

MBARI Live-Stereo Manual

Project # 569

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Camera Setup

- Resolution: 4K (3840x2160 pixels)
- Framerate: 30fps (Limit due to global shutter)
- Encoder: ProRes 422 (highest quality internal recording)
- Image Profile: Rec.709
- IP Addresses:
 - Static
 - 10.6.10.161 (Left, Master)
 - 10.6.10.162 (Right, Slave)
- HDMI Output
 - 4K30 (Higher resolution, lower framerate)
 - 1080P60 (Lower resolution, higher framerate)

Control Box

Setup

1. To setup the camera control box you'll need the following
 - a. Power supply (included)
 - b. Ethernet cord
 - c. Network switch connected to the cameras
2. Plug in the network connection and power cables
3. Ensure the cameras are connected and turned on before switching on the control box.
4. Switch on the control box with the switch on the back.

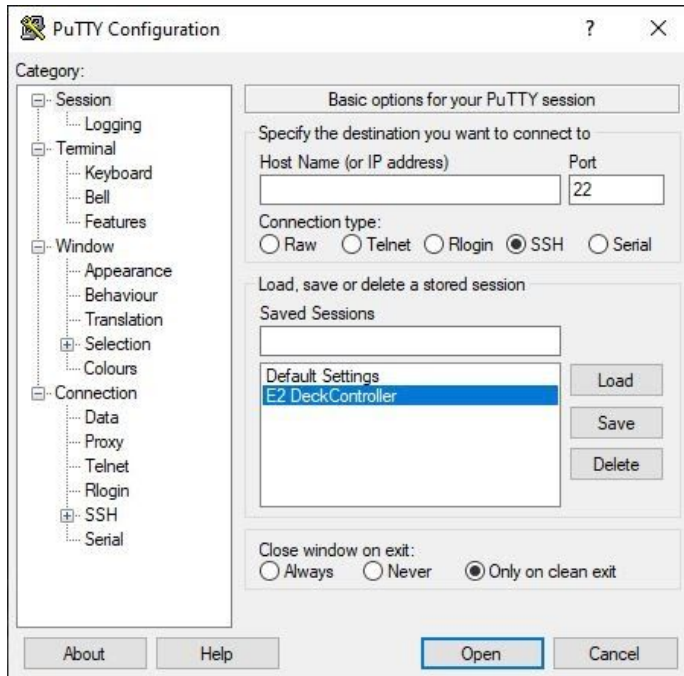
Note: The screen does not illuminate immediately. Please give the box 1 min. to boot up.
5. The controller should boot into the desktop screen then launch a script and start the controller. If this fails, double check your connections and power cycle the system.

Troubleshooting

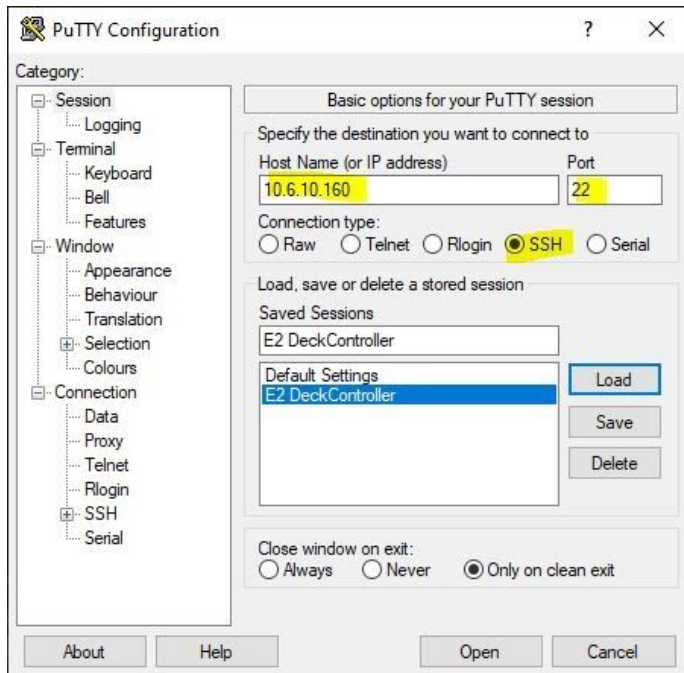
Note: Both cameras must be on and connected for the controller to boot properly. Please check this and reboot the system before further troubleshooting.

SSH Into the Controller

1. Launch puTTY from the Windows "Start" menu
2. Select "E2 DeckController" from the list and click "Load".



3. The IP address 10.6.10.160 should be loaded and port set to 22.

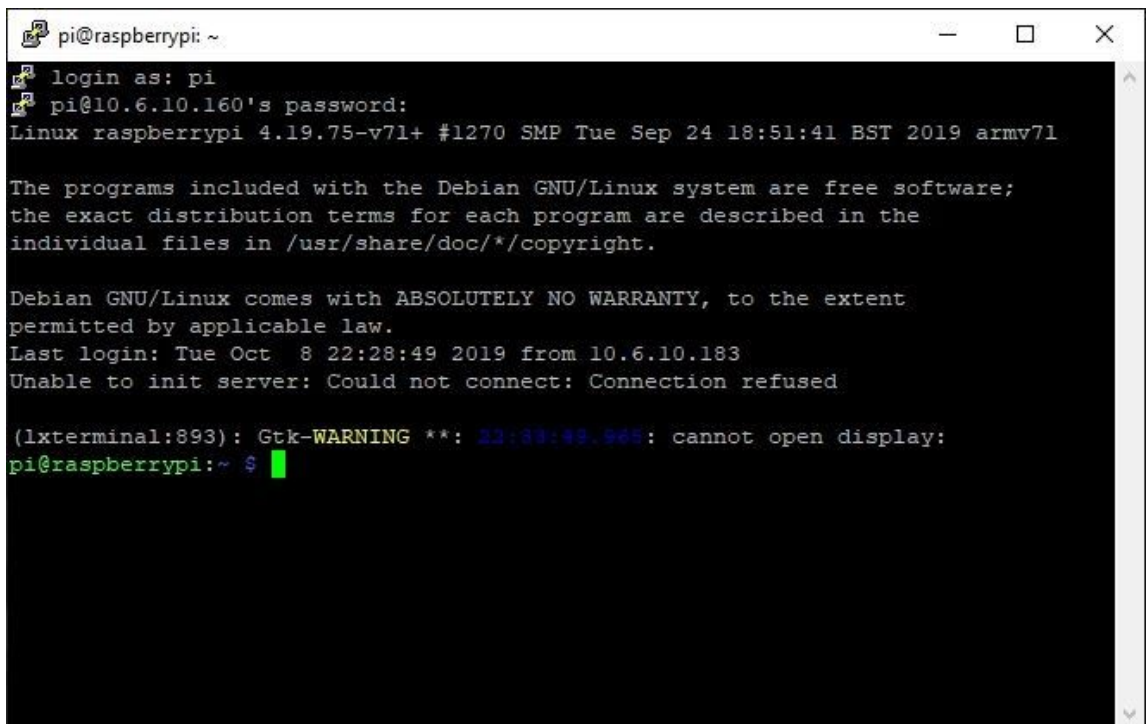


4. Click "Open" to launch the terminal window.
5. You will be prompted for a username and password. Use the following:
 - a. username: pi
 - b. password: admin



```
10.6.10.160 - PuTTY
login as: pi
pi@10.6.10.160's password: 
```

6. If typed correctly, the following text will display.



```
pi@raspberrypi: ~
login as: pi
pi@10.6.10.160's password:
Linux raspberrypi 4.19.75-v7l+ #1270 SMP Tue Sep 24 18:51:41 BST 2019 armv7l

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Tue Oct  8 22:28:49 2019 from 10.6.10.183
Unable to init server: Could not connect: Connection refused

(lxterminal:893): Gtk-WARNING **: 23:33:49.865: cannot open display:
pi@raspberrypi:~ $ 
```

Note: Launching the control software over SSH will fail because the GUI will attempt to load over SSH(a text-only connection). Once you have made the desired changes, reboot the pi to test.

Opening the Controller

1. Choose the side to remove
 - a. **Right side:** USB ports, network connection, screen connections
 - b. **Left side:** SD card slot, power connections
2. Remove the 4 screws and slide off the plastic side panel

Manually starting the controller script

1. Remove the right side-panel from the control box to access the usb ports
2. Plug in a keyboard and mouse.
3. Click on the  icon to launch a terminal window
4. type: `$ cd sexton-multicamera` and hit enter
5. type: `$ pipenv shell` and hit enter
6. type: `$ cd e2` and hit enter
7. type: `$ python main.py` and hit enter
8. The application should load the cameras and launch. If there is an error try and fix the listed problem, then run the last command again.

Software

StereoStitch

StereoStitch software allows two video streams to be stitched together and rendered directly to an Oculus (or similar) headset. For this deployment, the software license allows two cameras to be used in side-by-side configuration for stereo streaming.

Version: StereoStitchLive_v1.6.9.0_B2B

Serial: e2638de542b471ffd8fc98b15fbe99ce

Notes:

Blackmagic Desktop Video Setup

The Desktop Video packages provide capture and playback support for a large range of Blackmagic Design PCIe and thunderbolt products including the DeckLink, Intensity and UltraStudio product lines. The software allows configuration of the two DeckLink hardware devices so that StereoStitch can see the SDI camera feeds (originating as HDMI at camera)

Version: 11.1

Alax.Info JPEG Video Input Devices (64-bit)

Link: <http://alax.info/blog/1216>

This implements a [DirectShow](#) driver/wrapper over a HTTP based JPEG/[M-JPEG](#) streamed video, widely available with IP cameras. Once installed, it provides a Start Menu shortcut to manage video capture devices, where a user can add/remove devices. The devices are automatically registered with DirectShow and are available to applications.

StereoStitch Setup

1. To start StereoStitch setup click “Select Input Devices”

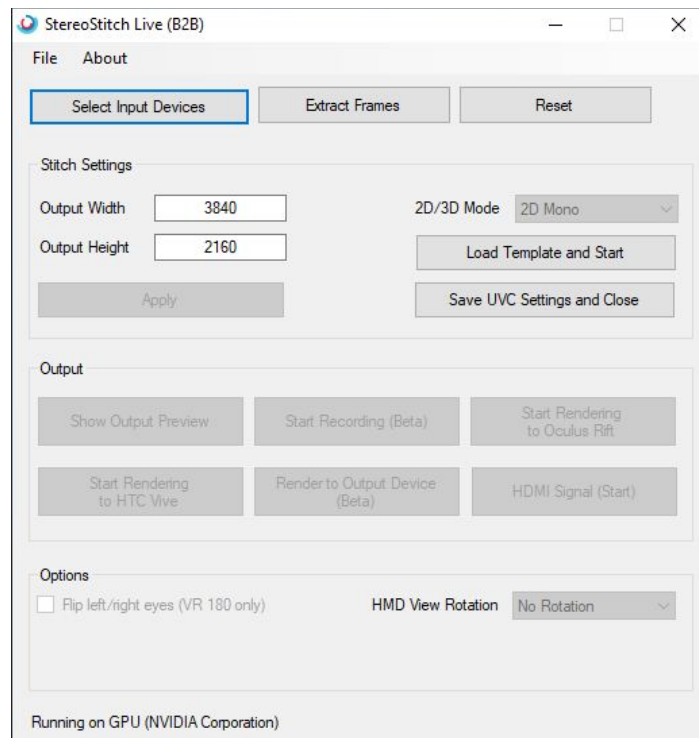


Figure X: StereoStitch Live Main Screen

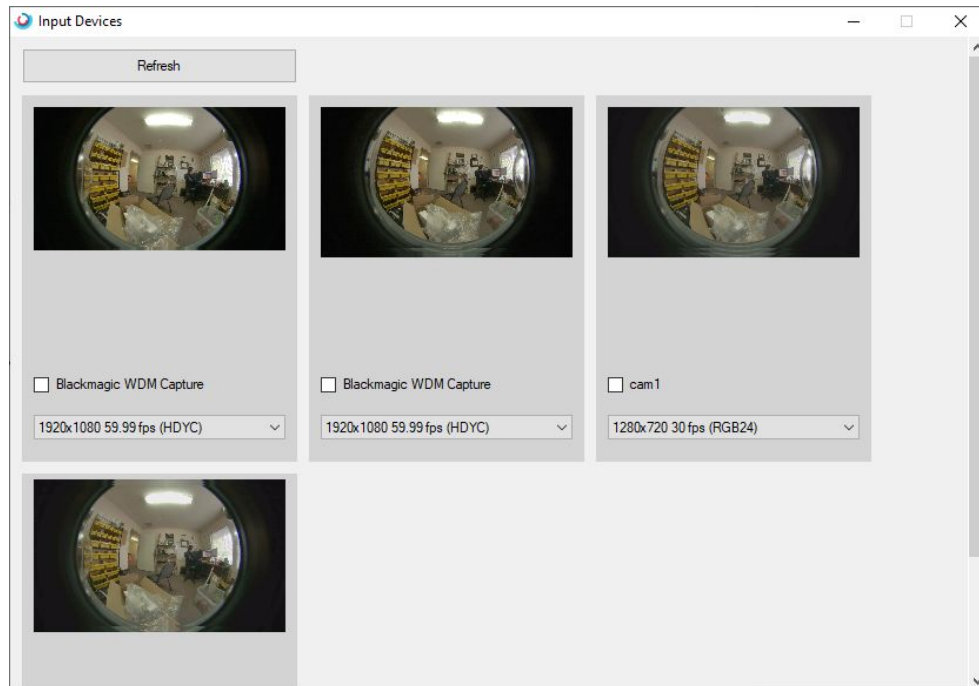
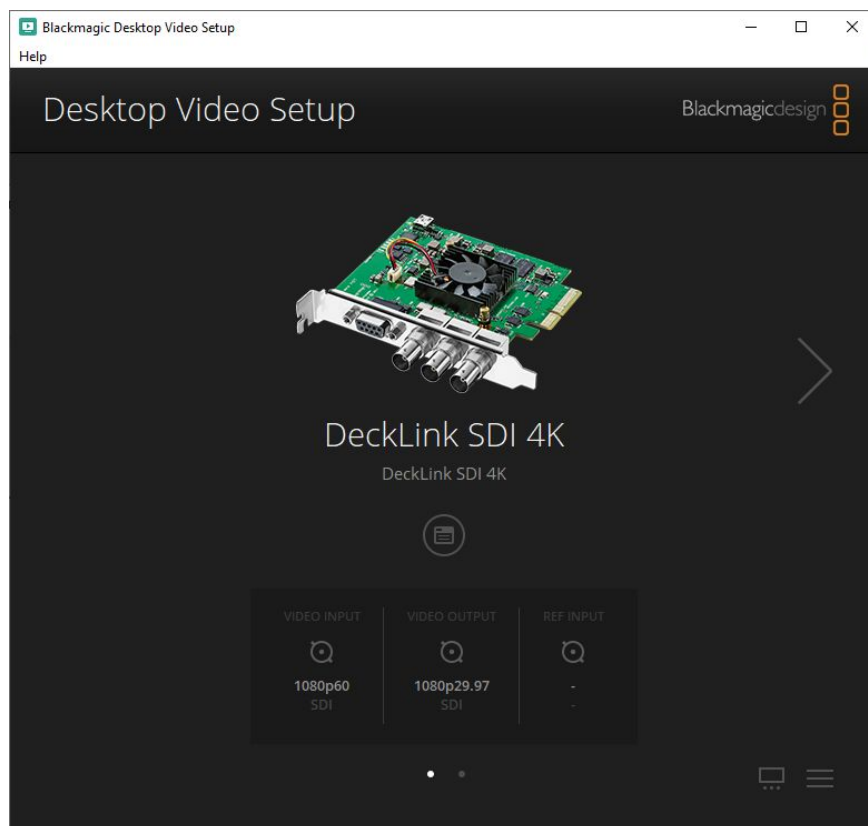


Figure X. StereoStitch Input Devices Screen (HDMI and MJPEG Streams)

Blackmagic Desktop Video Setup



JPEG Video Input Devices Setup (BACKUP METHOD)

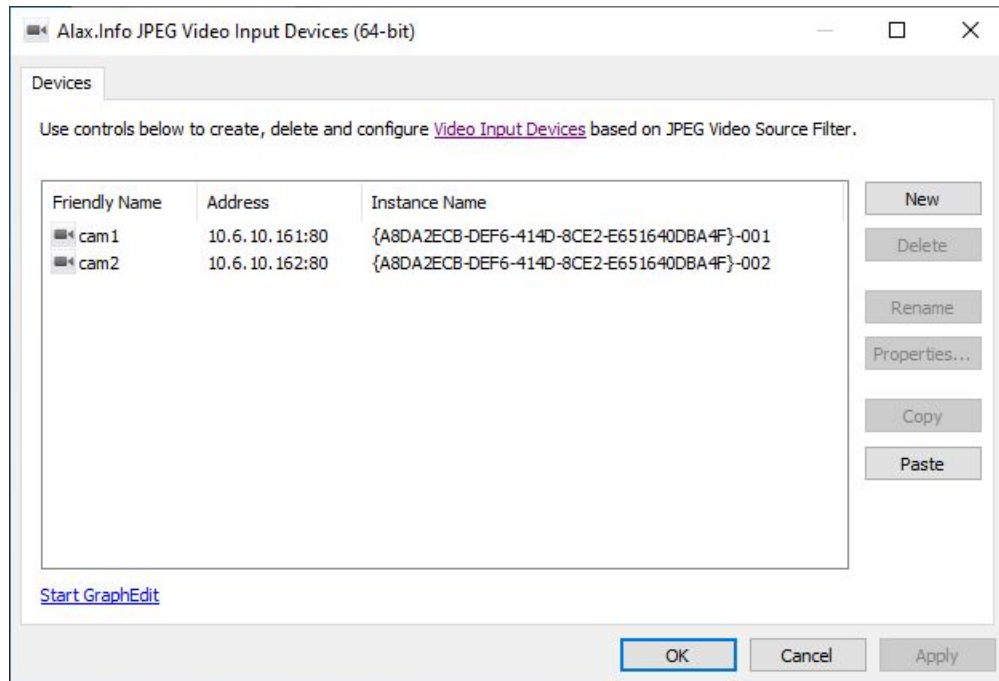


Figure X: Main screen of JPEG Video Input Devices Software

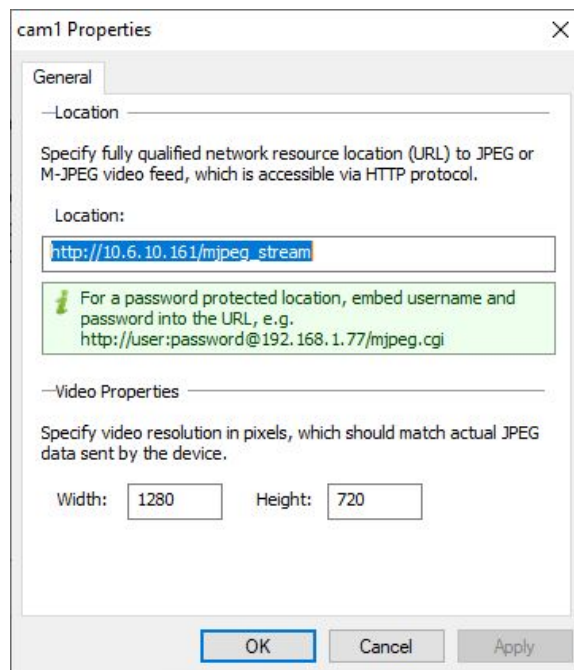
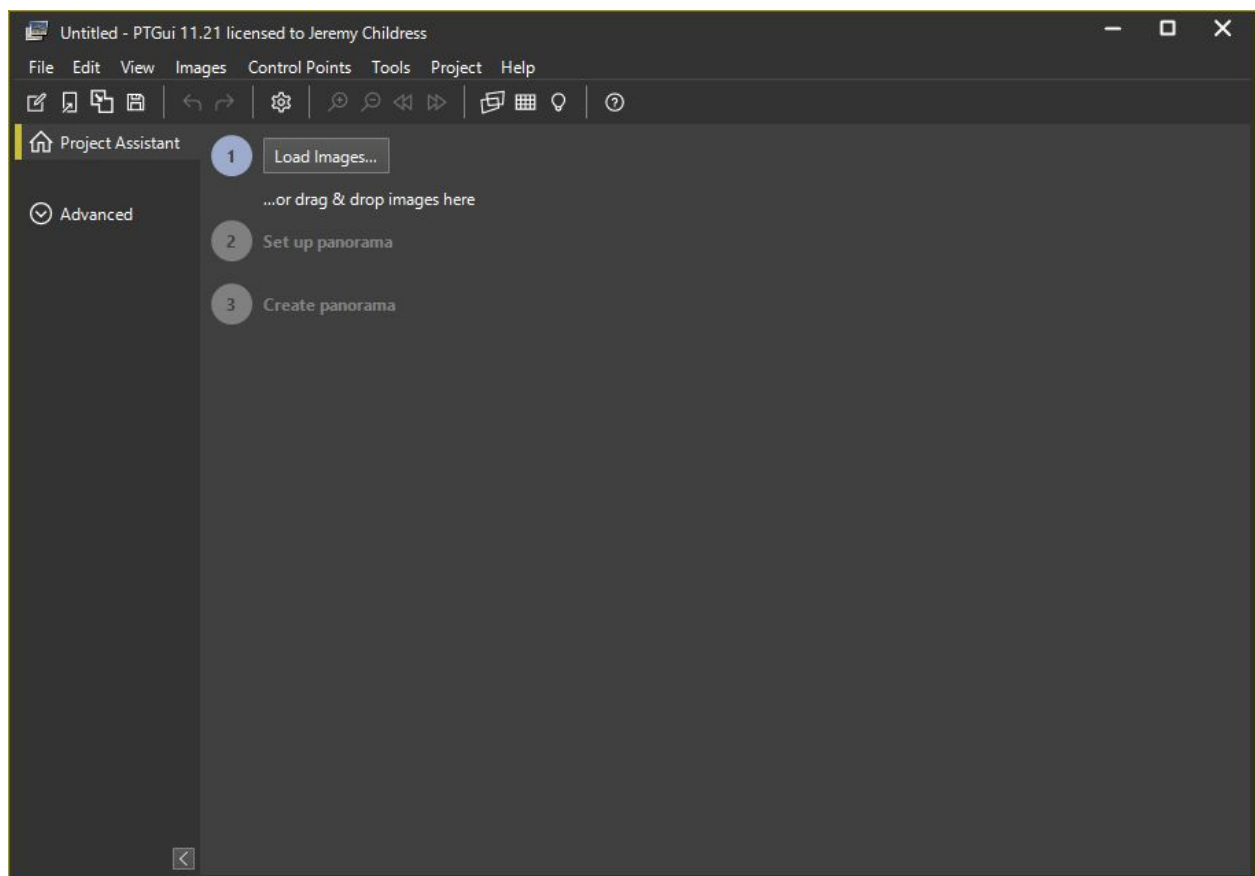


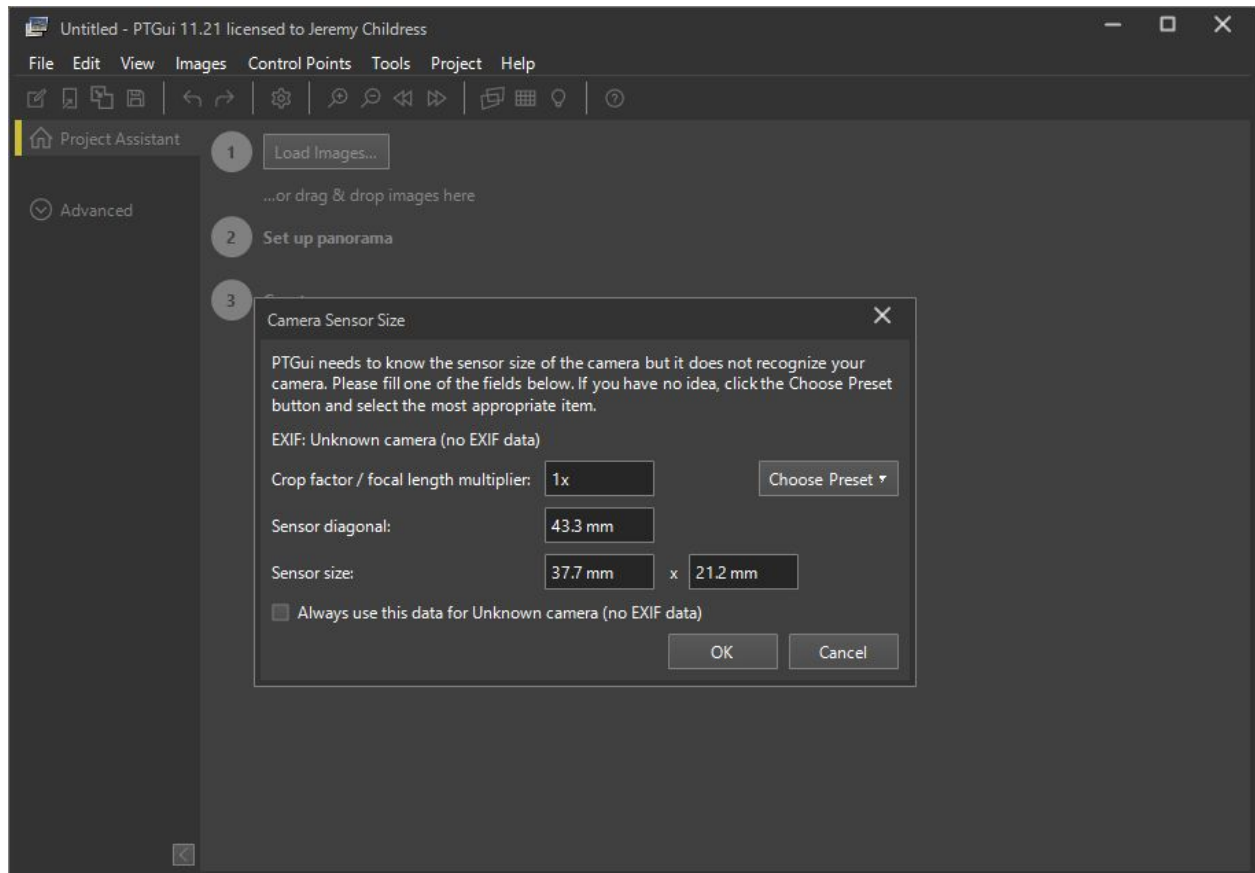
Figure X: JPEG Video Input Devices Camera Setup Screen

PTGUI Template Instructions

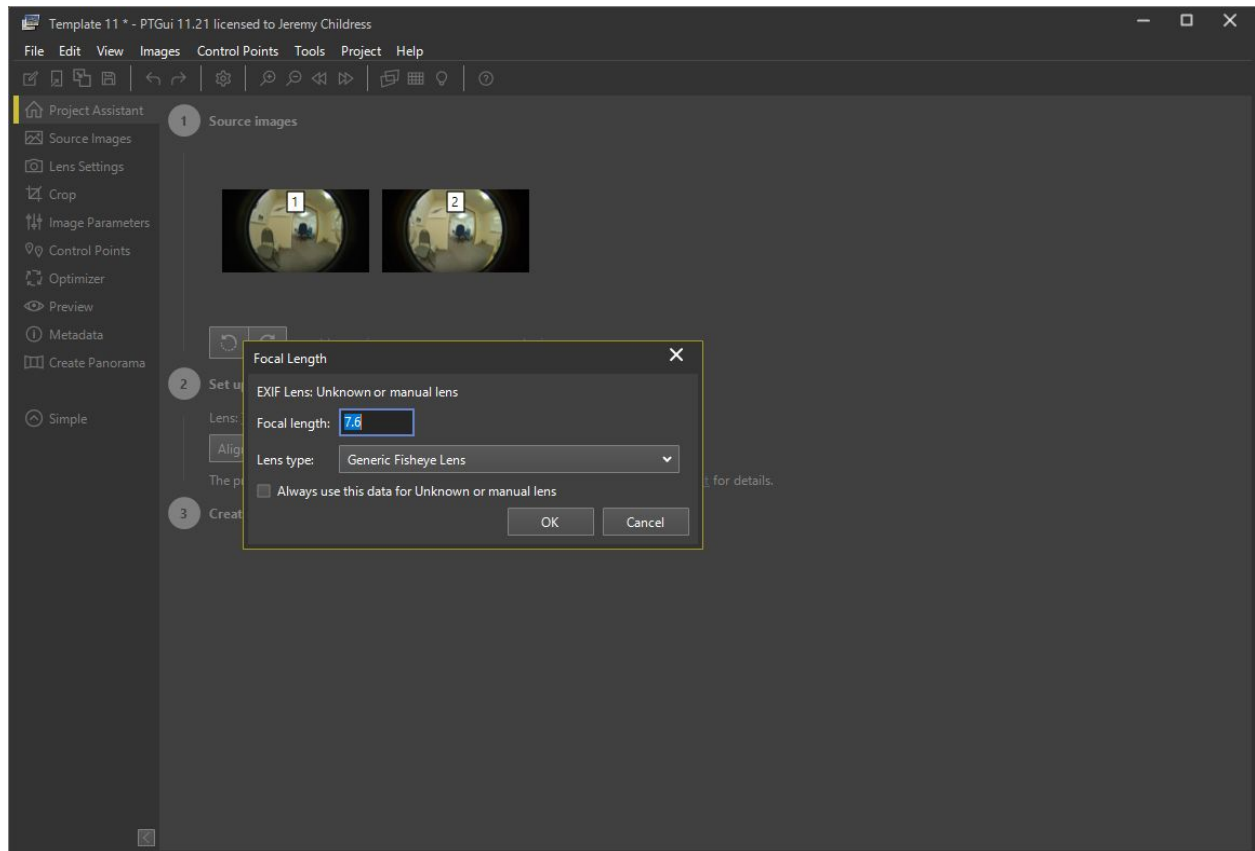
- You should build the template without taking into account the stereo, as if you were stitching a panorama.
- Set the field of view and don't optimize this value. Don't optimize a and c, only b. Don't optimize stretch values. Keep yaw-pitch-roll fixed for one lens, and optimize the values for the second
- export template for ptgui 10



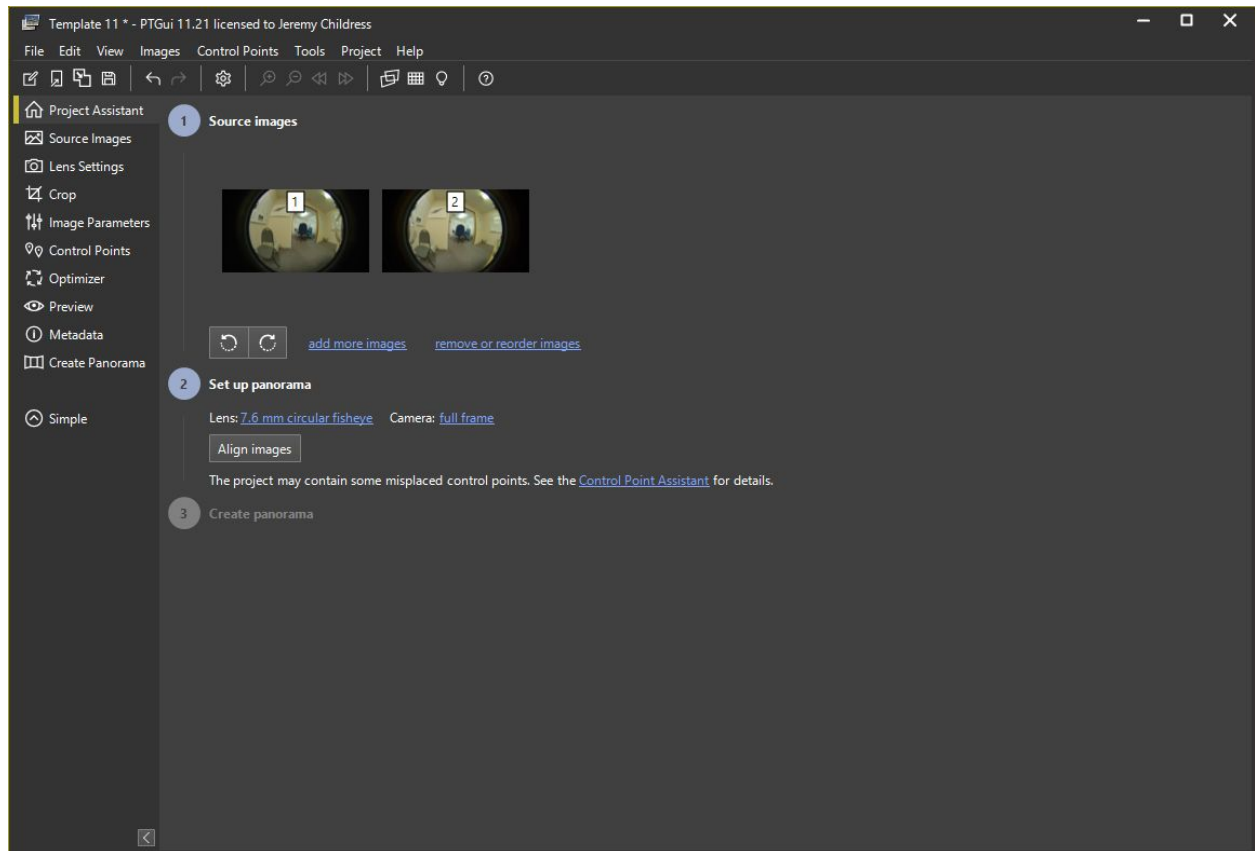
This is the start screen when you create a new project. When you drag 2 images into the window, the software will prompt for camera sensor size and lens focal length.



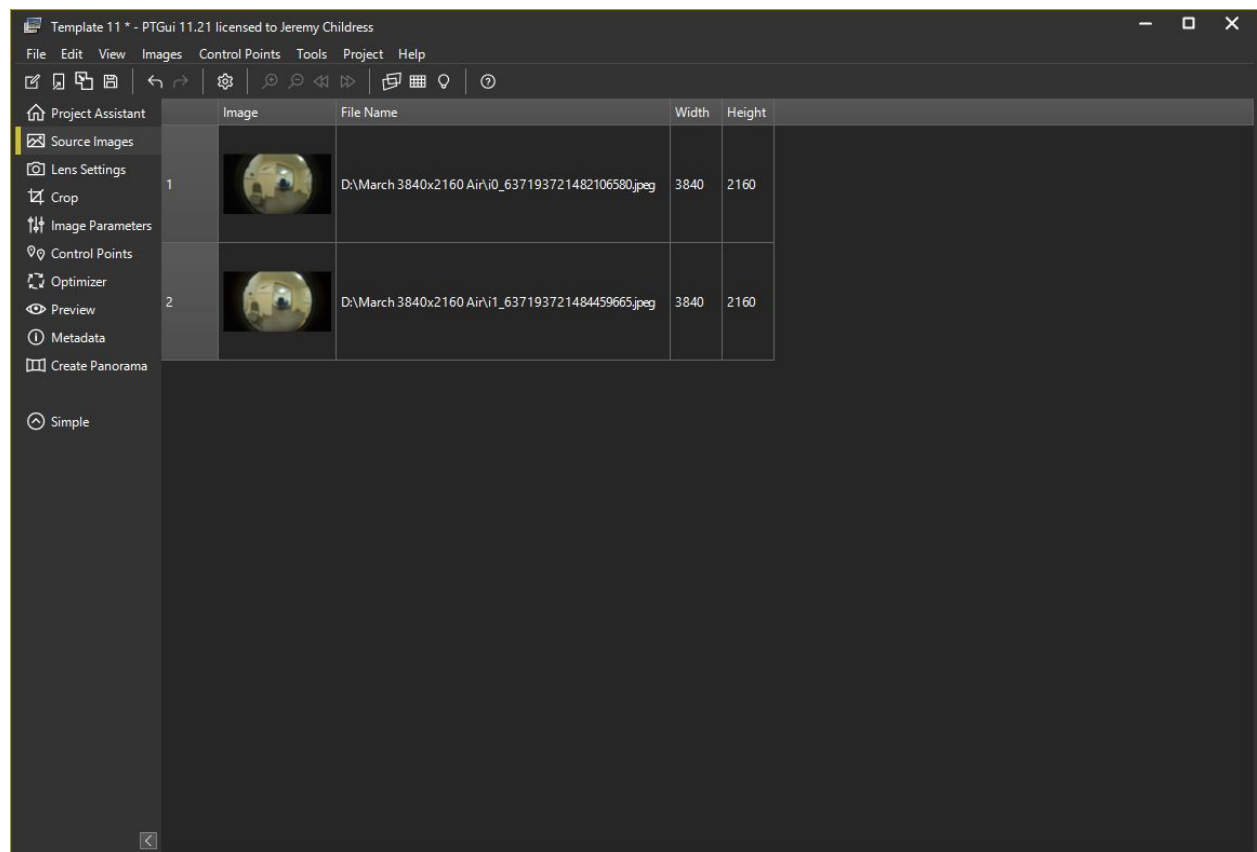
Set the Camera Sensor Size to Full Frame 35mm (using the pull down menu). This is arbitrary and doesn't have to be tied to the actual size of the sensor.



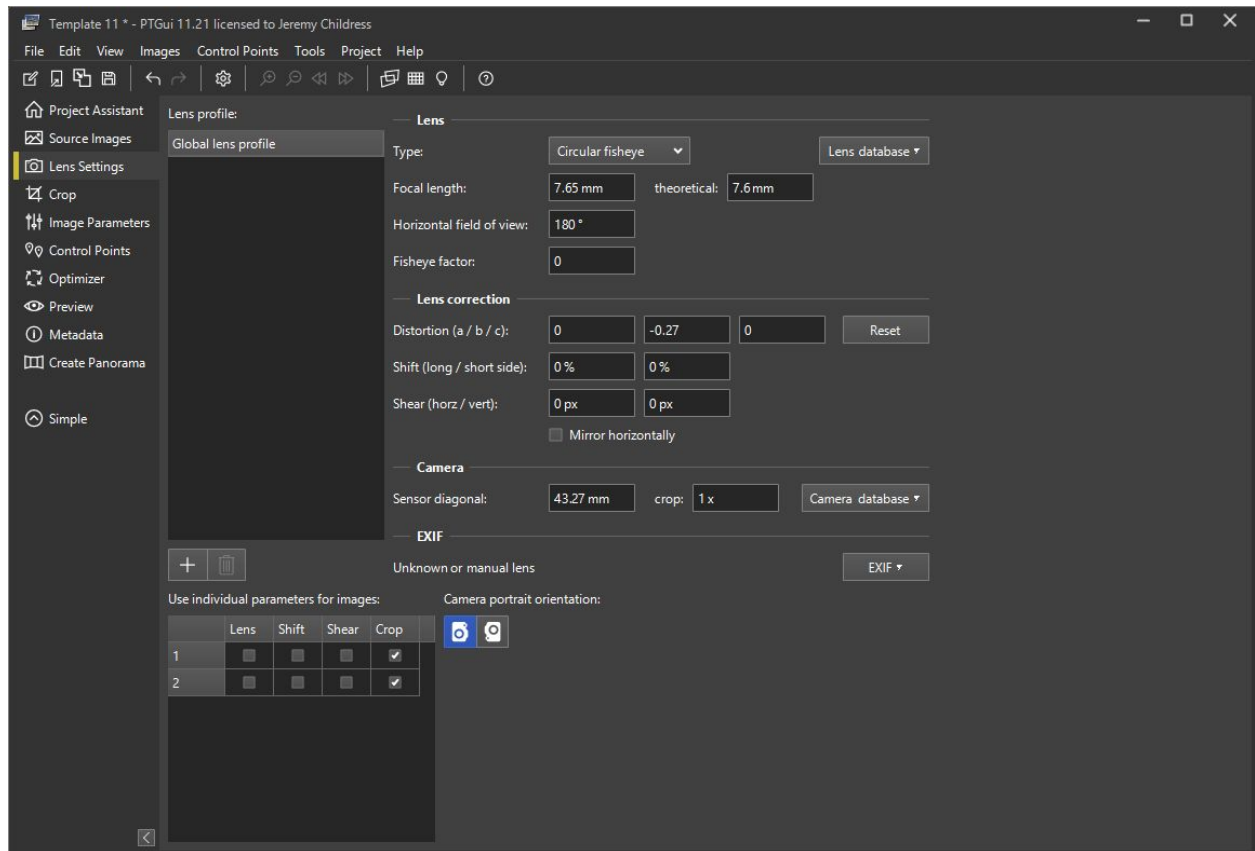
Enter a value for the focal length. This number may change based on adjustments to values on the other tabs, but 7.6mm is a good starting point.



This is what the Project Assistant screen should look like after the source images are imported.



Source Images tab (no editable values)



Lens Settings tab

- After running optimizer, focal length should still be 7.6mm
- Horizontal field of view should be adjusted to 180 degrees
- Fisheye factor = 0
- Lens Correction - only “b” should have a correction value



Each image will require a circular crop and match the image circle as close as possible. The “individual position” box should be checked for each of the images.

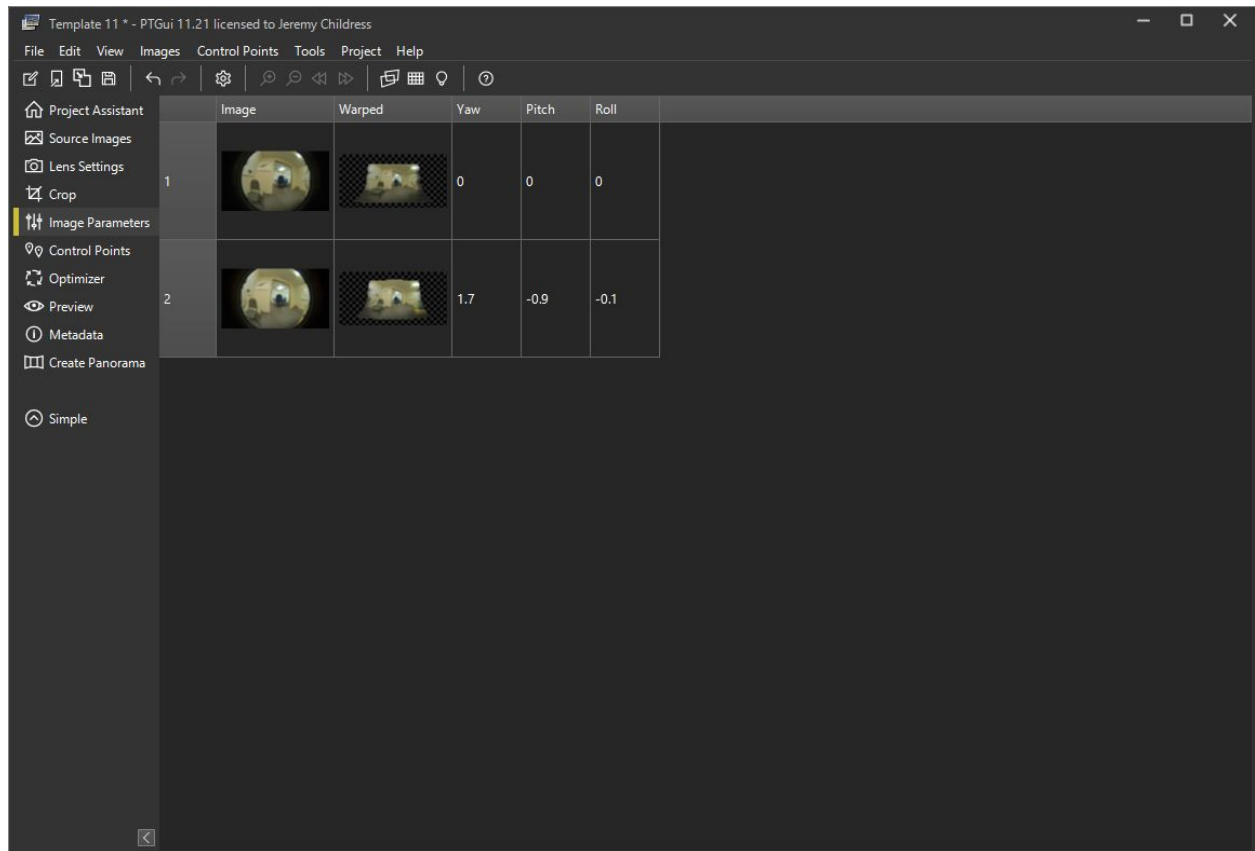
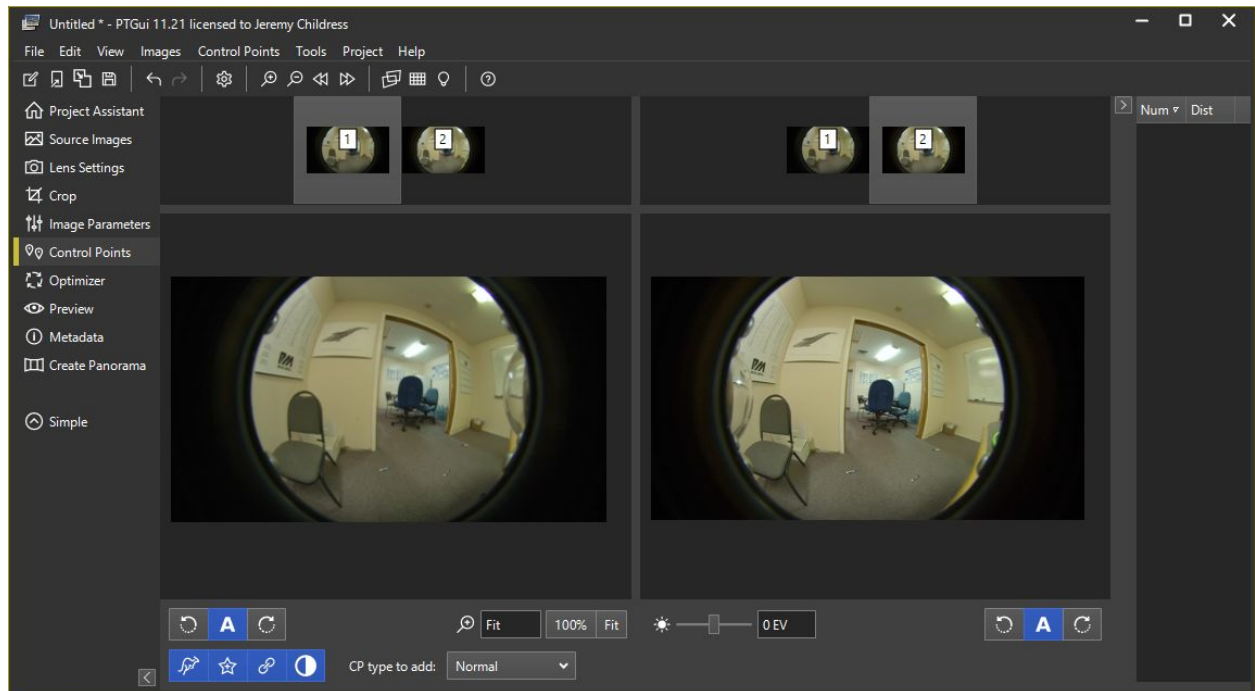


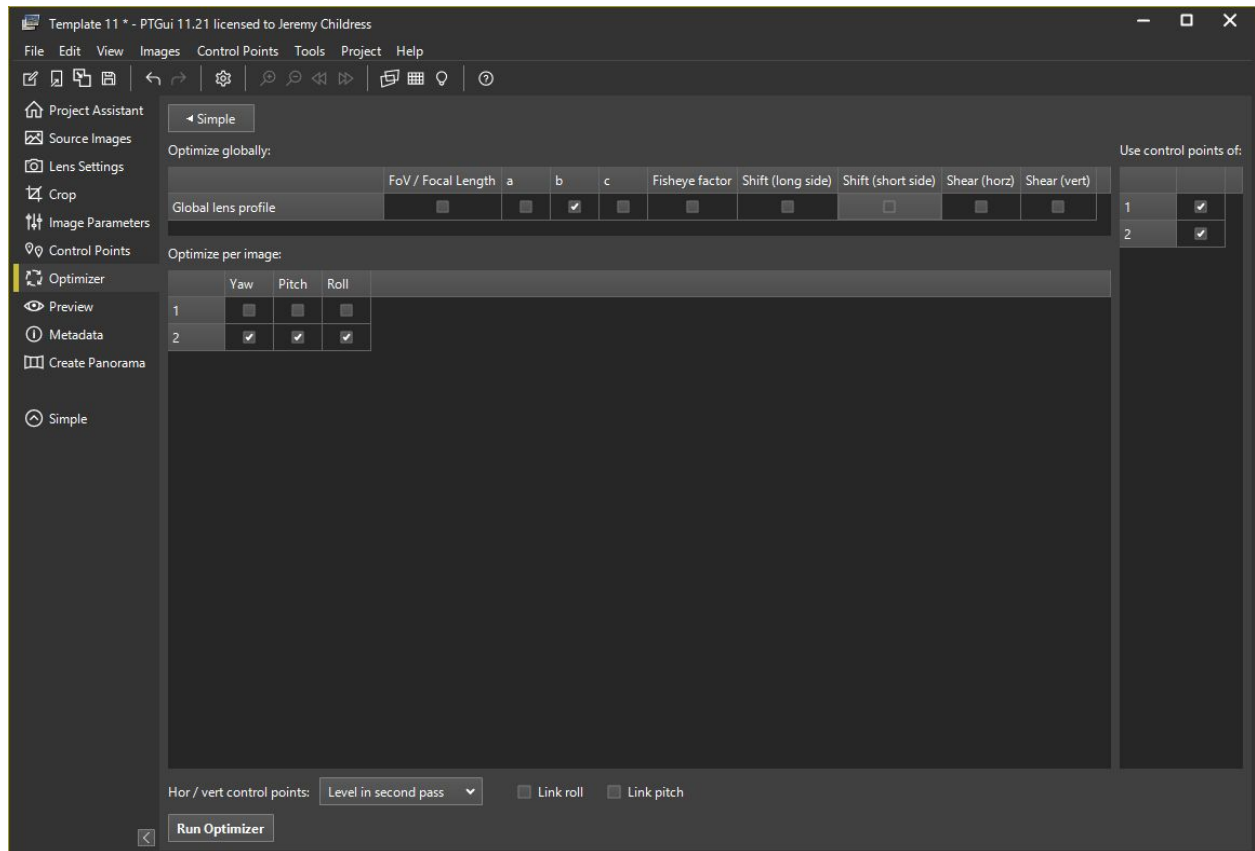
Image parameters tab will show Yaw, Pitch, and Roll values for image number 2 (image number 1 is treated as a reference frame). The warped preview should show symmetrical left/right distortion.



Prior to adding any control points.

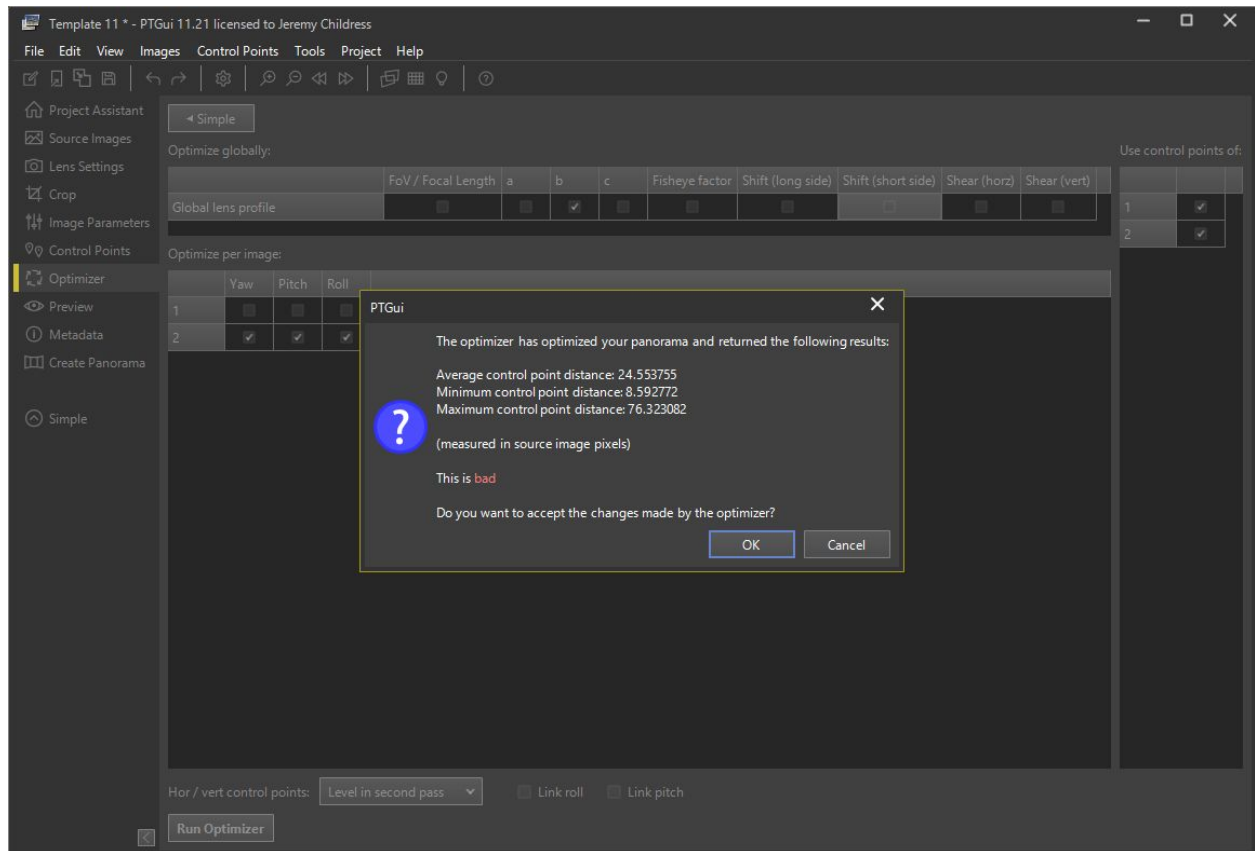


After adding control points.

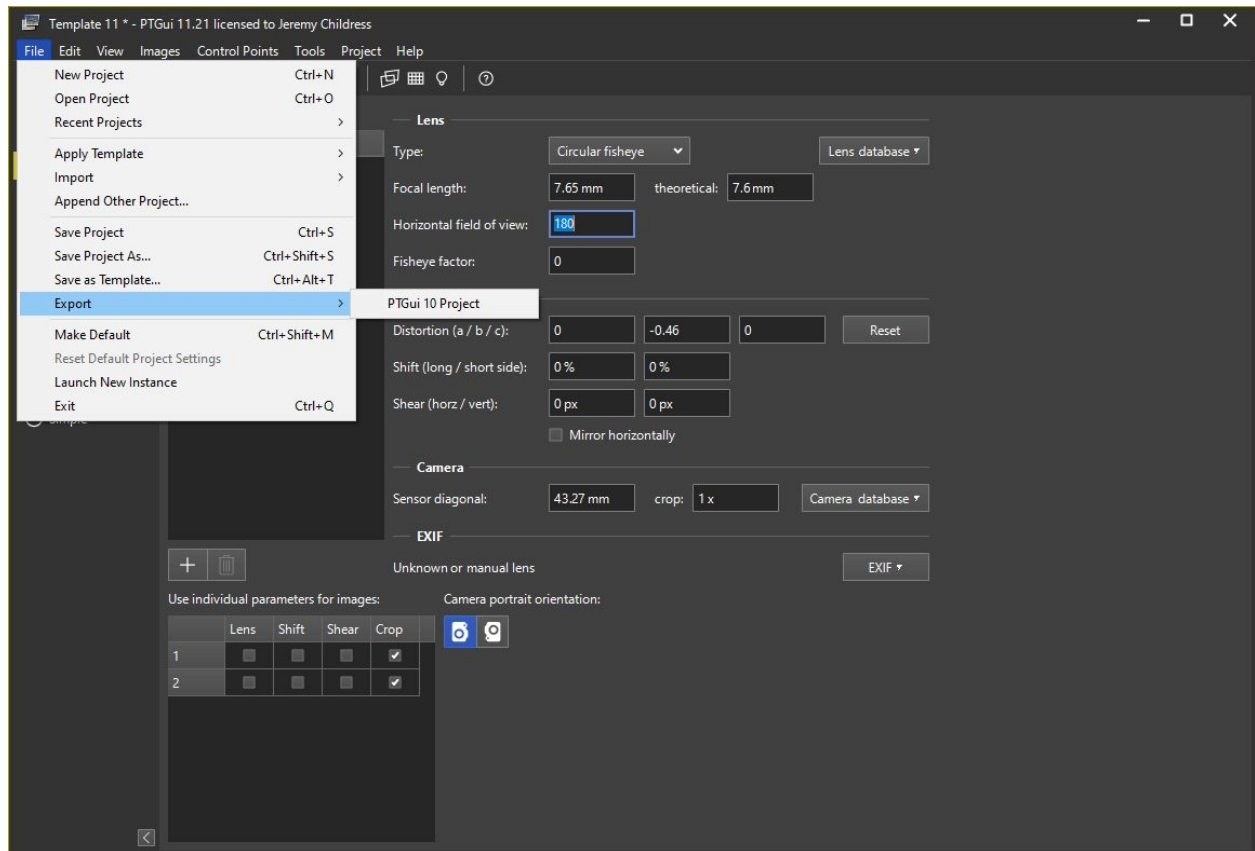


Optimizer Tab

- Go to “Advanced” mode
- Only optimize for “b” value
- Only optimize Yaw, Pitch, and Roll of image #2.
- Do not check “Link Roll” or “Link Pitch”



When you press the “Run Optimizer” button, a results box will pop up. The results will be “Bad” but will work for our application. Press the OK button to continue.



When done, export the project as a “PTGui 10 Project”. This is the template file that StereoStitch will need to project to a headset.