

# **NanEye in Awaiba Viewer**



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# NanEye in Awaiba Viewer

## 1 Introduction

The following document describes the NanEye specific options that can be used inside Awaiba Viewer software.

- Capture data from up to **2 NanEye** module with **NanoUSB2.2/EFM01 USB2** boards
- Capture data from up to **4 NanEye** module with **NanoUSB3** board

For additional information regarding the registers, please take a look into NanEye Full Spec.

## 2 NanEye in Awaiba Viewer

This option is used with **EFM01**, **NanoUSB** and **NanoUSB3** board with either **AwaibaViewer** or **StereoViewer** options.

For additional options please check Awaiba Viewer Quick Start document.

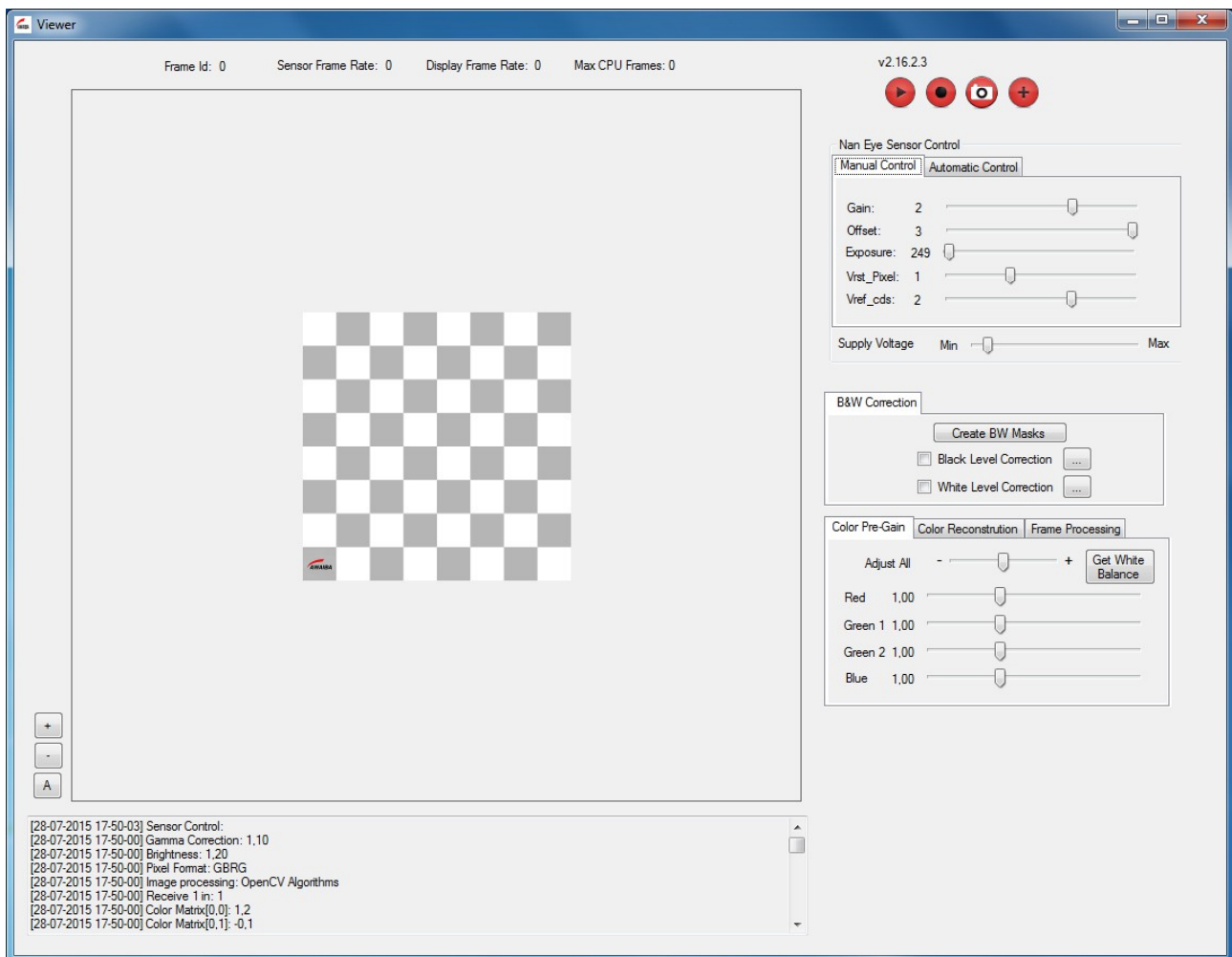


Figure 1: Awaiba Viewer - Main Interface

## 2.1 NanEye Sensor control

### 2.1.1 Manual Control Tab

Figure 2 shows the registers that can be changed by the user and the respective default values for NanEye 2D.

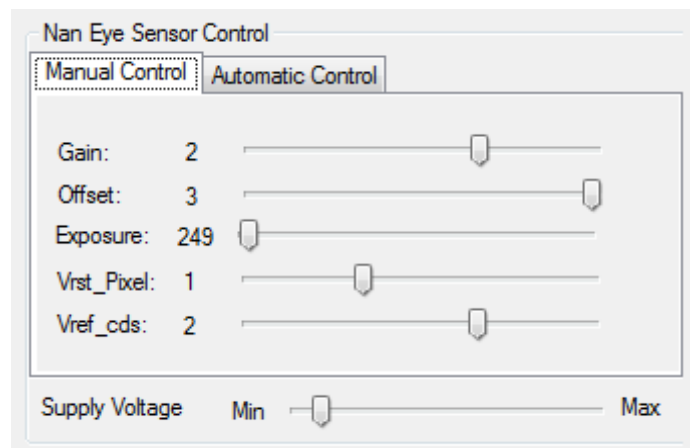


Figure 2: NanEye Sensor Control

- Gain:
  - Has values between 0 and 3
  - 0 is the darkest and 3 is the brightest level
- Offset:
  - Has values between 0 and 3
  - 0 is the darkest and 3 is the brightest level
- Exposure:
  - Has values between 0 and 250
  - 0 is the darkest and 250 is the brightest level
- Vrst\_Pixel:
  - Has values between 0 and 3
  - Sets the tension in which the pixel gets reset
- Vref\_CDS:
  - Has values between 0 and 3
  - Is the CDS reference voltage which helps to remove some noise



**Note:** Gain and Exposure registers can not be changed manually if Apply AEC is selected in Automatic Control tab!

## 2.1.2 Supply Voltage

The user can change the sensor voltage between 1.7V and 2.4V. Increasing the supplied voltage also increases the sensor frame rate.

## 2.1.3 Automatic Control

Figure 3 shows the interface of the automatic exposure control.

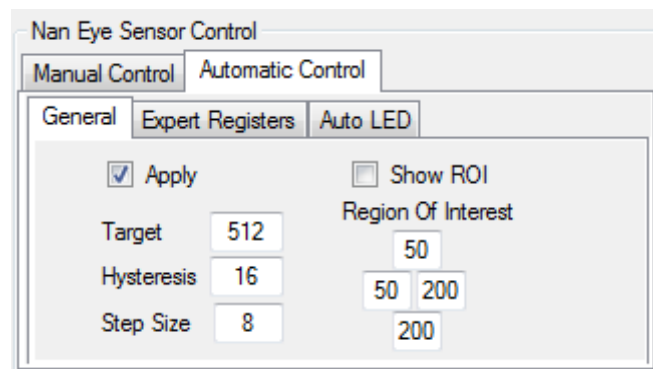


Figure 3: Automatic Control - General Tab

- Apply AEC:
  - In this mode the sensor will automatically change its registers, to adapt to the light that it is being exposed, and the user can not change them in the manual control.
  - When the sensor is saturated it will decrease the *Exposure* and *Gain* until the image is not saturated. On the other hand, if the image is too dark, it will increase the *Gain* and *Exposure* until the image is bright enough.
- Show ROI:
  - If this is enabled, it will show the area in which the AEC retrieves the values to perform its algorithm.
  - On the bottom of the image there are 4 blue lines which represents the *Gain* (each line is a gain value) and the yellow line the *Exposure* value.
- Region Of Interest:

- The values is the area (rows and columns) that the algorithm uses to check if there is a need to update the sensor's registers.
- Target:
  - Value that the algorithm will try to get. The lower it is, the darker the image will be. The higher it is, the brighter the image will be.
- Step Size:
  - The speed that the algorithm will adapt to the conditions. If this value is high, then the algorithm will adapt faster, but if it is too high, it could over-correct the image. If this value is too low, it will take the algorithm too much time to adapt the image to the current light conditions.

Figure 4 shows an example where *Gain* is 1 and *Exposure* approximately 200.

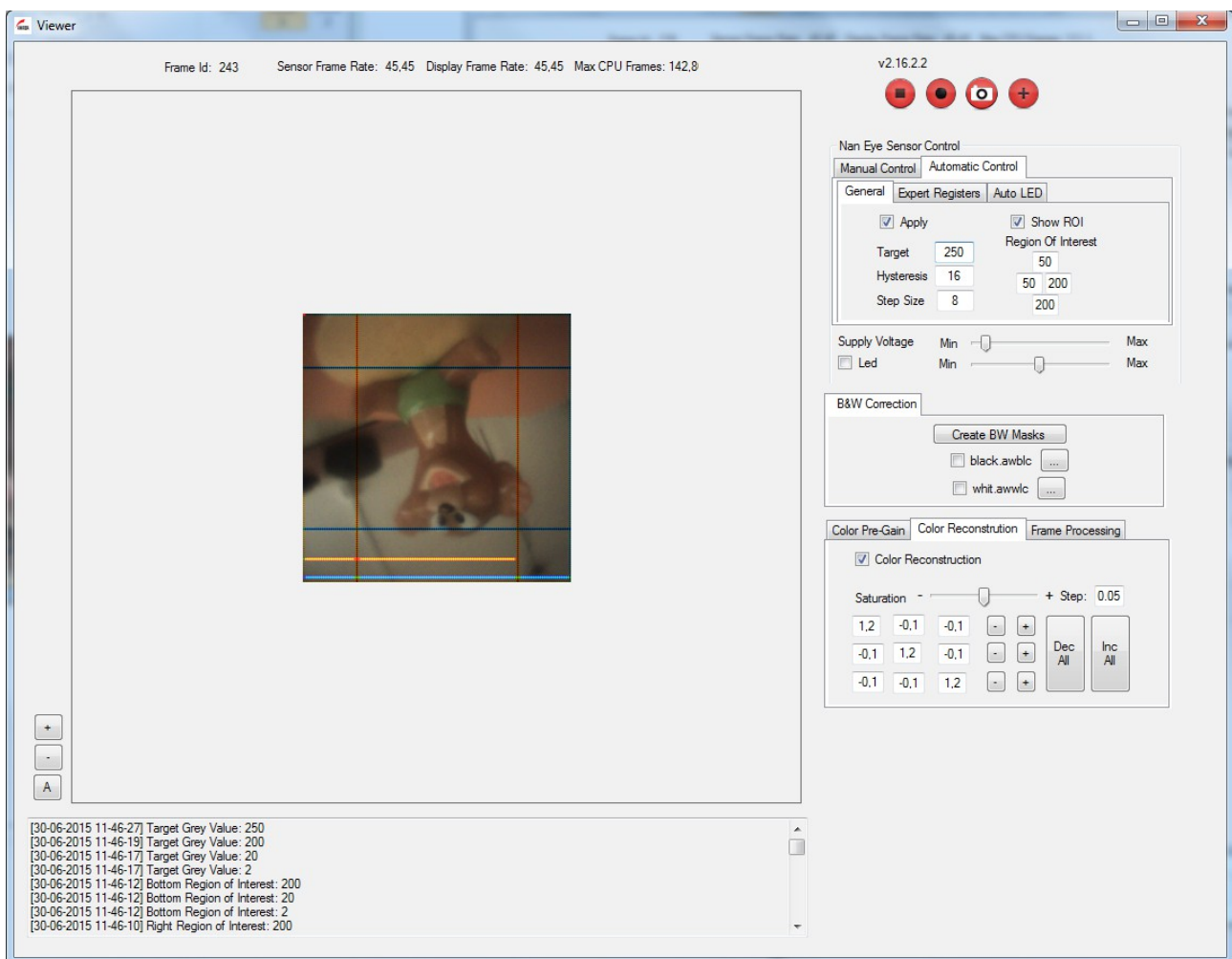


Figure 4: Example 1: Gain 1 and Exposure 200

Figure 5 shows another example where *Gain* is 3 and *Exposure* approximately 222.

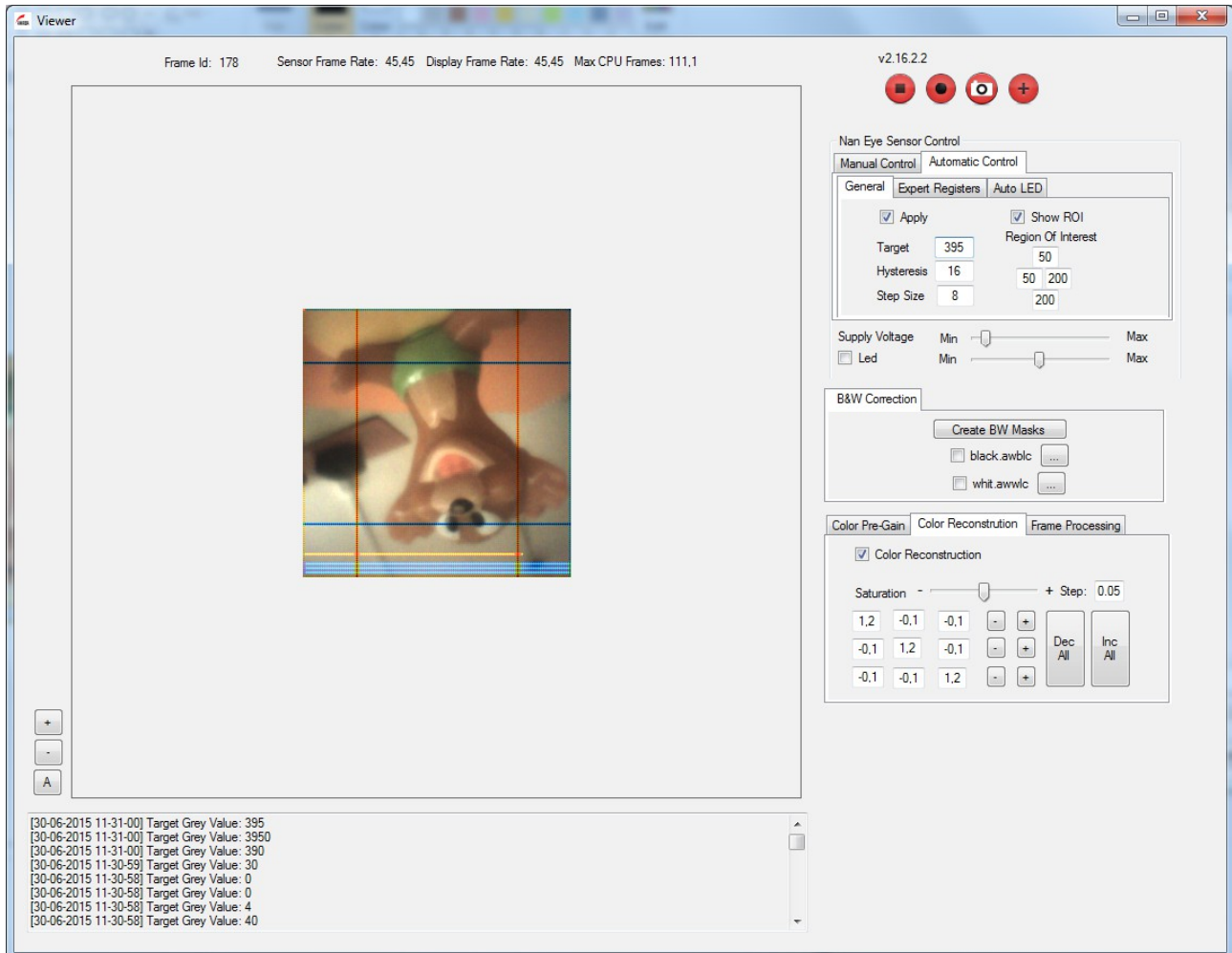


Figure 5: Example 2: Gain 3 and Exposure 222

## 2.1.4 Expert Registers

Explained in the **Automatic Exposure Control algorithm** document.

## 2.1.5 Auto LED

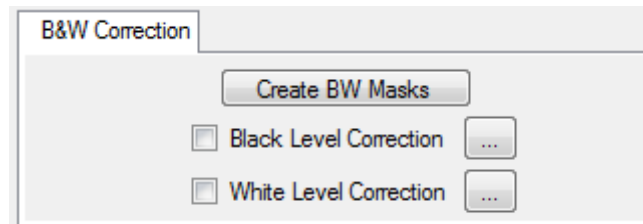
- Apply LED Auto (on **NanoUSB3** board):
  - Tunes automatically the LED luminosity

On **NanoUSB2** the LED is tuned manually. With the LED checkbox, checked, the LED will be turned on.



## 2.2 Black and White Masks

To improve the image quality, the user can create a Black and a White Mask individually, as shown in figure 6.



*Figure 6: Create Black and White Masks*

To load the files please press “...” button. Check the “checkbox” to apply the respective mask.

### 2.2.1 How to create Black Masks

- Press the **Create BW Masks** button
- Choose the File Name
- Cover the sensor and then the Software will create the Black Mask
- When finished, a message is displayed “Black Mask created successfully”

### 2.2.2 How to create White Masks

- Choose the File Name
- Adjust the light (using homogeneous light) to reach 90% of saturation
- When finished, a message is displayed “White Mask created successfully”

The files has the following extension: .awblc and .awwlc for Black and White masks respectively.

## 2.3 Image Processing

### 2.3.1 Color Pre-Gain

A Bayer Pattern is used as shown in figure 7.

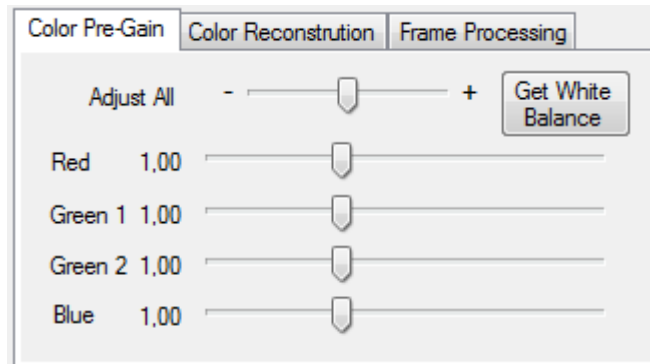


Figure 7: Image Processing - Color Pre-Gain tab

Adjusting the pixel individually:

- Default value is set as 1 (do not change the pixel value)
- The values can vary between 0.5 and 2

How to do **White Balancing**:

- Point the sensor to a white surface/object
- Press the button “Get White Balancing”
- The pixel values will adjust automatically

## 2.3.2 Color Reconstruction

Figure 8 shows the color reconstruction options.

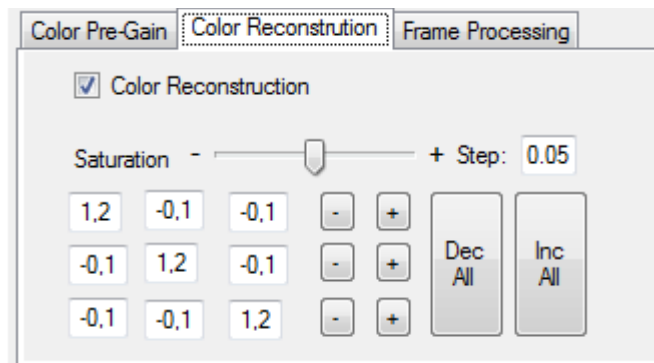


Figure 8: Image Processing - Color Reconstruction tab

In order to have a colourful image please check the Color Reconstruction checkbox.

It is also possible to tune the image saturation manually or through a color matrix for each channel (Red, Green and Blue respectively).

Color adjustment Matrix:

- The default value is set as 1.2 (do not change the Gain of each channel)
- To saturate the RED, the first row should be changed, increasing the first value and decreasing the other two
- This changes can be done by pressing the “+” or “-” buttons
- The same procedure can be done for the Green and Blue channels

## 2.3.3 Frame Processing

Figure 9 shows the frame processing tab options.

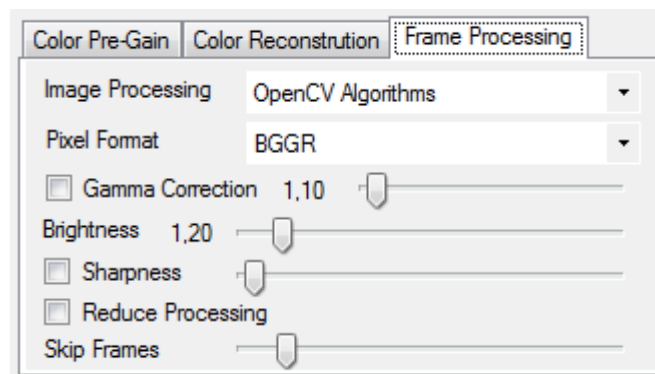


Figure 9: Image Processing - Frame Processing tab

- Image Processing
  - Awaiba Algorithms
  - Open CV Algorithms
- Choose pixel format
  - RGGB
  - GRBG
  - GBRG
  - BGGR (defined as default value to show the image color correctly)
- Gamma Correction
  - Applies a gamma function which allows the user to change values between 1 to 4
- Brightness
  - Applies linear gain to the image
- Sharpness
  - Allows to clean the image
- Reduce Processing
  - Used when the PC can not handle the data the sensor is sending
  - Only Masks are applied
- Skip Frames
  - Used when the PC can not handle all the frames the sensor is sending
  - Increasing the trackbar allows to skip more frames



## **NanEye in Awaiba Viewer**

**End of Document**