

Interfacing SWIR Vision Systems Devices to MATLAB

Important notes before you begin:

This application note is provided under the assumption that the user understands the USB3 Vision and GigE Vision standards. SWIR Vision Systems devices are USB3 Vision and GigE Vision compliant. This makes it simple to control image streaming and camera features when using third-party software that supports USB3 Vision and GigE Vision devices. **MATLAB does not natively support USB3 Vision protocol at this time, so this tutorial is limited to GigE Vision.**

MATLAB Compatibility with GigE Vision

There are Mathworks Toolboxes and Hardware Support Packages that are required to communicate with GigE Vision devices in MATLAB. The following tutorial uses:

- **MATLAB R2019a (Version 9.6)**
- **Computer Vision Toolbox (Version 9.0)**
- **Image Acquisition Toolbox (Version 6.0)**
 - **Support Package for GigE Vision Hardware**

In this tutorial, we will use the MATLAB's Image Acquisition Toolbox to stream video and adjust GenICam features using our GigE Vision compliant SWIR Vision Systems device. Modifications to the GenICam features are recalled and used unless expressly changed in MATLAB. Changes will persist a power cycle only if you execute the **Save Settings** feature after changing the parameters and before cycling the device's power.

Troubleshooting Connection Issues

Before interfacing to MATLAB, reference the **Acuros 1.1 Quick Start Guide** to install the appropriate SWIR Vision Systems software, power up the camera, and perform the first operation of camera. You should understand the software and image controls as described in the **Acuros 1.1 User Manual**. First, we recommend learning to use your product in the SVSImagIR software. Connecting to SVSImagIR is a simple way to ensure that your device is supplied with power and properly connected to the PC. The SVSImagIR software should be closed while you are interfacing to MATLAB.

By performing the installation described in **Acuros 1.1 Quick Start Guide**, you should have already installed the eBUS Universal Pro for Ethernet driver. This driver should not interfere with the ability to connect to MATLAB. There are a couple of things you may want to check if you are having trouble connecting:

1. A firewall is not blocking camera communication
2. There are no other imaging application or an antivirus programs enabled that use packet filtering drivers
3. **Image Acquisition Toolbox Support Package for OS Generic Video Interface** must not be installed
4. **Image Acquisition Toolbox Support Package for GenICam Interface** must not be installed

Connecting to MATLAB’s Image Acquisition Toolbox

Open MATLAB and enter `imaqtool` in the MATLAB Command Window to open the Image Acquisition Tool dialog. In the Image Acquisition Tool dialog, select the **iPORT-NTx-GigE** device in the **Hardware Browser** section. In the **Acquisition Parameters** section, select **Mono14** from the list of available formats and click the **OK** button (Fig. 1). Once the camera is finished loading, some additional controls will appear. These controls can be used to capture video and adjust GenICam features.

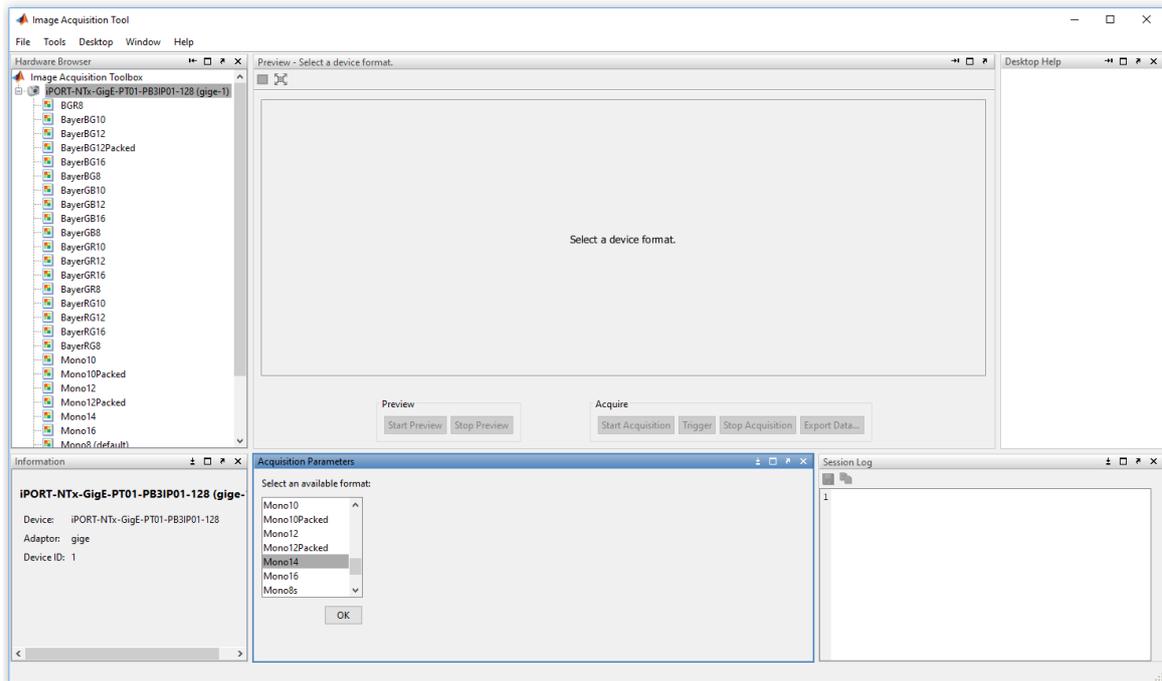


Figure 1: A SWIR Vision Systems USB3 Camera connected to MATLAB’s Image Acquisition Tool. Notice the **Mono14** format is selected in the **Acquisition Parameters** section at the bottom of the dialog.

Capturing Video

Once the camera is connected and finishes loading, the **Preview** and **Acquire** controls will become available in the **Preview** section of the dialog. We will use these controls to capture video. First, open the **Device Properties Tab** in the **Acquisition Parameters** section and change the **Acquisition Frame Count** to 10. Click **Start Acquisition** and allow the process to finish. This process may take several seconds (Fig. 2). Click the **Export Data...** button in the **Acquire** controls to open the **Data Exporter** dialog. Finally, save the 10 frames as your desired data destination.

Changing a GenICam Feature

Once the camera is connected and finishes loading, navigation tabs will appear in the **Acquisition Parameters** section of the dialog. Other than the settings found in the **Region of Interest** tab, all of the GenICam features can be found in the **Device Properties** tab. Notice that the features are organized in alphabetical order. To change an example GenICam feature that is specific to the SWIR Vision Systems camera, navigate to the **Mirror** feature and use the dropdown menu to select **HorizontalOnVerticalOff** (Fig. 3). Go to the **Preview** section of the dialog and click **Start Preview** to preview an image. Wait for the process to finish and a valid image will be displayed in the 2D image area. Note that the image data is flipped horizontally. This indicates that the **Mirror** GenICam feature was successfully modified and the change went into effect.

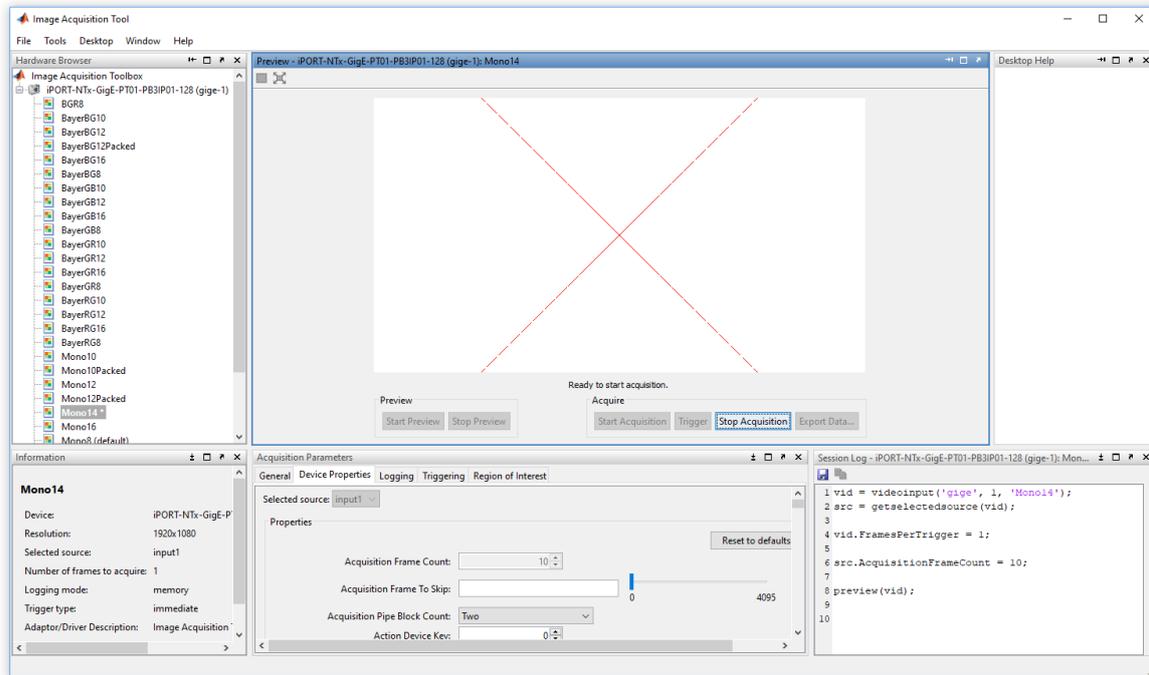


Figure 2: MATLAB’s Image Acquisition Tool dialog while acquiring images. While acquiring, the GUI will display a white rectangle with a red ‘X’ in the 2D image area. This process will take a few moments, but the 2D image area will display valid image data once the acquisition is complete.

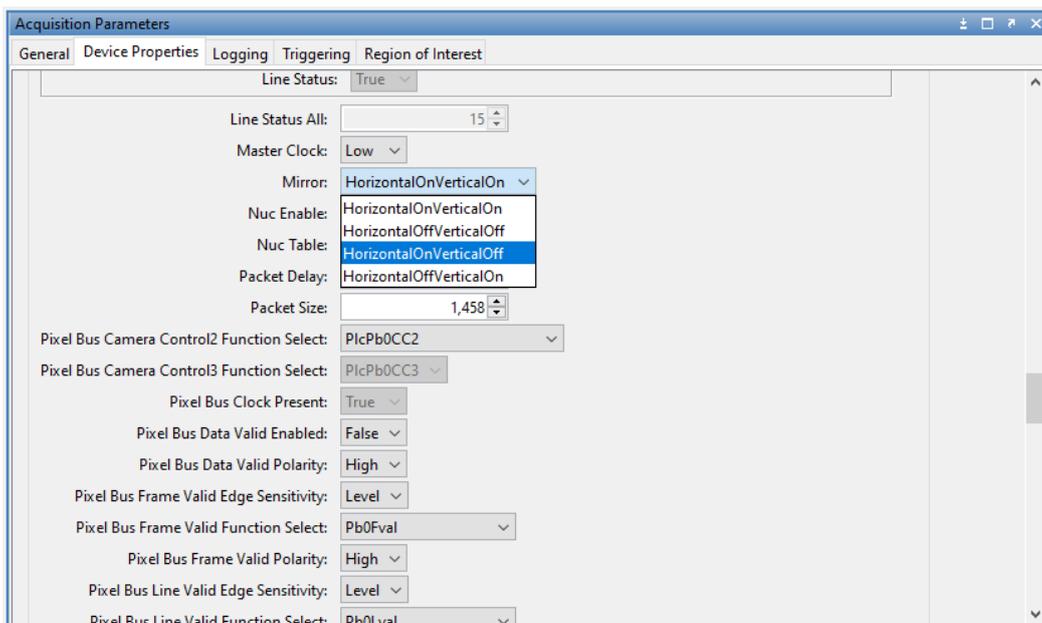


Figure 3: The **Device Properties** tab of the **Acquisition Parameters** section. Most of the GenICam features can be controlled from here. In this example, the **Mirror** feature, which changes the orientation of the image data, is set to **HorizontalOnVerticalOff**.