



Flexible Vision Inc.  
8220 Arjons Dr.  
San Diego, CA 92126

# Product Instructions

# FV-ONPREM-2070

*Printed Material No: 03242020*



	<p><b>⚠ WARNING</b></p> <p><b>Read all safety warnings and instructions</b> <i>Failure to follow the safety warnings and instructions may result in electric shock, fire and/or serious injury.</i></p> <p><b>Save all warnings and instructions for future reference</b></p>
--	---

# Table of Contents

General Information	3
Technical Data	4
Mounting Options	8
Initial Setup	9
Creating an Account	9
Linking your device to the internet	9
Linking your device to your account	9
Assigning a workstation name (optional)	9
Page Overviews	10
Settings Page	10
Dashboard	11
Camera Details	11
Live Video	12
Calibration	13
Rotation Calibration	14
Resolution	16
Snap & Find	17
Upload and Process	18
Masking	19
Pass/Fail	20
IO Presets	21
Controls	22



# General Information



## WARNING

- Read all safety warnings and all instructions. Failure to follow the warnings and instructions may result in electric shock, fire and/or serious injury.
- Save all warnings and instructions for future reference.

## Safety signal words:

- DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- NOTICE NOTICE is used to address practices not related to personal injury.

## Limited Liability / Warranty

Contact the Flexible Vision to Purchase products and services. Warranty will only be approved if the product has been installed, operated and maintained according to the product instructions. Warranty will not be approved if it should be detected that the system has been opened or tampered with.

Any repair work carried out under the guarantee conditions is free of charge. Our responsibility is limited to the repair or, if we consider it necessary, to its free replacement.

The following are not covered by our guarantee:

Damage due to incorrect handling, failure to observe the instruction manual, or attempts by any non-qualified party to repair the instrument; any consequences whatever which may be connected either directly or indirectly with the instrument supplied or its use. Do not open the housing or the power supply. Breaking the seals invalidates warranty.

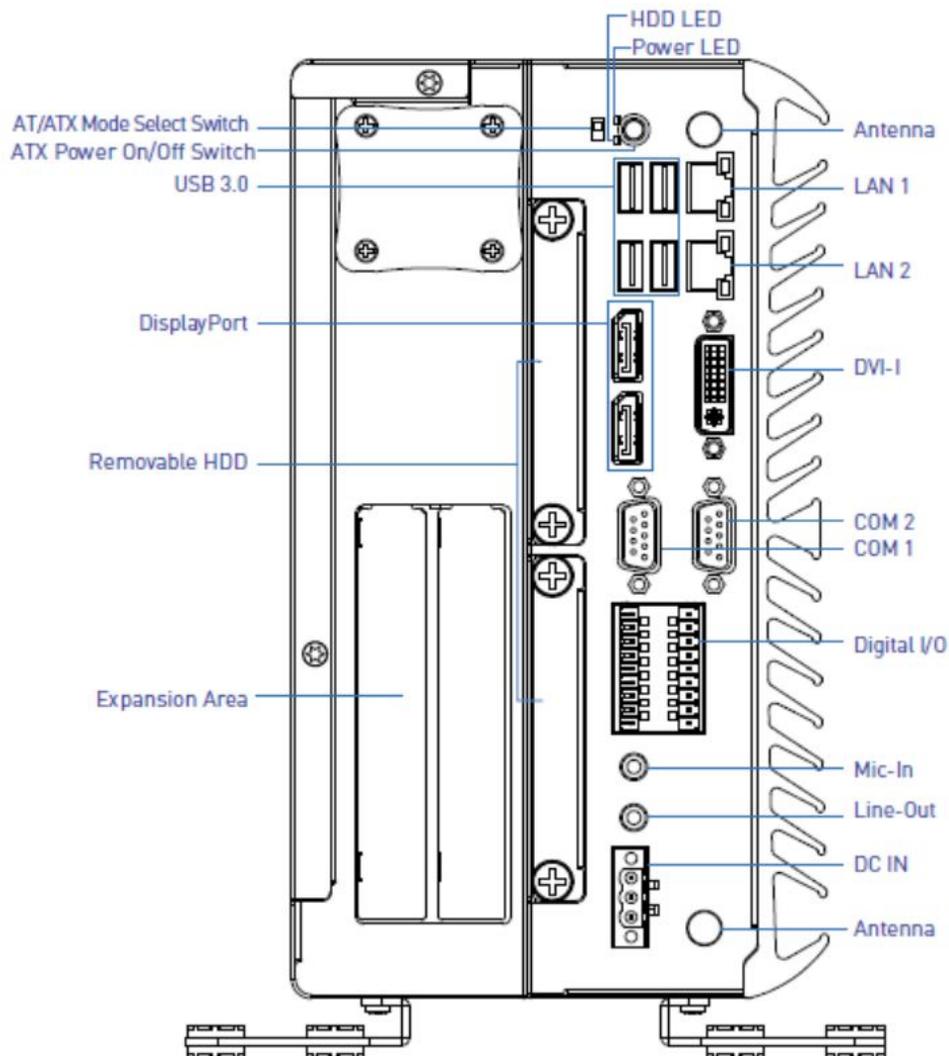
## Overview

The Flexible Vision ON-PREM is an image capturing solution for running image inferences on factory floors.



# Technical Data

- Front Panel DC IN Used to plug a DC power input with terminal block Speak-out Used to connect a speaker
- Mic-in Used to connect a microphone
- Digital I/O Terminal Block-The Digital I/O terminal block supports 8 digital input and 8 digital output
- COM port COM1 ~ COM2 support RS232/422/485 serial device
- DVI-I port Used to connect a DVI monitor or connect optional split cable for dual display mode
- DisplayPort Used to connect a DisplayPort monitor
- USB 3.0 port Used to connect USB 3.0/2.0/1.1 device
- LAN port Used to connect the system to a local area network
- ATX power on/off switch Press to power-on or power-off the system AT/ATX mode select switch Used to select AT or ATX power mode
- Power LED Indicates the power status of the system
- HDD port Removable 2.5" SATA HDD
- Area Antenna hole Used to connect an antenna for optional MiniPCIe WiFi module

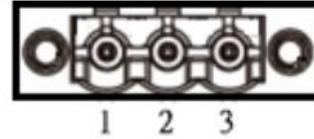


## Connector Details

### DC\_IN1: DC Power Input Connector (+9~50V)

Connector Type: Terminal Block 1X3 3-pin, 5.0mm pitch

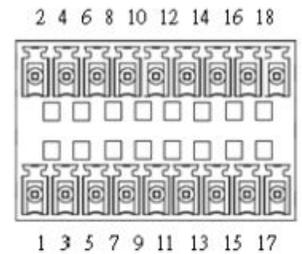
Pin	Definition
1	+9~50VIN
3	GND



### DIO1: Digital Input / Output Connector

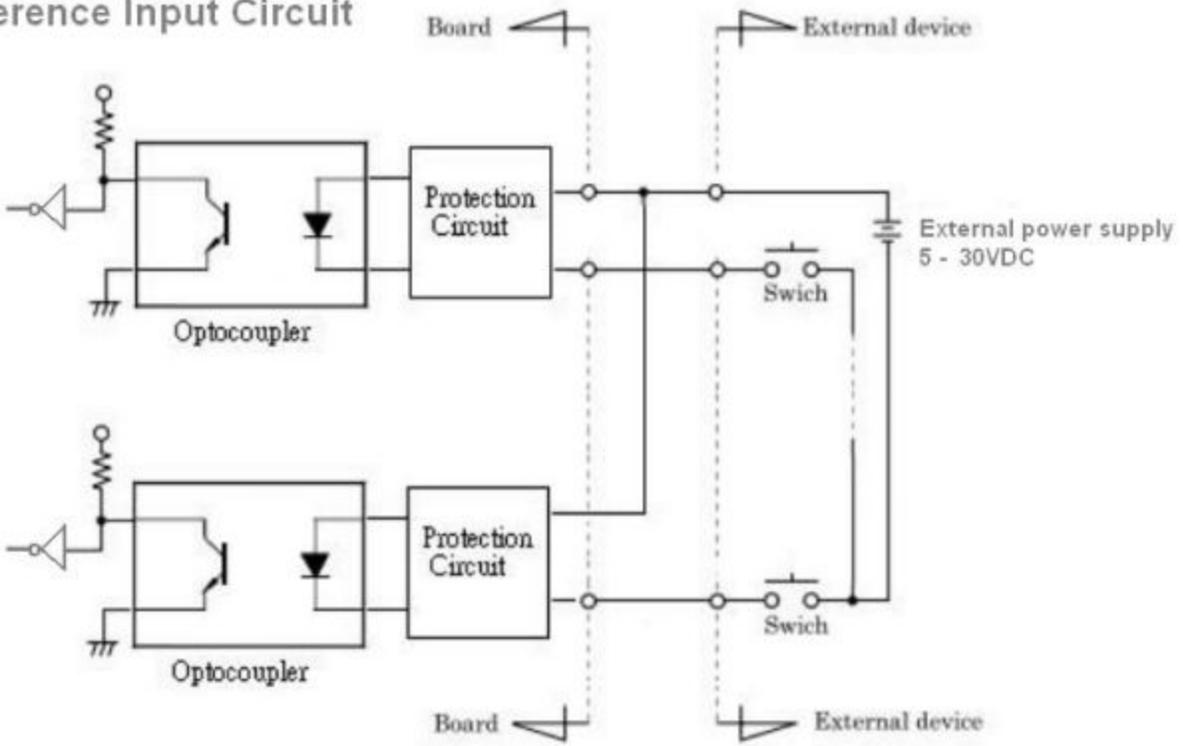
Connector Type: Terminal Block 2X9 18-pin, 3.5mm pitch

Pin	Definition	Pin	Definition
1	DI1	2	DO1
3	DI2	4	DO2
5	DI3	6	DO3
7	DI4	8	DO4
9	DI5	10	DO5
11	DI6	12	DO6
13	DI7	14	DO7
15	DI8	16	DO8
17	DC INPUT	18	GND

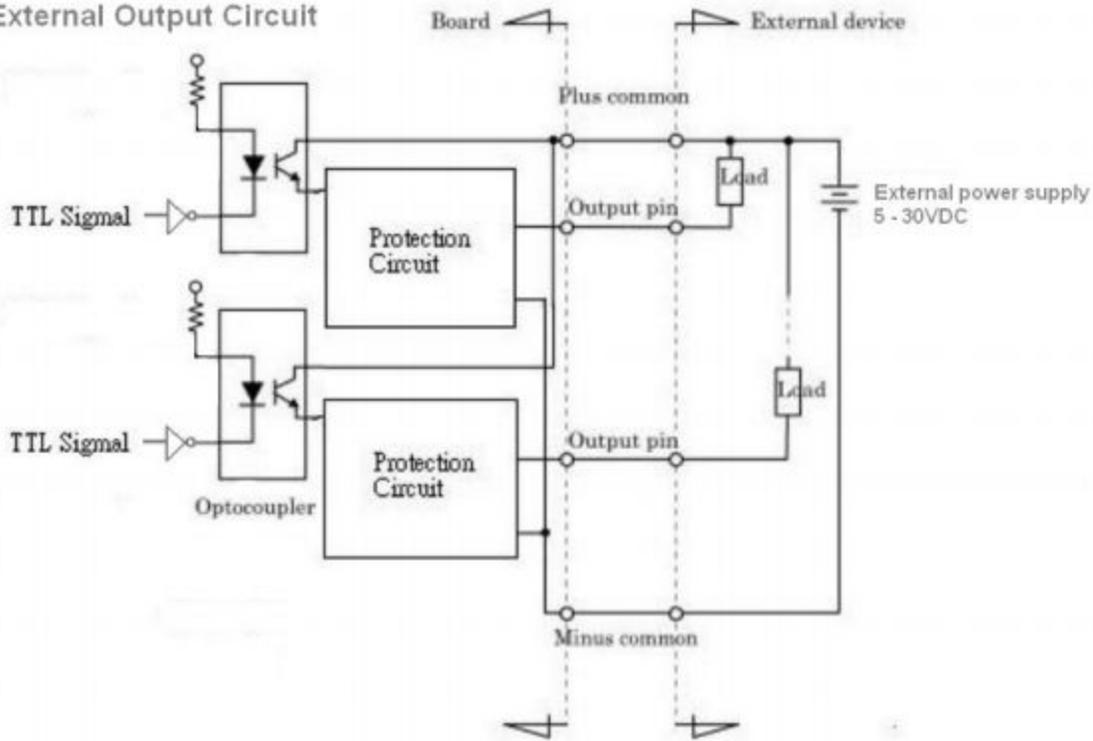


# Reference Circuits

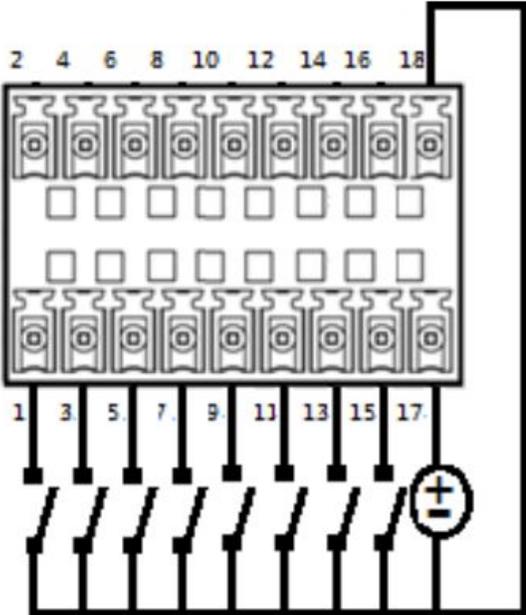
## Reference Input Circuit



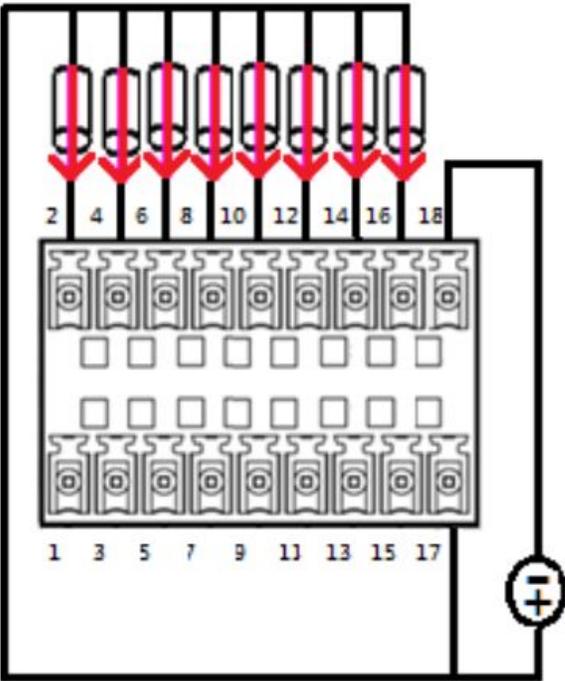
## External Output Circuit



Example Input Wiring (NPN)



Example Output Wiring (NPN)



# Mounting Options

**Step 1: Unpack selected mounting option**



**Step**

**2: Mount the kit using the includes mounting hardware**



# Initial Setup

After successfully powering up the system and installing a USB camera, we can now begin linking this on-prem device to your cloud account.

## Creating an Account

- Step 1: From a computer, visit [www.FlexibleVision.com](http://www.FlexibleVision.com)
- Step 2: Click on the “Start Now” button
- Step 3: On the lower portion of the login prompt, “Don’t have an account” click “Sign up”
- Step 4: Enter a Username and Password and then click “submit”
- Step 5: After a few moments, you will be redirected to your new account page

## Linking your device to the internet

- Step 1: Power on your Flexible Vision on-prem device
- Step 2: From your laptop, connect to the “vision\_cell” wifi hotspot using “password” as the password.
- Step 3: Open up a browser session using Chrome. Type “192.168.12.1” into the address bar. This is the default IP address of the Flexible Vision System.
- Step 4: Enable popups in the Chrome menu bar.
- Step 5: From the prompt, select your factory SSID and enter the password. Once connected, you should see the assigned IP address appear on bottom of the prompt
- Step 6: From your laptop, connect to the same SSID wifi network as the Flexible Vision on-prem device.

## Linking your device to your account

- Step 1: Either click on the assigned IP address of the device, or enter it into the address bar.
- Step 2: In the second popup tab, you will be prompted with a confirmation screen. Click “confirm”
- Step 3: You will be prompted with a login screen. Enter your Flexible Vision credentials.
- Step 4: Your device is now linked to your account and the popup windows can be closed.

## Assigning a workstation name (optional)

Upon signing into the Flexible Vision on-prem device from a new computer, you will be prompted to enter a device name. This name will be used to track what devices are making prediction requests.



# Page Overviews

## Settings Page

The screenshot displays the Settings Page with three main sections: Network, Sync, and System. The Network section includes fields for Wi-Fi Name, Wi-Fi Password, Vision Cell IP (192.168.100.134), and LAN IP (fe80::d7ac:44f8:3d96:cb20). The Sync section shows the last sync time (2020-03-27 16:27:29.574469), sync interval (5 mins), and next analytics cleanup (Tuesday at 5:57 PM). The System section contains fields for System Username, System Password, and Workstation Name. At the bottom, there are buttons for SYNC MODELS, REFRESH CAMERAS, SHUTDOWN, and RESTART, along with version information (0.62 | 0.12 | 0.3) and a status message: "Your system is up to date."

### Network:

- Connect to a new wireless network
- View the WIFI assigned IP address
- View and set the LAN IP address

### Sync

- Set time interval to sync analytics with the cloud (subscription required)
- Set time interval to clear locally stored analytics

### System

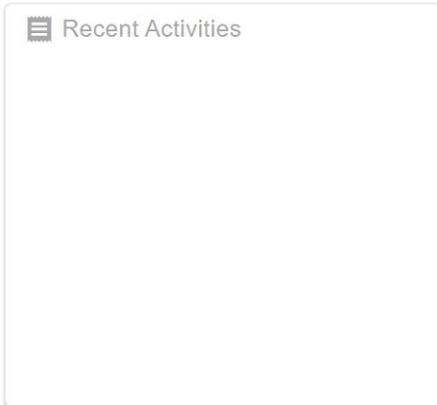
- Change device username and password.
  - Defaults: Username: "admin" Password: "visioncell"
- Change your Workstation Name (optional field)

### Lower buttons on page

- "Sync Models" will pull all of your cloud trainings and update them on this device
- "Refresh Cameras" will refresh the camera list.
- "Shutdown" will safely turn off your system. Pressing the blue power button will turn it back on
- "Restart" will reboot your system.
- "Update System" If a software update is available this button will appear. Press to Update.



## Dashboard



This dashboard will show results from your most recent 10 results. To download this page in a report format, click “download report” in the lower right of this page.

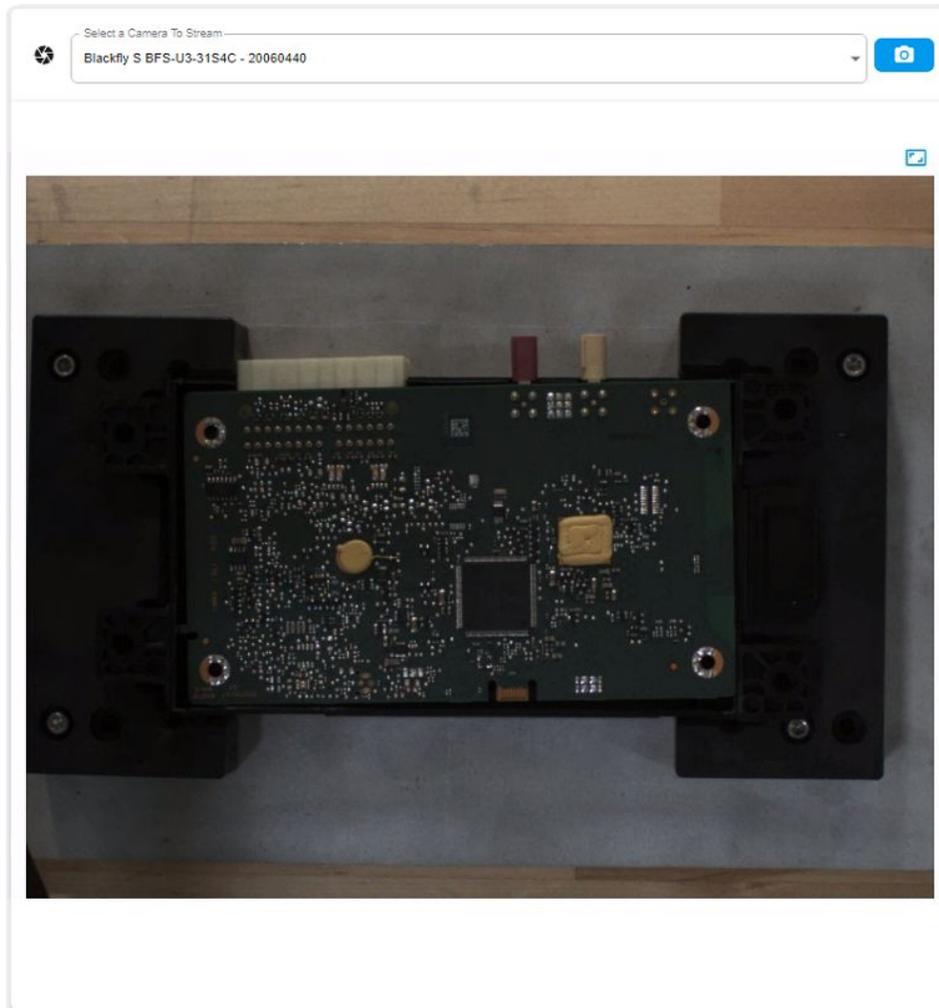
## Camera Details

Name	Height (px)	Width (px)	Calibrated	Offset Angle	Image Midpoint (px)	Pixels / MM	Actions
Blackfly S BFS-U3-31S4C - 20060440	1024	1280	false	0	[0,0]	-1	⋮
Blackfly S BFS-U3-31S4C - 20072033	480	640	false	0	[0,0]	-1	⋮

From the camera details page, you can see the selected resolution and calibration information of each connected device. This information is read only.



## Live Video



Within the Live Video tab you can monitor the video feed of your cameras in full screen and download a snapshot image

### Monitor Live Feed:

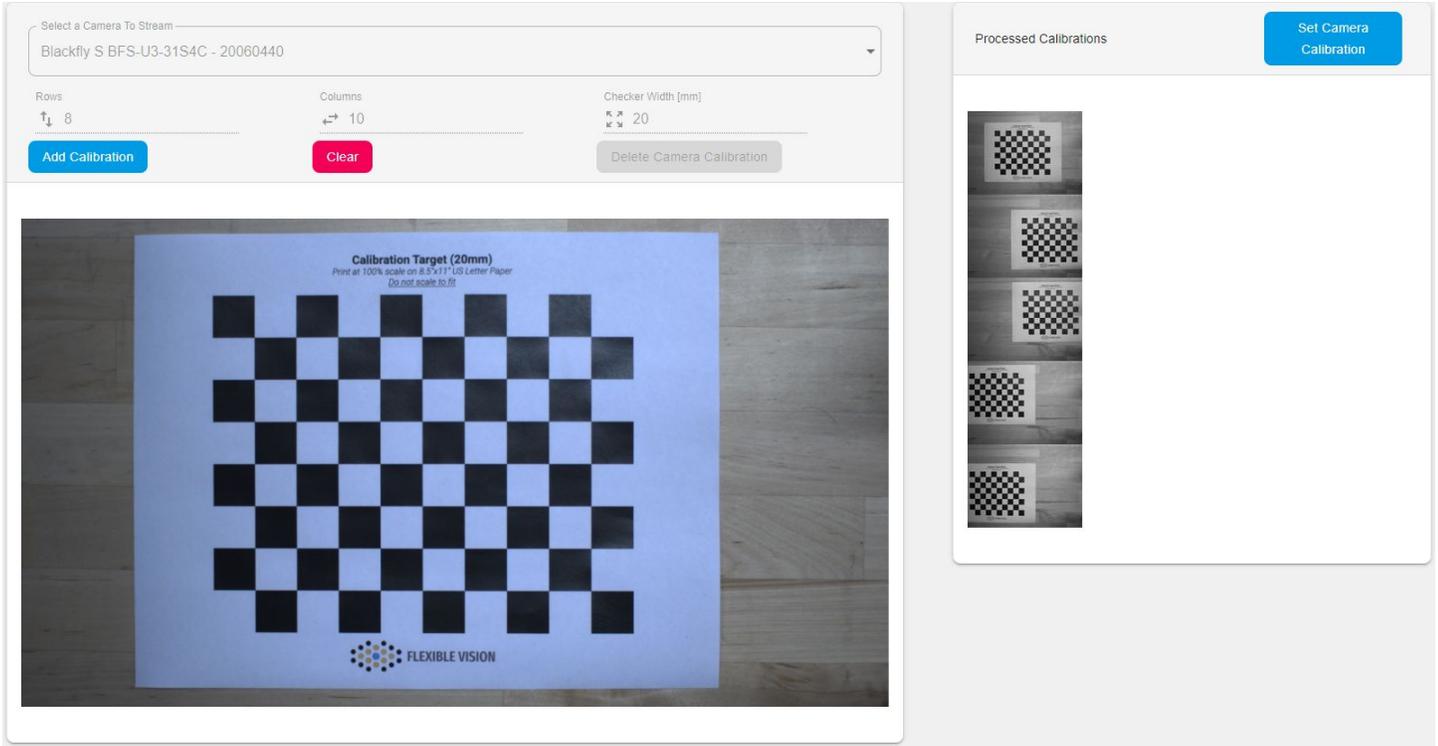
- Step 1: Select a USB camera from the dropdown list at the top of the screen
- Step 2: (Optional) Click the  icon to go full screen. This is useful for dialing in focus of a camera

### Download Images:

- Step 1: Select a USB camera from the dropdown list at the top of the screen
- Step 2: Click  to capture the current camera frame
- Step 3: Click the "Download" button at the bottom of the page to download this image to your local computer. This tool is beneficial for uploading images for training in the cloud.



# Calibration



Calibration of each camera is required when your application calls for measurements in real world coordinates. The checkerboard calibration grid has two functions. The first function is to calibrate pixels/mm and the second function is to remove any lens distortion. Both functions are completed simultaneously.

## Calibrate Camera:

Step 1: Select a USB camera from the dropdown list at the top of the screen

Step 2: Enter in the number of Rows, Columns, and Checker Width into the corresponding fields.

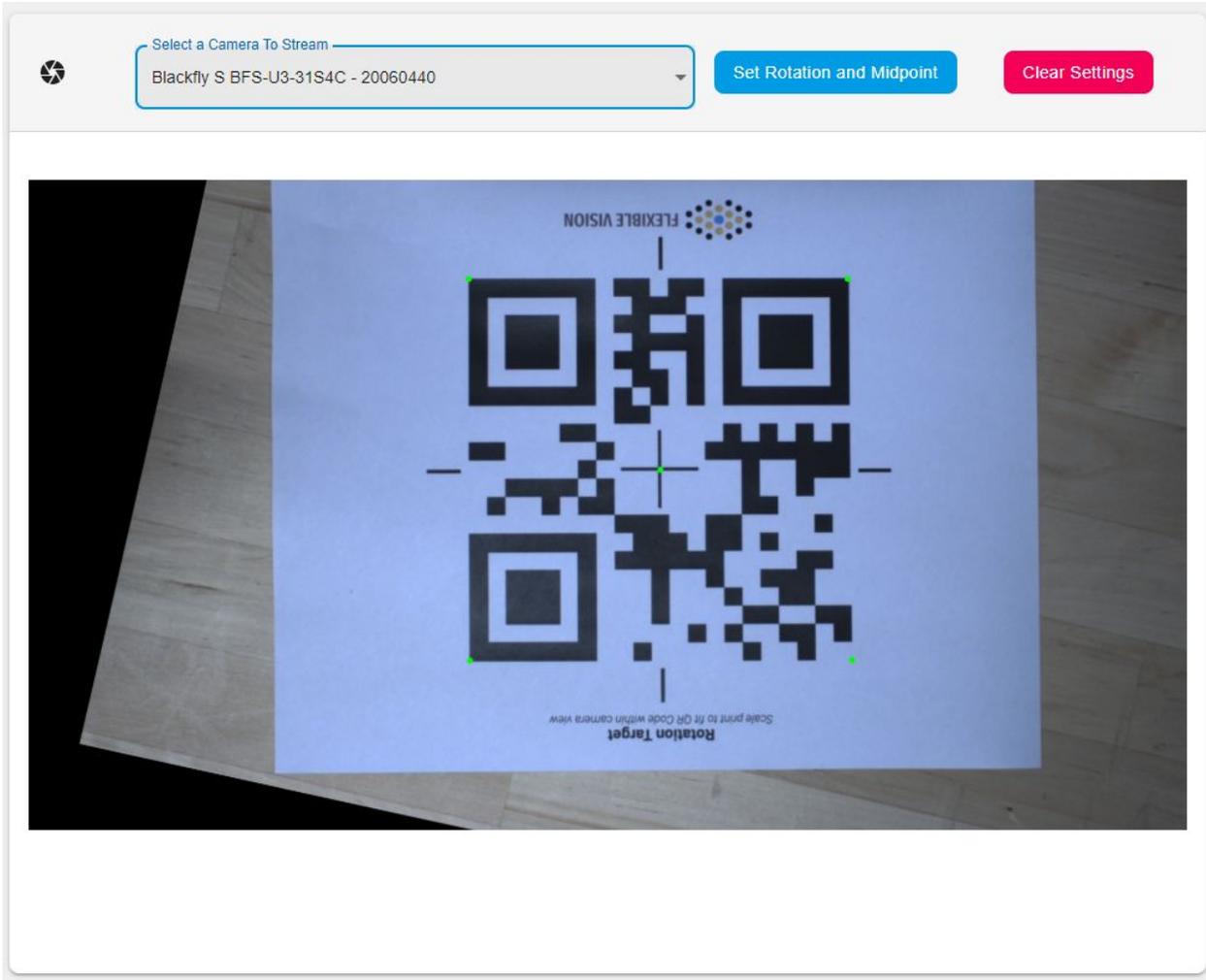
Step 3: Move the grid to various locations within the field of view of the camera. Between each movement, make sure to press the **Add Calibration** button to add the calibration to the stored image list. For best results, ensure you have collected images with the grid close to the image border, this is where the most distortion occurs from a lens. If at any time you would like to restart the calibration, simply press the clear button and start over from step 1.

Step 4: To calculate and store your calibration press the **Set Camera Calibration** button. To verify the calibration was successful, navigate to the camera details page where you should see a pixel/mm conversion now listed for your selected camera.

Name	Height (px)	Width (px)	Calibrated	Offset Angle	Image Midpoint (px)	Pixels / MM	Actions
Blackfly S BFS-U3-31S4C - 20060440	1440	2560	true	167.33294007499214	[961,581]	4.585888212698477	⋮
Blackfly S BFS-U3-31S4C - 20072033	480	640	false	0	[0,0]	-1	⋮



# Rotation Calibration



Rotation Calibration of each camera is required when your application calls for measurements in real world coordinates. This operation is typically completed for robot pick and place applications; although, it can be useful in a variety of other applications as well.

## Calibrate Camera:

Step 1: Select a USB camera from the dropdown list at the top of the screen

Step 2: Place your QR code within the field of view of the camera.

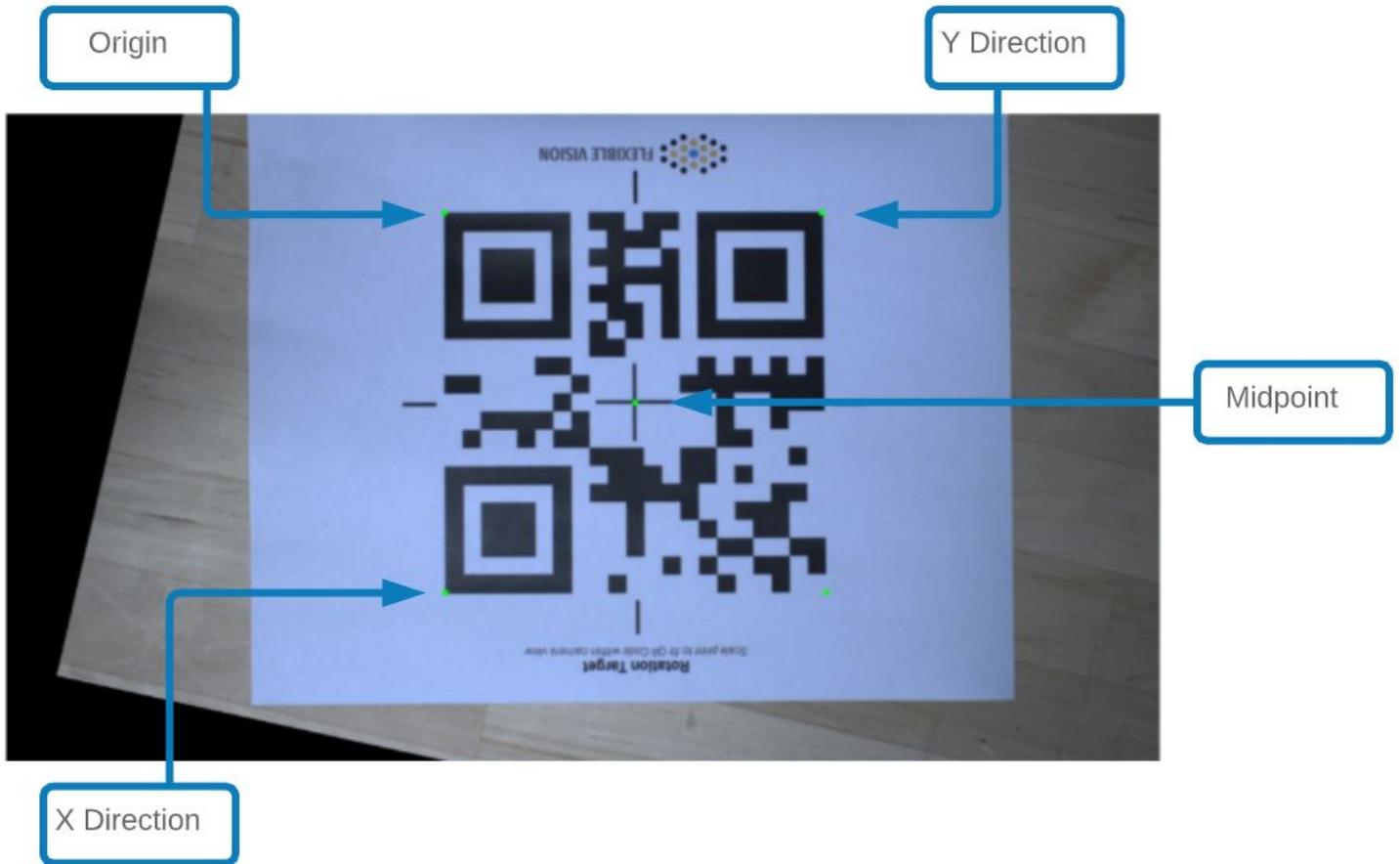
Step 3: Press the [Set Rotation and Midpoint](#) button to add the calibration to calculate and store the calibration. To verify the calibration was successful, navigate to the camera details page where you should see a Offset Angle and Midpoint now listed for your selected camera.

Name	Height (px)	Width (px)	Calibrated	Offset Angle	Image Midpoint (px)	Pixels / MM	Actions
Blackfly S BFS-U3-31S4C - 20060440	1440	2560	true	167.33294007499214	[961.581]	4.585888212698477	⋮
Blackfly S BFS-U3-31S4C - 20072033	480	640	false	0	[0,0]	-1	⋮



### Calibration Point Overview:

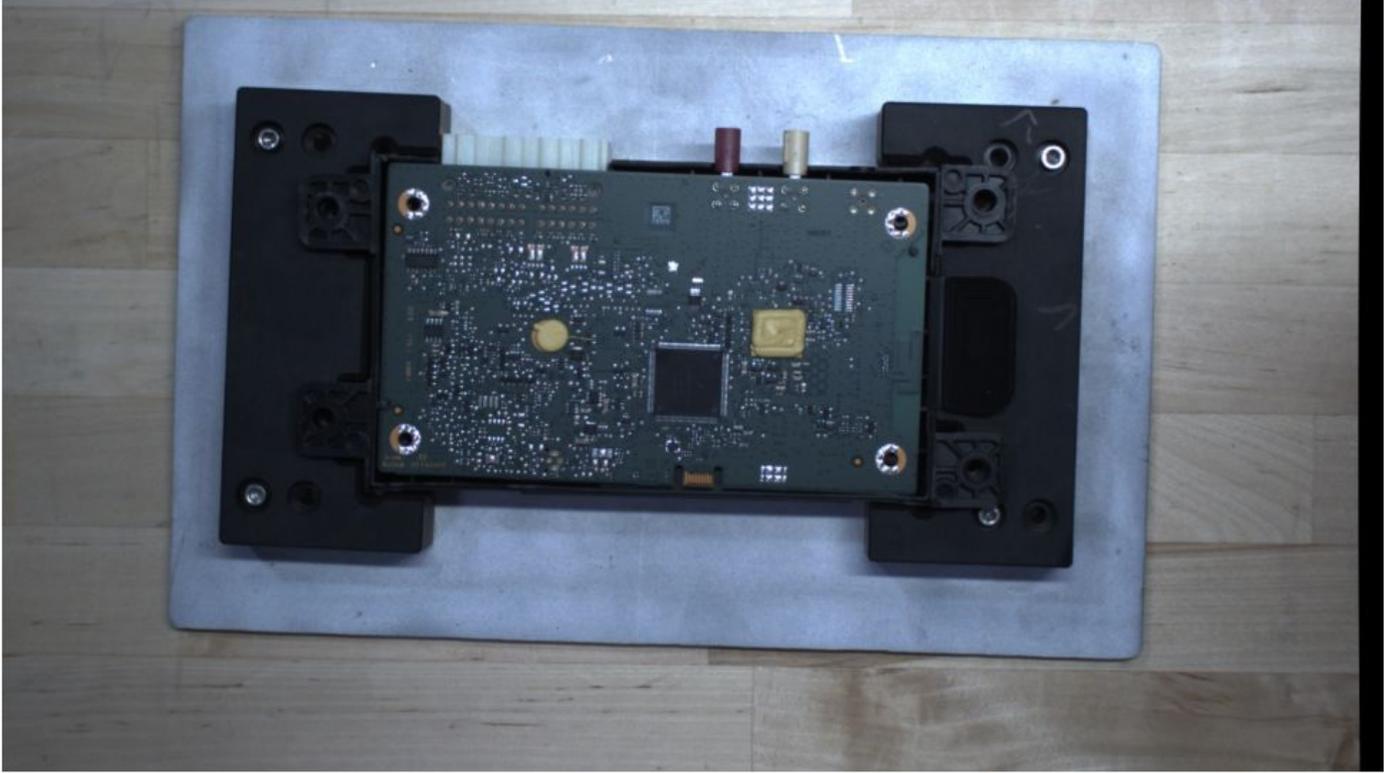
- The green dots represent where the calibration data was found.
- For robot calibration, these are the locations you will touch off for a frame calibration.



## Resolution

Select a Camera  
Blackfly S BFS-U3-31S4C - 20060440

Select a Resolution  
2560x1440



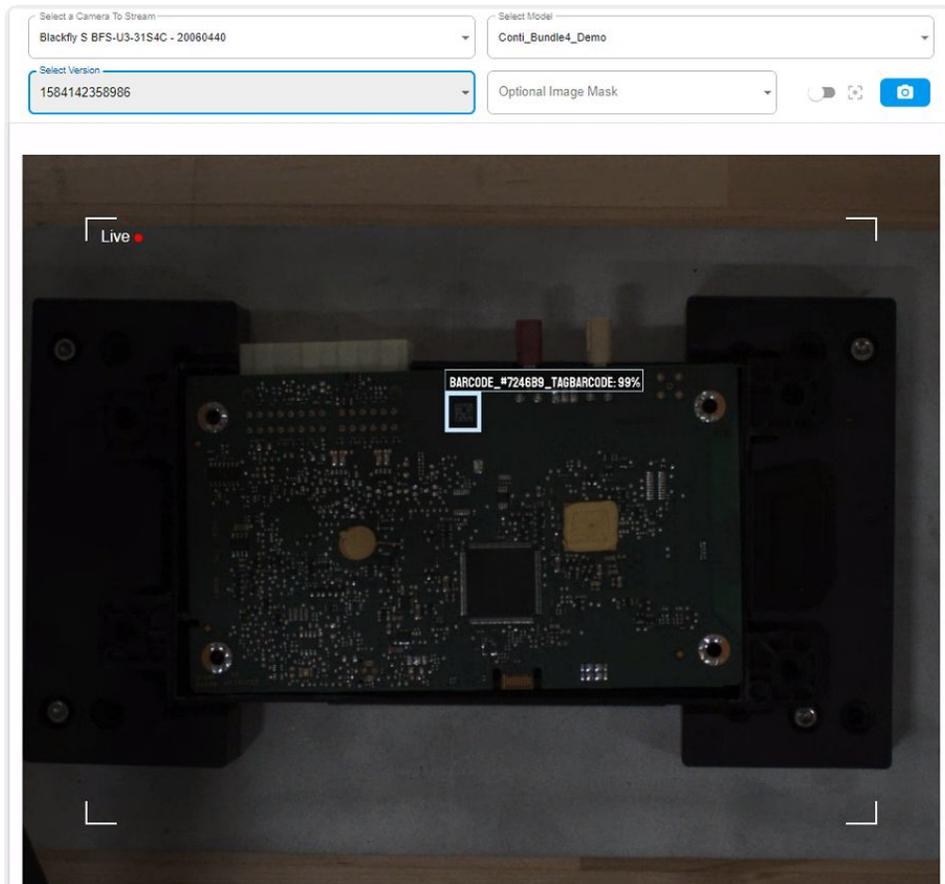
Adjusting resolution of your camera is helpful when your application calls for higher speed or higher accuracy. When adjusting your resolution the image will crop the number of pixels selected from the resolution dropdown

### Change Resolution:

- Step 1: Select a USB camera from the dropdown list at the top of the screen.
- Step 2: Select a pre-specified resolution option from the second dropdown list on the right.



## Snap & Find



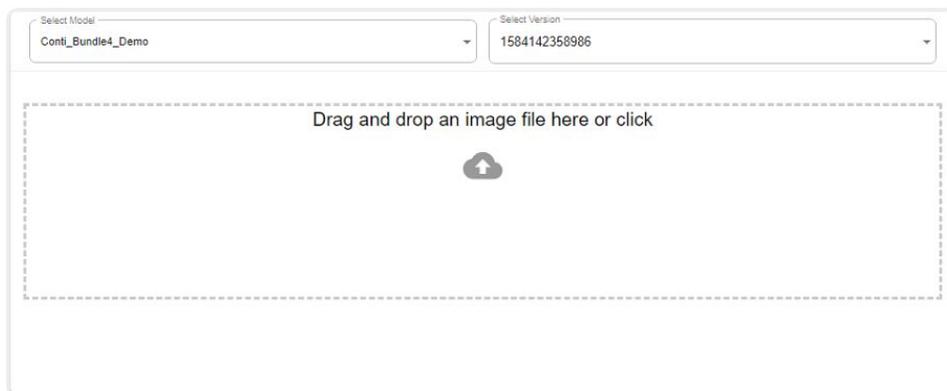
Snap & Find is a great resource for validating a vision process. This window will present a live stream of the selected camera and what it is finding. You can optionally capture the current image frame for traceability.

### Start a live stream:

- Step 1: Select a USB camera from the dropdown list at the top of the screen.
- Step 2: Select a vision program from the second dropdown
- Step 3: Select a vision program version from the third dropdown
- Step 4: Optionally, Select a camera mask from the fourth dropdown.
- Step 5: Optionally, Click the  icon to capture the current image and log it for traceability on your local USB drive. if subscribed, this image will be logged to your cloud storage account upon the next sync interval.



## Upload and Process



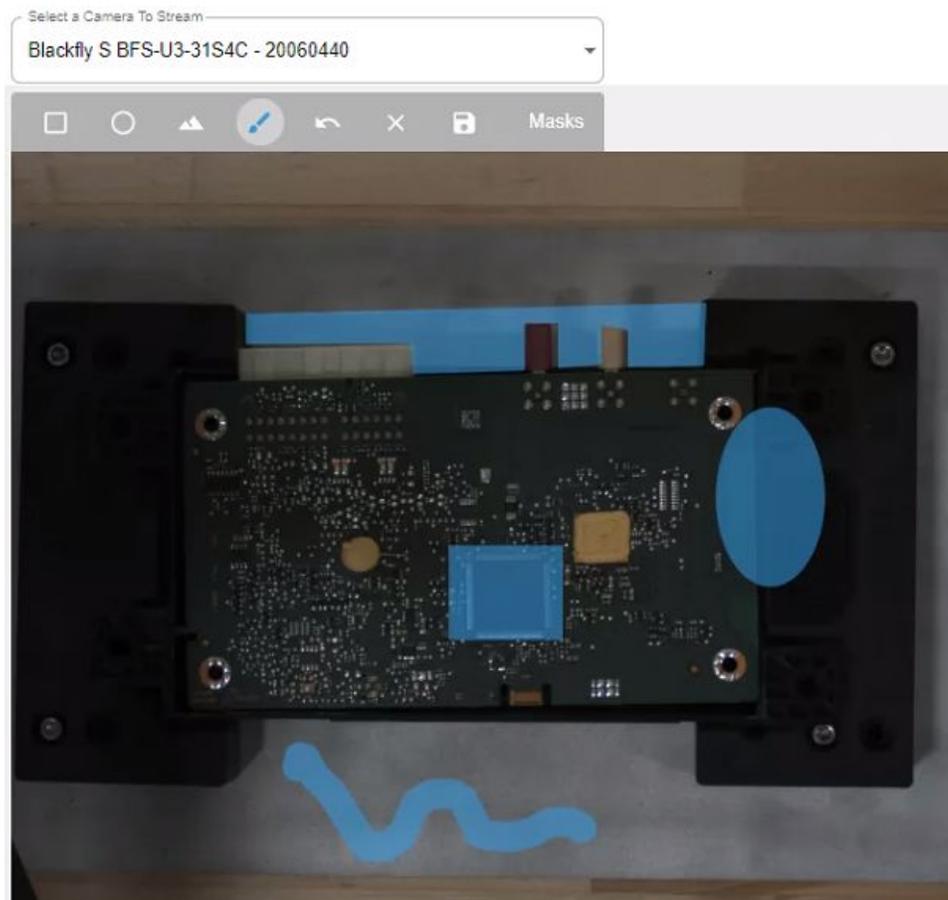
Upload and process is a great tool for when you do not have a live stream camera. Typical applications include x-ray analysis or analysing large image archives. From this page you can upload image files in most formats. After each upload the results will automatically be logged for traceability on your local USB drive and if subscribed, these results will show in your cloud account upon the next sync interval.

### Upload and Process an image file:

- Step 1: Select a vision program from the first dropdown
- Step 2: Select a vision program version from the second dropdown
- Step 3: Either drag and drop a file onto the boxed area of the page or alternatively, click on the boxed area of the page and search your computer for the image tile to be processed.



## Masking



Camera masking is a tool for blocking out parts of a camera's field of view during the prediction process. This tool is helpful for focusing the prediction to occur in a specific location of the image.

### Toolbar overview:

-  Drawing tool pallet box, ellipse, Polygons, and lines.
-  Undo
-  Clear all masks from the current image.
-  Save
-  Show a list of saved masks.

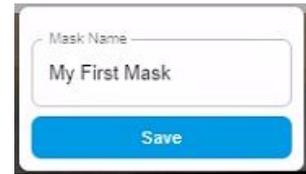
### Creating a Mask:

- Step 1: Select a camera from the first dropdown
- Step 2: Select a masking drawing tool.
- Step 3: Click once on the image to select your start point. click again on the image to select the end point of your drawing tool. When using the polygon tool, to terminate your drawing session, roll your mouse back to the beginning point where you will see a green dot, then click the green dot once.



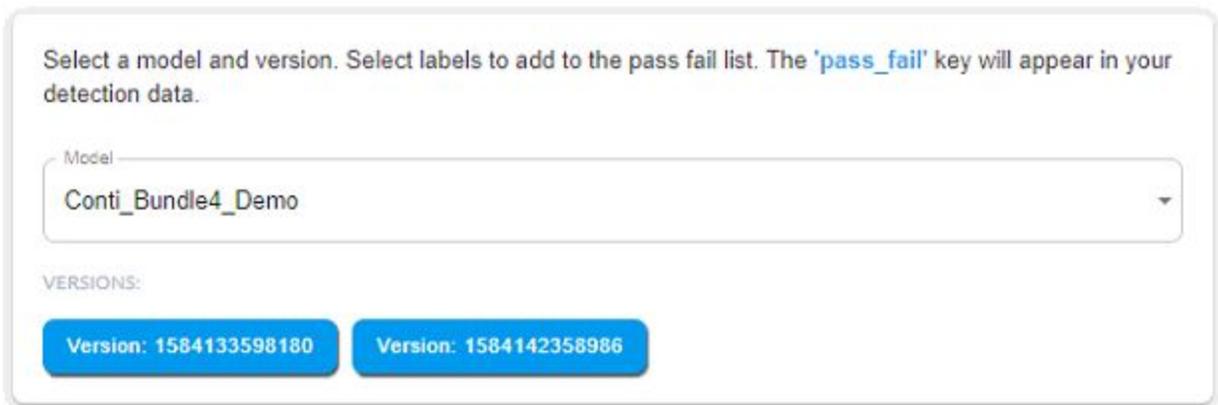
## Saving a Mask:

- Step 1: Select the  icon.
- Step 2: Give your mask a unique name. then click “Save”



## Pass/Fail

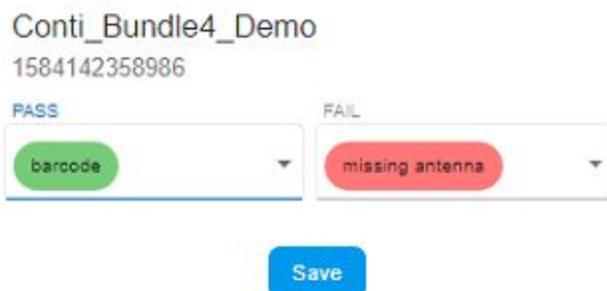
The Pass/Fail function will assign tags of a given model and version to either Pass or Fail. Once assigned, The pass/fail digital output will toggle based on the processed image results. The pass/fail attribute will also be logged in the detailed results of the processed image. If any failed attribute is detected, the image result will be failed. If any pass attribute is detected and no fail attributes are detected, the image result will be passed.



## Creating a Pass/Fail list for a given program version :

- Step 1: Select a program from the first dropdown
- Step 2: Click on a blue version button
- Step 3: Add pass or fail tags to your list by pulling down the popup window's corresponding drop down. Clicking on the tag name to add it to the list. The pass attributes will show in green while the failed show in red.
- Step 4: Click Save when your list is complete.

Example List:



# IO Presets

I/O Presets

Preset 1

I/O Type: GPI 1 | Model: OCR\_and\_Barcodes | Version: 1583702131819 | Camera: Blackfly S BFS-U3-31S4C - 20060440 | Image Mask: My First Mask

Preset 2

I/O Type: GPI 2 | Model: Contl\_Bundled4\_Demo | Version: 1584142358986 | Camera: Blackfly S BFS-U3-31S4C - 20060440 | Image Mask

Preset 3

I/O Type | Model | Version | Camera | Image Mask

Creating IO presets allows you to run a preset or multiple presets based on a digital input or TCP/IP command. the preset will consist of which digital input or TCP command will control it, program, version, and optional mask.

## Creating a Preset :

- Step 1: Select a Input or TCP/IP command from the first dropdown
- Step 2: Select a program from the second dropdown
- Step 3: Select a version of your project from the third dropdown
- Step 4: Select the camera to use from the fourth dropdown
- Step 5: Optionally, Select a mask to use during processing from the fifth dropdown
- Step 6: The preset will automatically save after selecting a mask; however, clicking the save icon will save any changes.



# Controls

## Digital IO Status and Control

The GPIO Status interface is divided into two main sections: Outputs and Inputs.

**Outputs:** A table with columns for Pin, Task, Status, and Toggle.

Pin	Task	Status	Toggle
Output 1	Process Complete	No Processes	<input type="checkbox"/>
Output 2	System Ready	Working...	<input type="checkbox"/>
Output 3	System Busy	Busy	<input type="checkbox"/>
Output 5	Pass	Waiting...	<input type="checkbox"/>
Output 6	Fail	Waiting...	<input type="checkbox"/>

**Inputs:** A grid of 8 input pins, each with a status indicator (red or green dot).

- Input 1: Red dot
- Input 2: Green dot
- Input 3: Red dot
- Input 4: Red dot
- Input 5: Red dot
- Input 6: Red dot
- Input 7: Red dot
- Input 8: Red dot

The IO status and controls are available for visualization and control. you can jog the Outputs and read the inputs. These functions are typically used when texting communication between mating automation equipment.

## TCP/IP Settings

The TCP/IP Settings interface is titled "Configure Prediction Outputs" and contains two columns of toggle switches, all of which are currently turned on.

- Number of Objects Found
- Prediction End Time
- Prediction Start Time
- Total Prediction Runtime
- Barcode Data
- OCR Data
- Packet Header
- Location in Millimeters

The TCP/IP settings allow control over what type of data will be sent in response to the TCP/IP trigger command. Updates are saved automatically after each change. TCP/IP commands can be sent over port 5300.



