AOSViewer
User Manual

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1 Introduction

The AOSViewer is a software utility to enable basic image processing and live viewing of a camera stream for alignment and scientific analysis with a focus on facilitating system alignment.

2 Usage

2.1 GUI Architecture

Like most of the AOS software tools, the user input and settings are on the left of the screen and the outputs are on the right side of the screen. In this software, there are tabs on both sides of the screen. The tabs on the left organize the inputs. The tabs on the right allow the user to customize the displayed output.

2.2 Camera Connection

Upon startup, the AOSViewer will list all the cameras available to the user in the top left corner. The user can select a camera and click on the "Start Image Acquisition" button to start a camera feed. Figure 1 shows the screen after connection to the camera. The user can specify the exposure time of the camera using a log-scale slider at the top of the Draw tab on the input side.

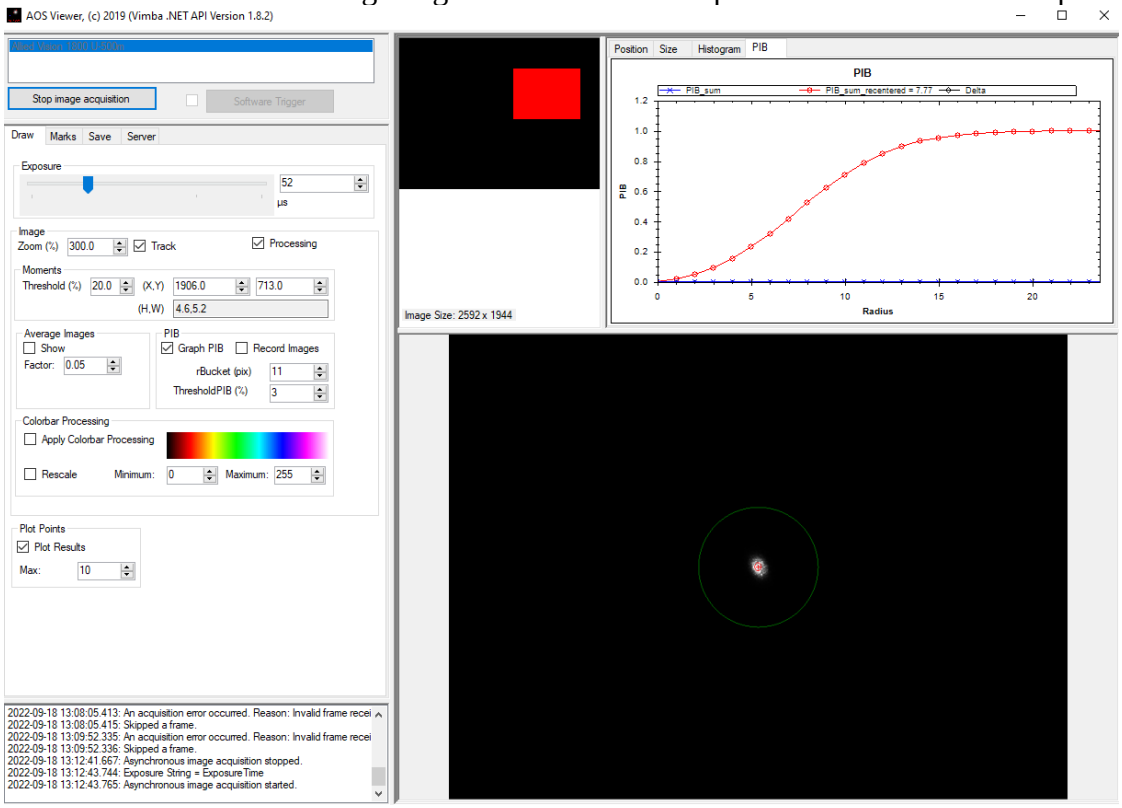

Figure 1: Screenshot Upon Connection

2.3 Viewer Outputs

2.3.1 Image Display

Upon connection to the camera, a section of the camera image will automatically be displayed in the bottom right of the screen. The section that is displayed is indicated in the top left of the output side of the screen as a red rectangle in the black square of the entire image. The user can specify the zoom level with a numeric up-down control. The Track checkbox allows the user to center the window on the centroid of the image. This is useful if the spot jitter needs to be rejected to make it easier to see changes in the spot size and shape. To maximize the viewer frame rate, the user can deselect the Processing check box, but none of the calculated results including the tracking will be available. The image is typically displayed in gray scale, but the user can specify a colormap for the image using the Colorbar Processing group box. The image scale can be specified in this group box as well to enable better visualization of power fluctuations. The minimum and maximum are specified on a 0 to 255 scale.

2.3.2 Calculated Results

The top right of the screen allows the user to select different displayed calculated outputs. All of this processing is turned on and off using the Plot Results checkbox at the bottom of the Draw tab. The number of previous points can be specified by the user in the numeric up down in the Plot Points group box. The default upon startup is the time-varying position graph. The user can also select a time-varying spot size graph. The spot position and size are first and second moments of the image respectively. Both moment calculations are completed with the user-specified threshold.

The Histogram tab shows the user a 100-point log-scale histogram of the pixel count values. This is very useful when determining if the camera is saturated.

The final output tab is a power in a bucket (PIB) calculation result. The image irradiance sum is plotted vs. the radial distance from the centroid of the image. The user can select the bucket radius for a sum reported in the PIB graph legend and the threshold used in this calculation separate from the threshold used in the moments calculation.

The user can also turn on a running average of the image to average out noise or speckle in the measurements. The image displayed is a running average if the user selects the Show checkbox in the Average Images group box. The running average calculation is given by

$$I_{avg}' = w*I_{input}+(1-w)*I_{avg},$$

Where I_{avg}' is the new image average, I_{input} is the input image, I_{avg} is the old average image, and w is the weight factor specified by the user.

2.4 Marking the Image Display

The Marks tab on the input side (left) is used to draw point and size markings on the image. Figure 2 shows an image of the AOSViewer with the Marks tab in focus and an image with markings. The user can save a spot position using the Save button. A selected mark in the table can be deleted with the Delete button. The marker size is specified by the user above the table.

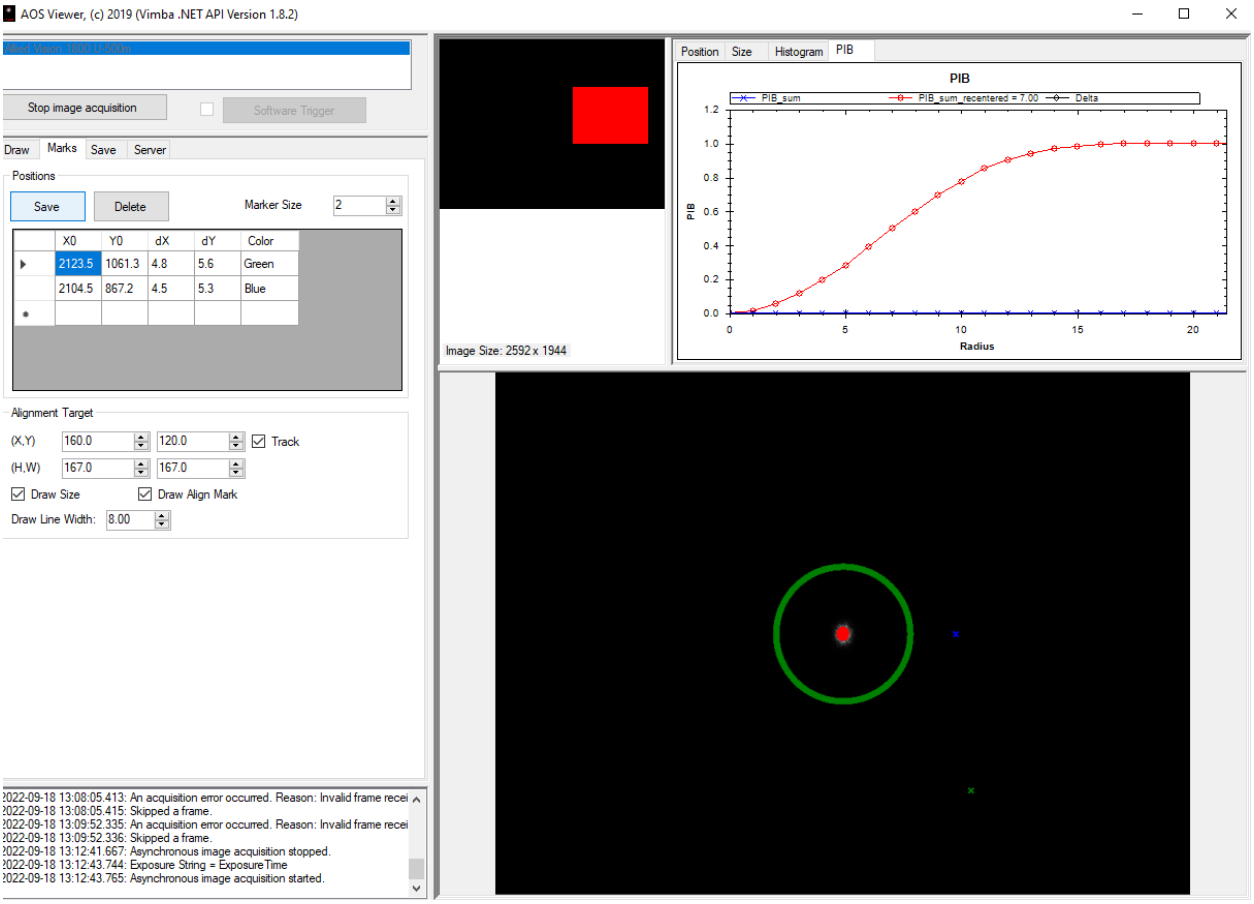

Figure 2: Screen Shot of Image Marking Options

The user can also overlay a circle onto the screen at a specified pixel size in green using the controls in the Alignment Target group box. The user can chose to move the alignment target with the centroid of the image or specify a pixel location. Selecting the Draw Size check box will draw a red circle on the image at the size calculated with the second moment. The drawing line width is specified with the numeric up-down at the bottom of the Alignment Target group box.

2.5 Saving Images

Figure 3 shows the Save tab on the input side. The user can specify a file name base and a number of images to be captured with a specified delay between capturing these images. When the user clicks the DAT button, the software will directly save the images into a DAT file format, which is a simple file format with a short file header, a short image header, and the raw binary image data. A DAT reader function comes with the AOS software. A separate DAT viewer GUI software is available from AOS. The Snap button allows the user to save one image. The VimbaLogger button launches a separate application that records the images to a DAT file.

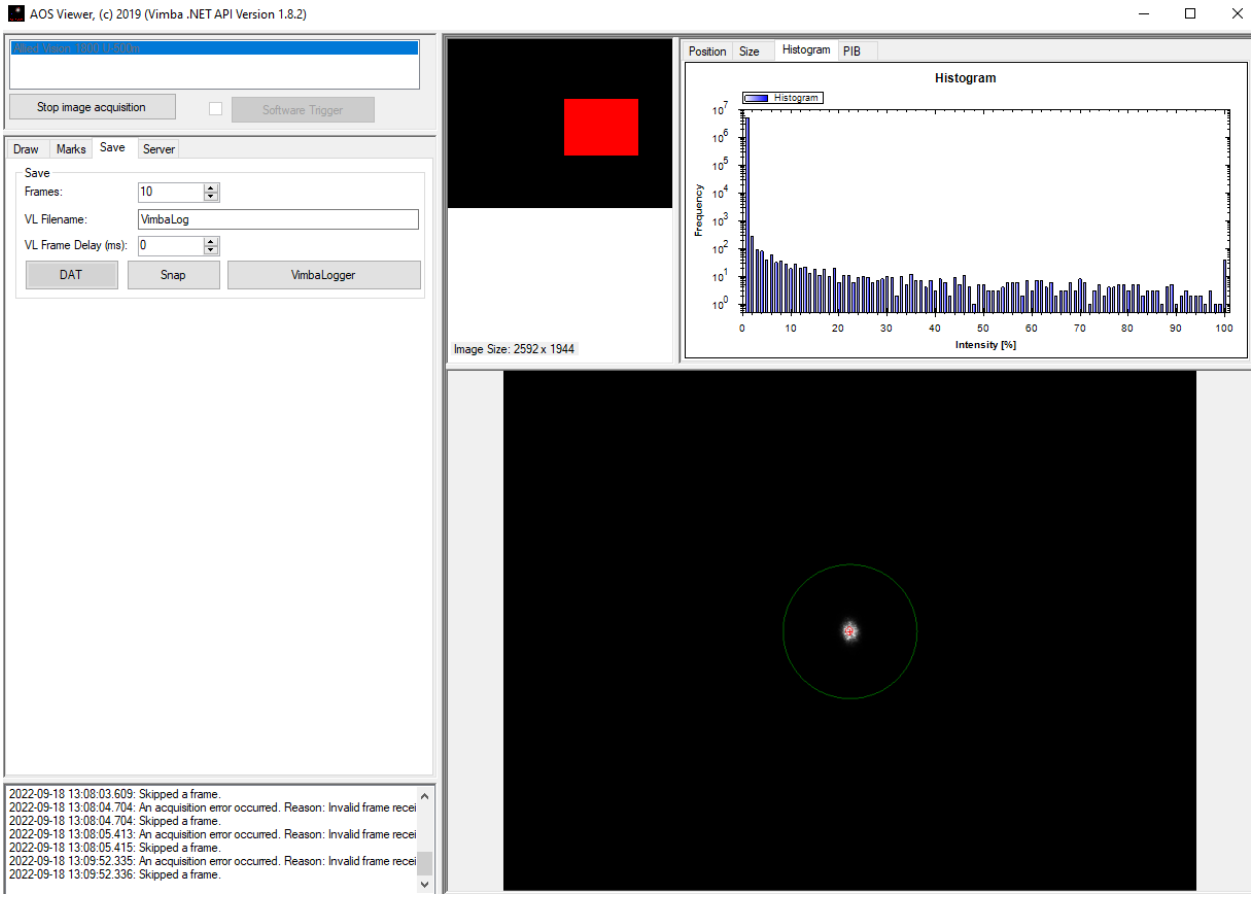

Figure 3: AOSViewer Save Tab and an Example Histogram Output

2.6 Image Server

Figure 4 shows the Server tab in the AOSViewer software. This tab is an experimental functionality that allows an external program to connect to the flow of images coming into the AOSViewer via a TCP connection. The user can start this server with the Start TCP Server button at the user-specified port. The Send Images checkbox will enable images to be communicated to a connected TCP client in a CAGE file format. Contact AOS for more information on this functionality.

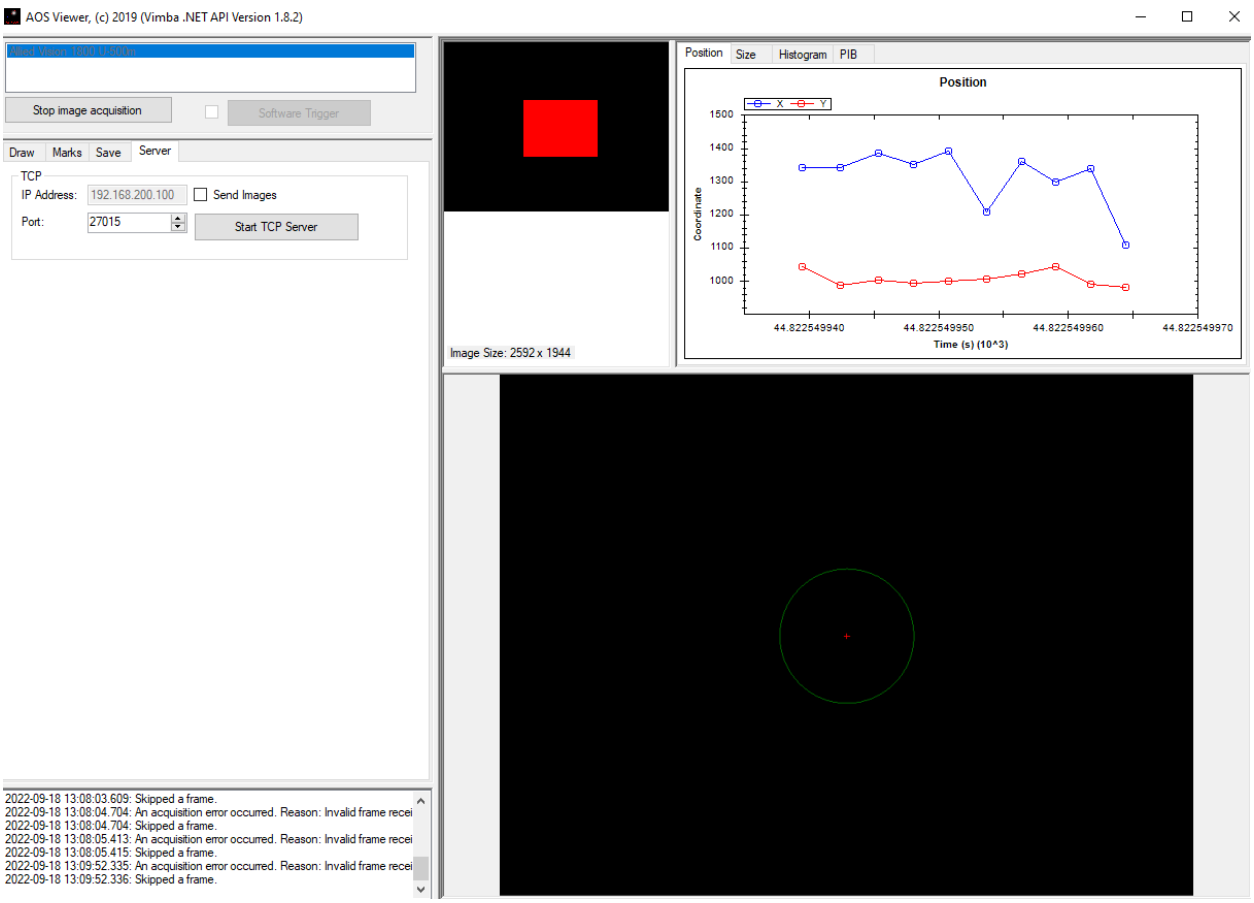

Figure 4: AOSViewer Screenshot Showing the Server Tab and an Example Spot Position Output