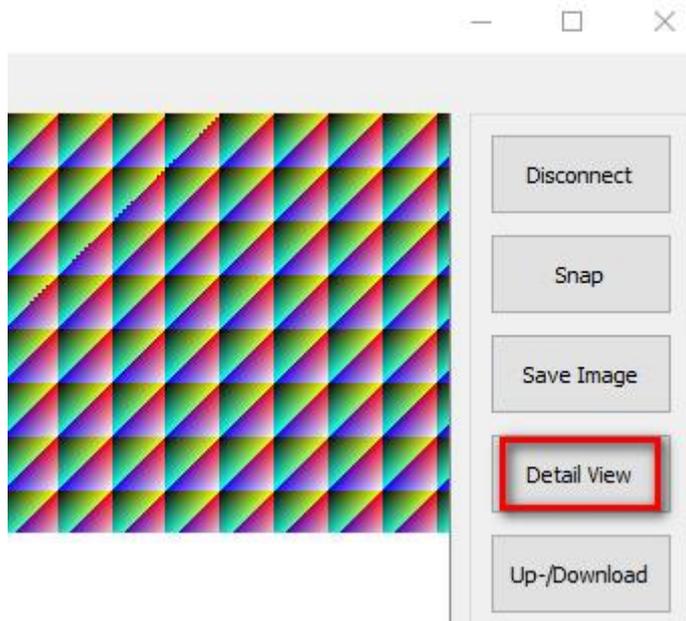
For DSNU, there is no need to set the target value, because the target value stays 0 for dark reference. There is currently also no need to test and preview DSNU effect. After setting the region size and clicking “Save DSNU File to Local PC”, a dark reference file will be created. It has .ka91 as file extension too and has the same file size as the shading file.

## 8 Plot function

GCT provides the basic plot function which can help image analysis. Just like generating a shading file, which uses a grab image or an existing image on PC, the input image for a plot function can be also obtained from grab process or can be loaded from PC.

Use plot on a grab image

- 1) Prepare a grabbed image in GCT. If the camera is currently connected in GCT, a grab image can be obtained from clicking “Snap” button or from checking/unchecking “Grab” checkbox. Then an image from the camera is captured and displayed in GCT
- 2) Click “Detail View” button on the right side of the main window.



- 3) Choose a region which should be plotted. The user can input the start x position, start y position, width and height of the region where he wants to apply plot. He can also choose this region with mouse clicks. The chosen region will be marked with violet color. By default, the original marked region is the first whole line of the grab image.

Parameters for Plot Region

Start 2-Click-Selection (x)

Plot Region x

Plot Region Width

Start 2-Click-Selection (y)

Plot Region y

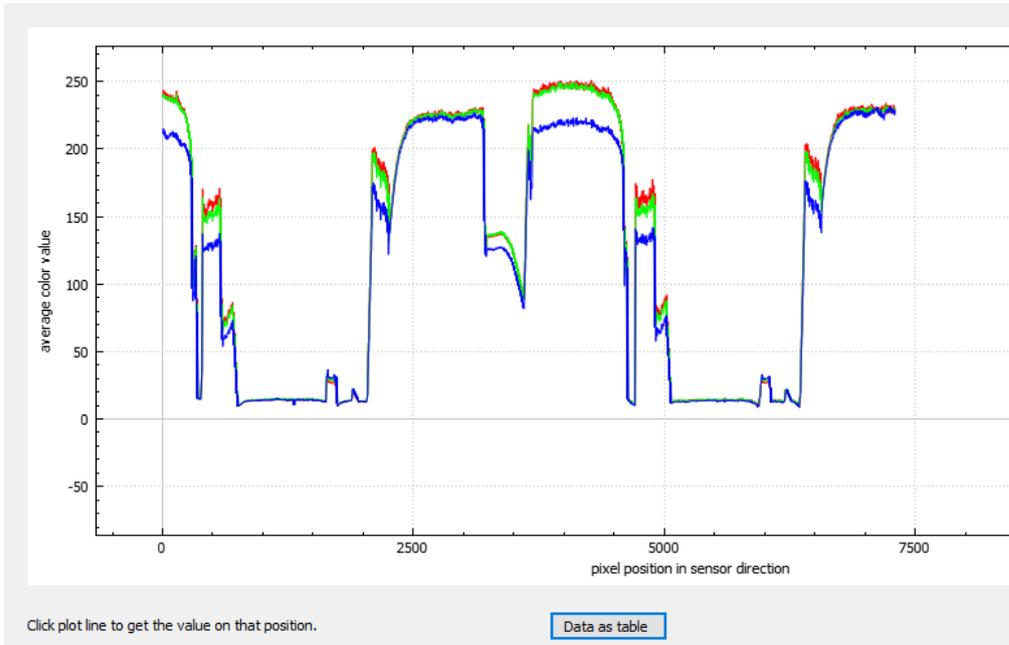
Plot Region Height

- 4) Click “Start Plot” to display the plot graph. The plot graph can be zoomed with the mouse wheel and be moved with left mouse. If a certain point on the plot graph is selected, then the average R,G,B value of the corresponding sensor pixel will be displayed in the bottom area.

Use plot function on an existing image from the PC

- 1) Click “Chromasens Features” menu, then “Flat-Field Correction Field” -> “Generate PRNU Reference”
- 2) Choose “load image from storage” option and load a source image, you will open the shading wizard
- 3) Set the size of plot region
- 4) Click “Start Plot” to display the plot graph

Plot of Average Color Value



It is also possible to display the plot data in a table, if the button “Data as table” is clicked

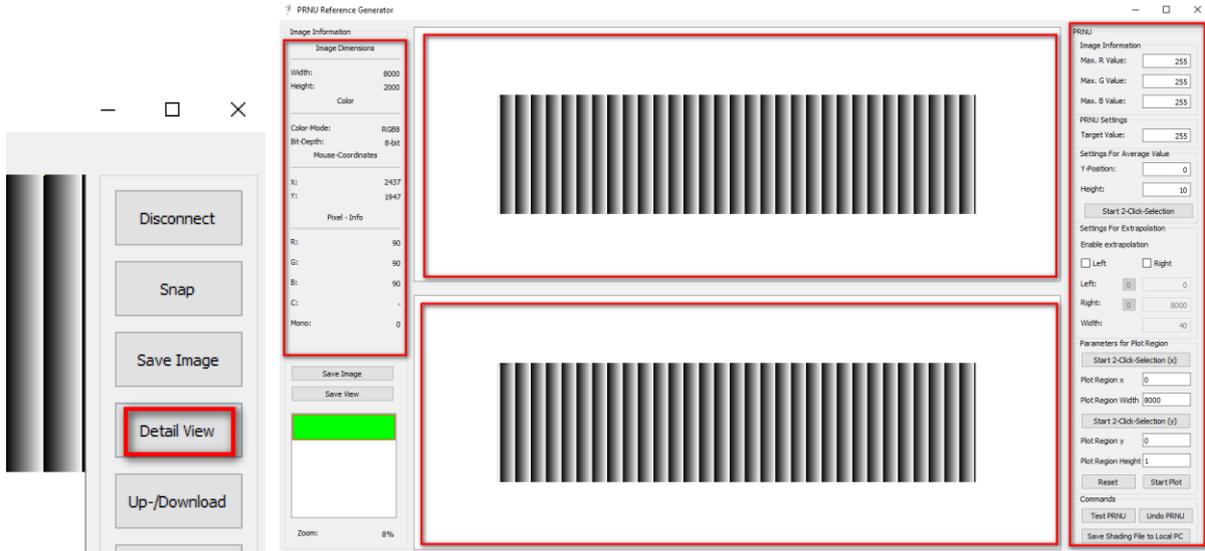
Chromasens\_GCC\_Windows\_x64

Index	Sensor Position	Red	Green	Blue
0	1	241.333	240.35	214.017
1	2	240.633	239.7	213.583
2	3	240.867	239.967	215.333
3	4	242.583	240.3	213.417
4	5	240.7	241.083	213.033
5	6	240.683	239.95	213.217
6	7	242.2	240.3	213.4
7	8	243.8	239.233	212.733

## 9 Detail View of Image

After grabbing an image from the camera, the user can click “Detail View” button to get more information of the grab image.

It is also possible to view details of a loaded image from PC. This is available from menu “Chromasens Features” -> “Flat-Field Correction Reference” -> “Generate DSNU Reference” or “Generate PRNU Reference”

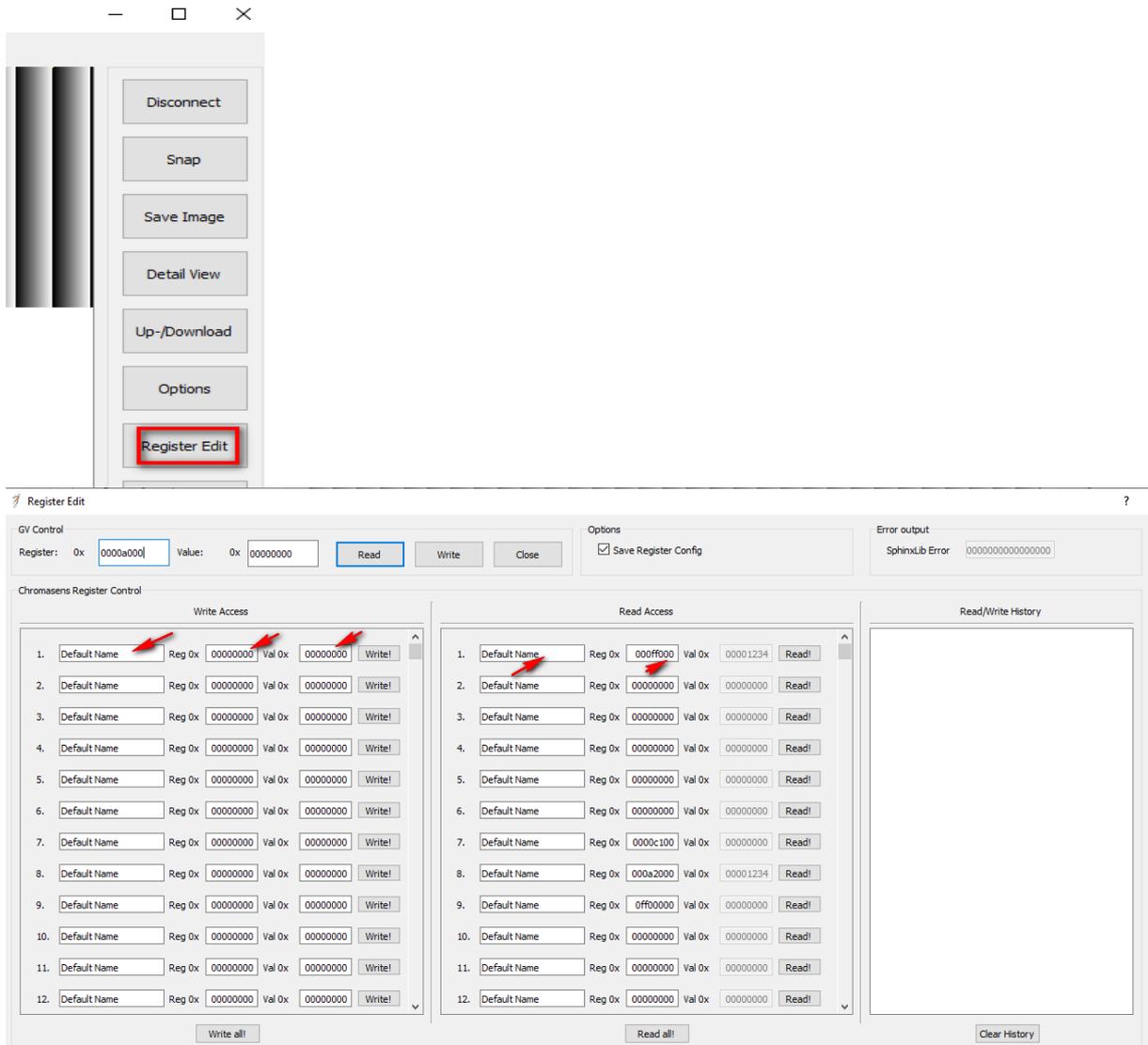


The opened new window of detail view can be divided in 4 parts.

Position	Description	Operation
Upper middle area	The view of original grab image	The view can be zoomed in/out, and it can be scrolled in horizontal and vertical direction.
Bottom middle area	The copy of original grab image	This view is only useful to provide preview of shading effect. Otherwise it is just a copy of the original image view
Left area	Shows image size, color depth, current mouse position and color value of the current point	Moving mouse on the original image view (upper middle area), then the point coordinate and pixel color will be displayed in real time
Right area	Set parameters of shading region, or plot region	

## 10 Register

Registers are locations in the camera, where certain data can be saved and read. In GCT, the user is able to manage 400 register addresses and their values. The registers can be viewed by clicking “Register” button on the main window.



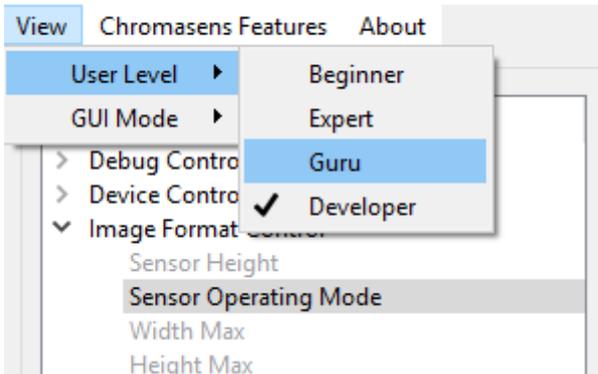
The user can input the register address and value, which should be written into there, and he can also read the register value from a certain register address. The content of all 400 registry entries will be recorded in the file in "C:\Users\Public\Documents\Chromasens\GCT\lastRegisterEdit.ini".

## 11 Camera XML Content

### 11.1 *User level*

Every camera has an xml file, which contains the camera features. The features will be all listed like a tree structure after a camera connection is built. Each feature has a visibility level. Some camera features are available for example only for guru-level or developer-level, but not visible for beginner-level. The level can be edited by clicking "View" -> "User Level" menu in the main window.

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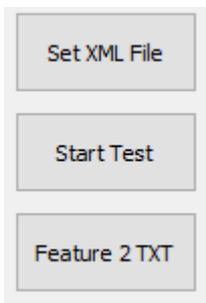
### 11.2 *Operation on Camera Features*

Some features of the camera can be only read. The user does not have permission to change the value. In the tree structure, they are listed in gray. Other features are not only readable but also editable. Those features are displayed in black, whose value can be changed.

Each feature has its own data type. Some features are boolean, or integer, or float, or string, or enumeration. Some features can be executed as a command. The following table lists some example of different feature types.

Data type of feature	Example: Only readable parameter	Example: Read/writable
boolean	Device Control -> Device Package Consistency	Device Fan Enable
Integer	Device Control -> Device SFNC Version Major	Image Format Control -> Test Pattern Generator Selector -> Test Pattern Value
float	Device Control -> Device Temperature Selector -> Device Temperature	Acquisition Control -> Acquisition Line Time
string	Device Control -> Device Package Version	Device Control -> Device User ID
enumeration	Device Control -> Device Scan Type	Image Format Control -> Test Pattern Generator Selector -> Test Pattern
command		Device Control -> Device Reset

## 12 Other functions



### **12.1** *Set XML File for the camera.*

In the main window of GCT, the user can choose a camera xml file to upload to the camera. The content of the camera xml file will be updated immediately. This can be done by clicking "Set XML File" button

### **12.2** *Start Test*

Currently, the test does snap one image, then pauses for several seconds and then snap the next image. This will be repeated until the user clicks the "Stop Test"

### **12.3** *Save Camera Feature as Txt-File*

The currently visible features (depends on user level) will be saved as plain text in a target text file by clicking "Feature 2 TXT".

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