



# PANORAMAS



parallax | 'perə,laks |

noun

The effect whereby the position or direction of an object appears to differ when viewed from different positions, e.g. through the viewfinder and the lens of a rangefinder camera: *What you see in the viewfinder won't be quite what you get in the photograph because of parallax error.*

In panoramic photography: *When the relative position of a subject changes while pivoting the camera. Parallax error occurs when objects in the image are not at the same place relative to each other.*





> 360° Pano





# Capturing Images for Panorama

Cropping a Single Image

# Panoramic Proportions

2 : 1

8 x 4

14 x 7

3 : 1

12 x 4

21 x 7

5 : 1

20 x 4

35 x 7



Nikon D810

12-24 Zoom @ 70mm

1/30 sec, *f*10, ISO 64

~3 : 1



Nikon D810  
12-24 Zoom @ 24mm  
1sec, *f*7.1, ISO 64

4 : 1

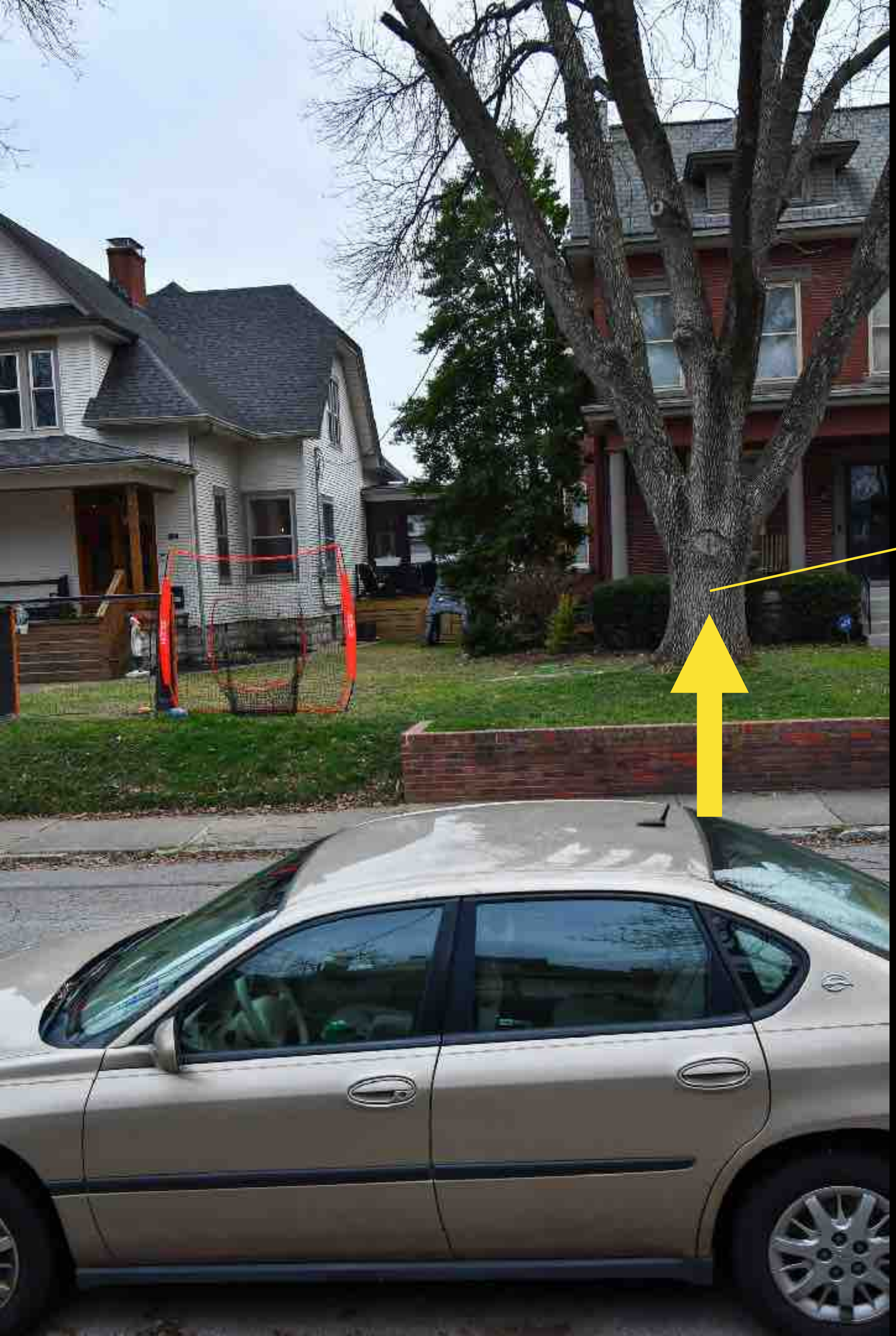


# Capturing Images for Panorama

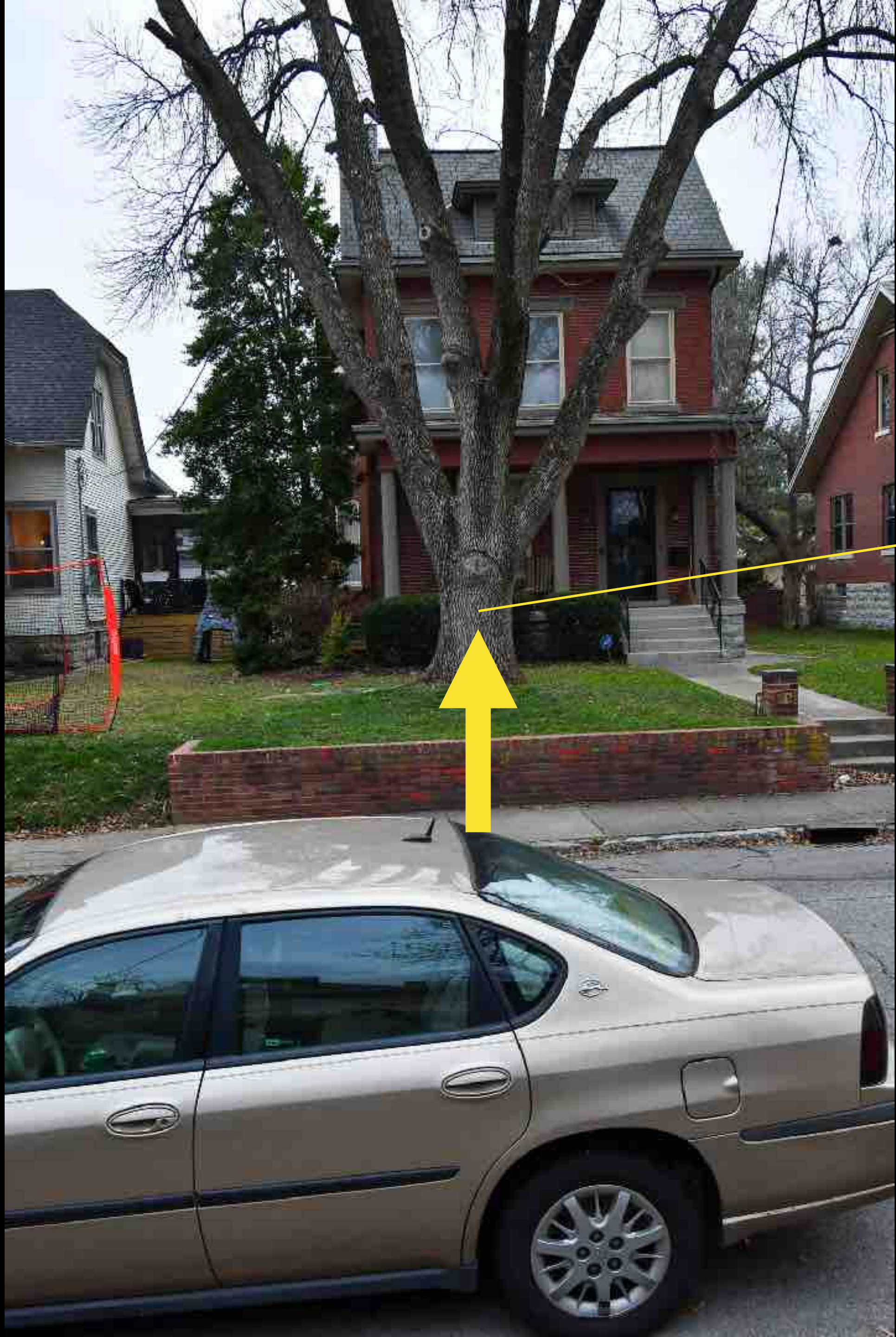
Hand Held

Overlapping Images.

30%



Visual reference point.



Visual reference point.





Visual reference point.

New reference point.





New reference point.



New reference point.





New reference point.

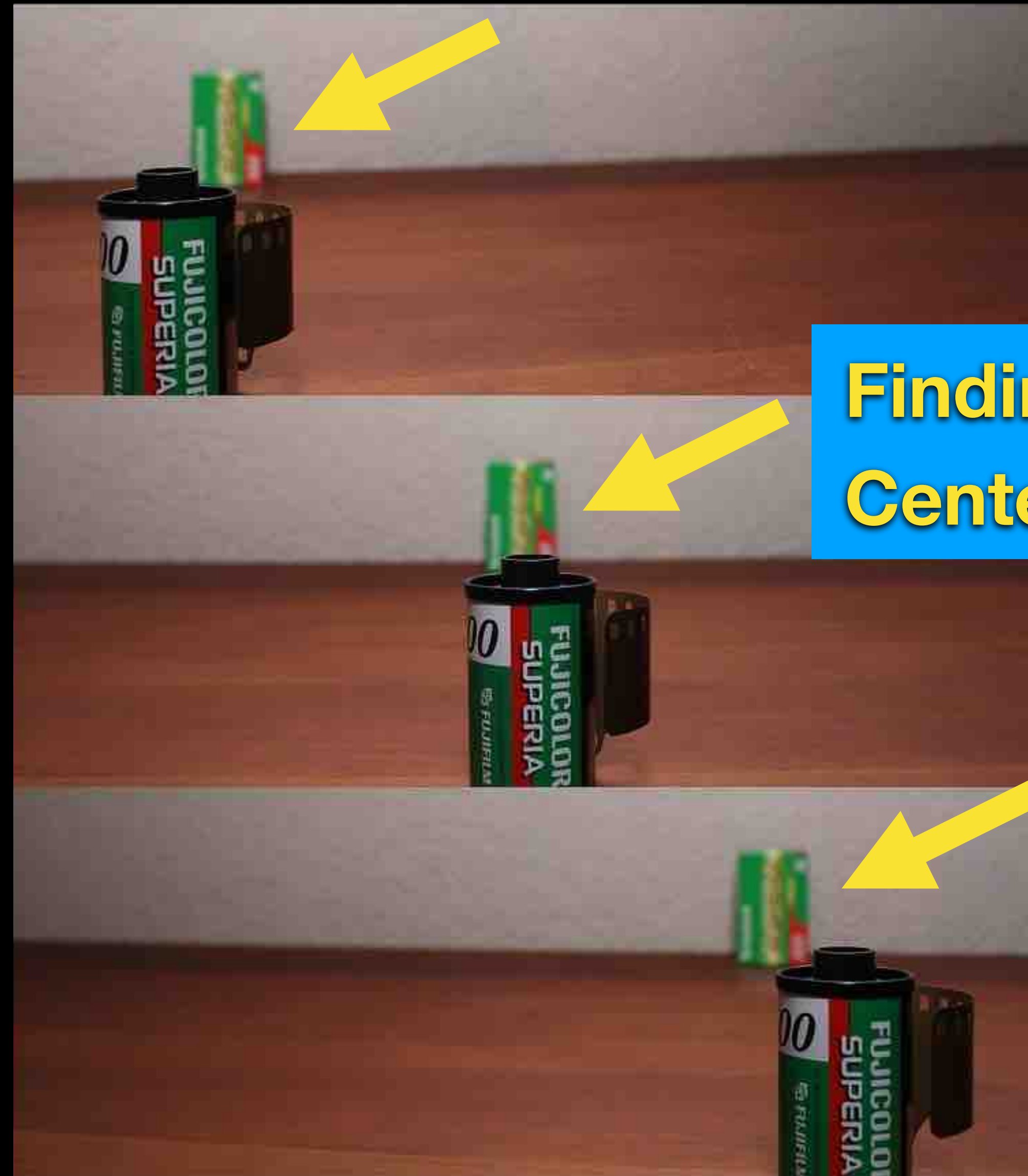


New reference point.

Pivoting at Sensor  
creates parallax.



In panoramic photography: When the relative position of a subject changes while pivoting the camera. Parallax error occurs when objects in the image are not at the same place relative to each other.



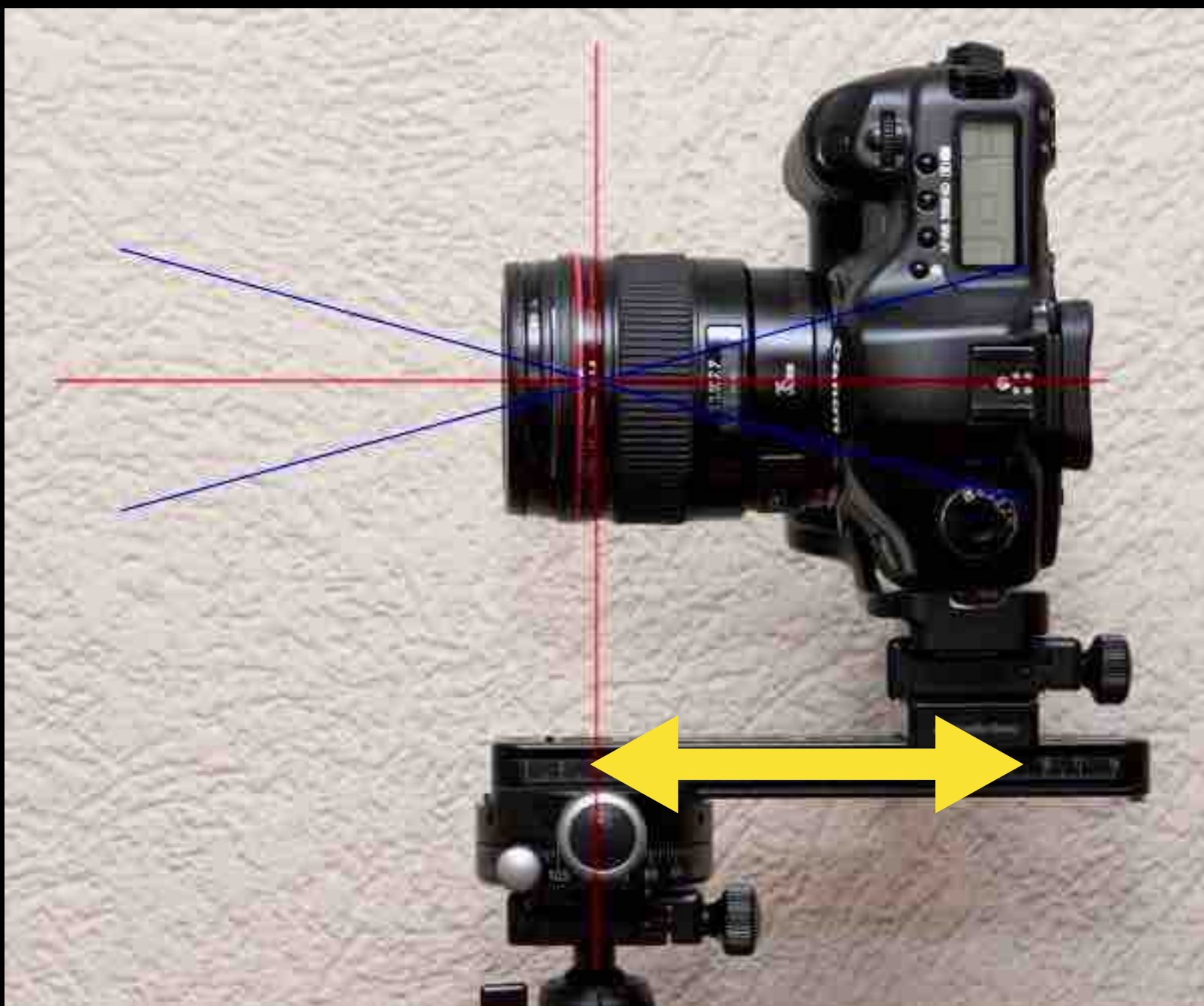
**Finding the Nodal Point  
Center Alignment**

Pivoting at Pupil  
prevents parallax.



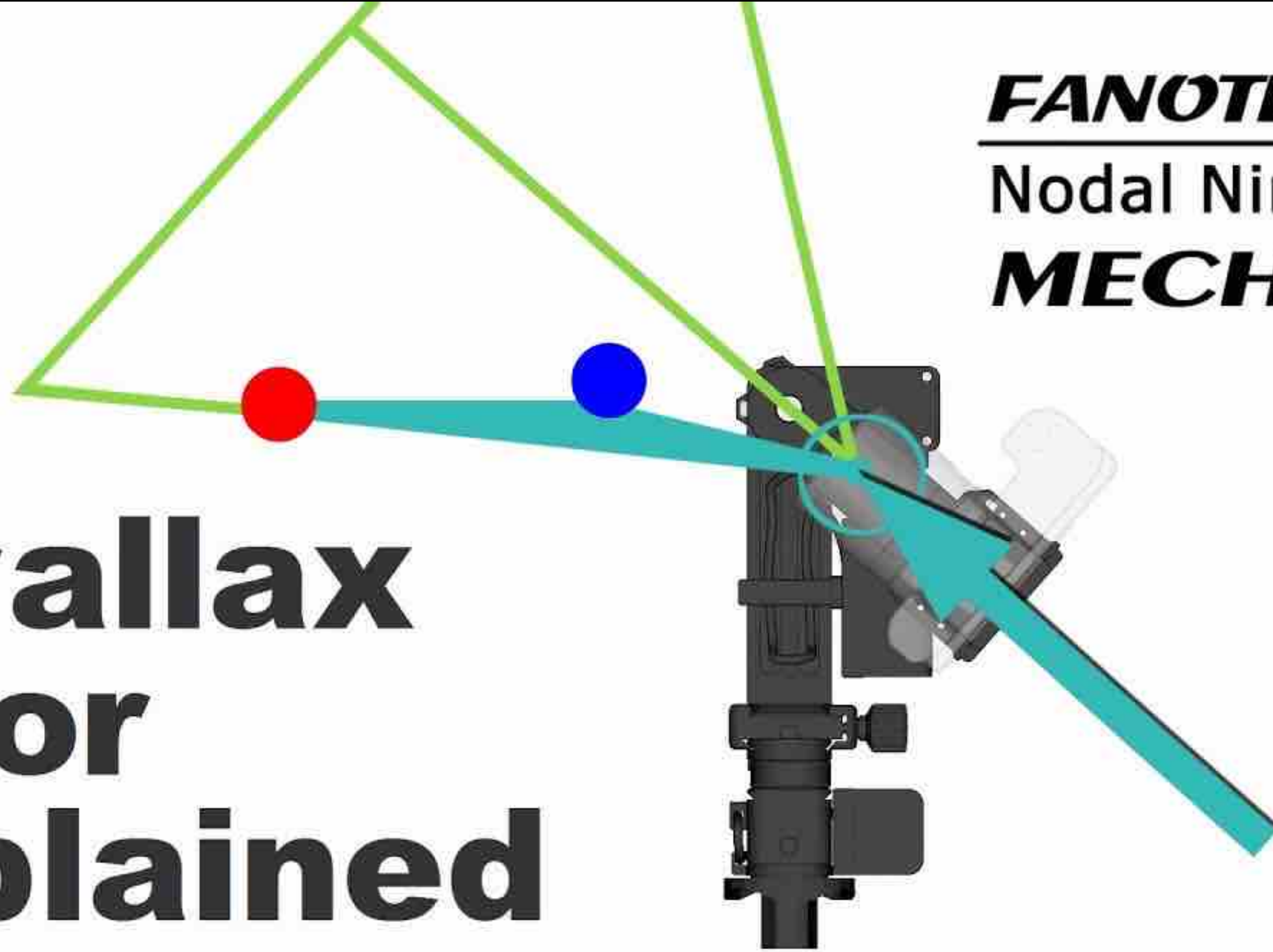


Better alignment with foreground / background separation.



***FANOTECH***  
**Nodal Ninja**  
***MECHA***

# Parallax error explained

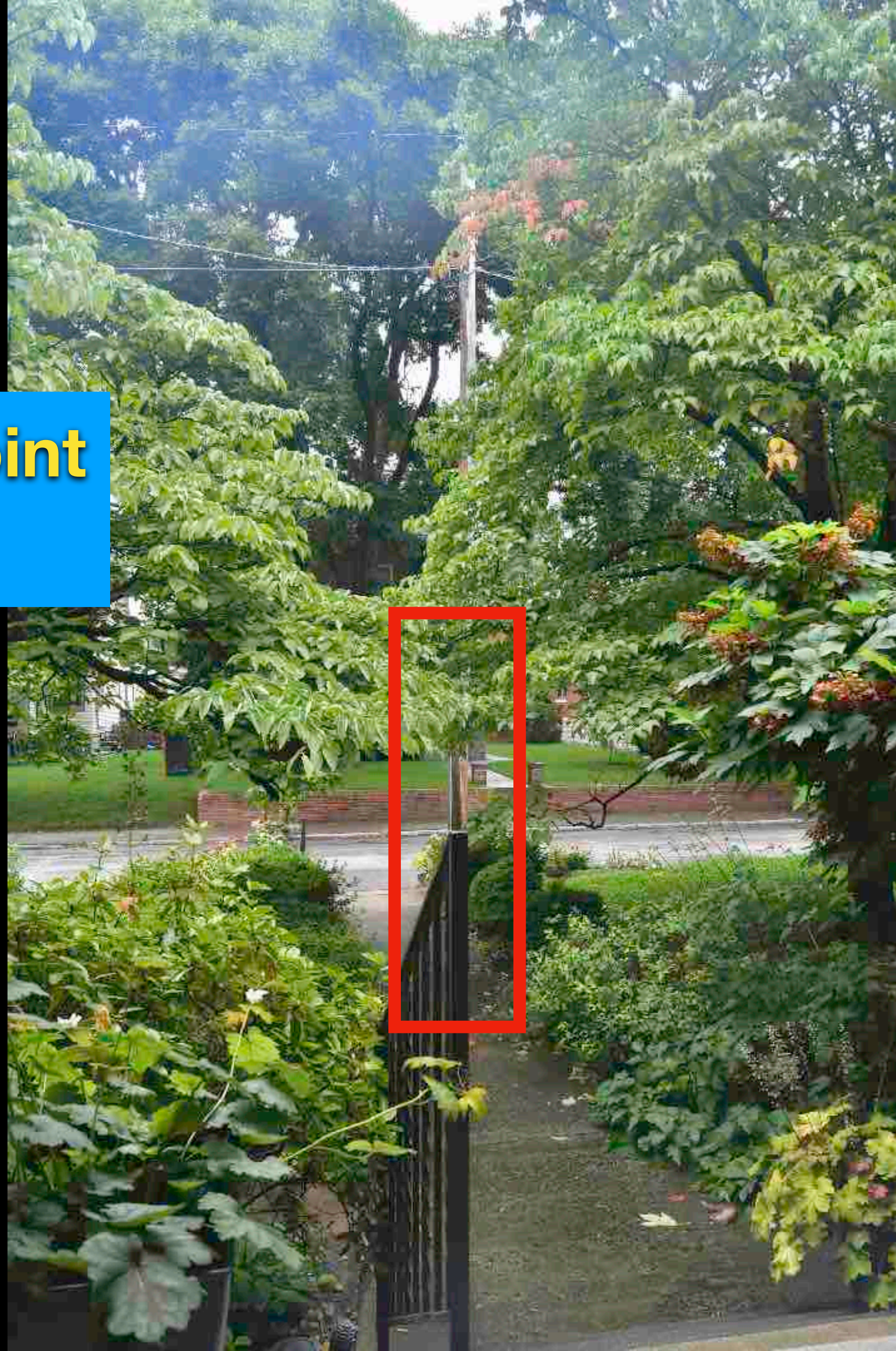




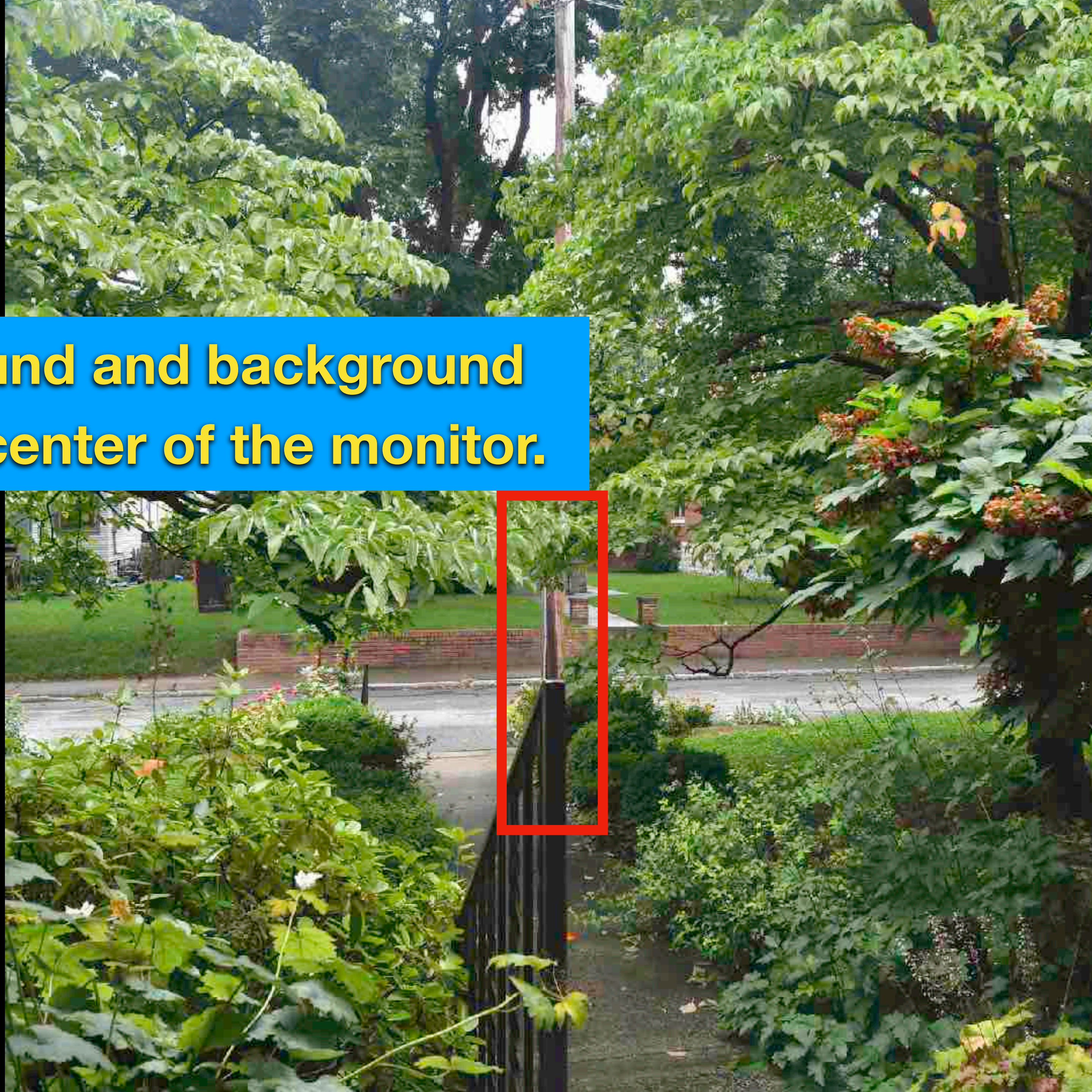
# Capturing Images for Panorama

Pano Bracket

## Finding the Nodal Point with Live View



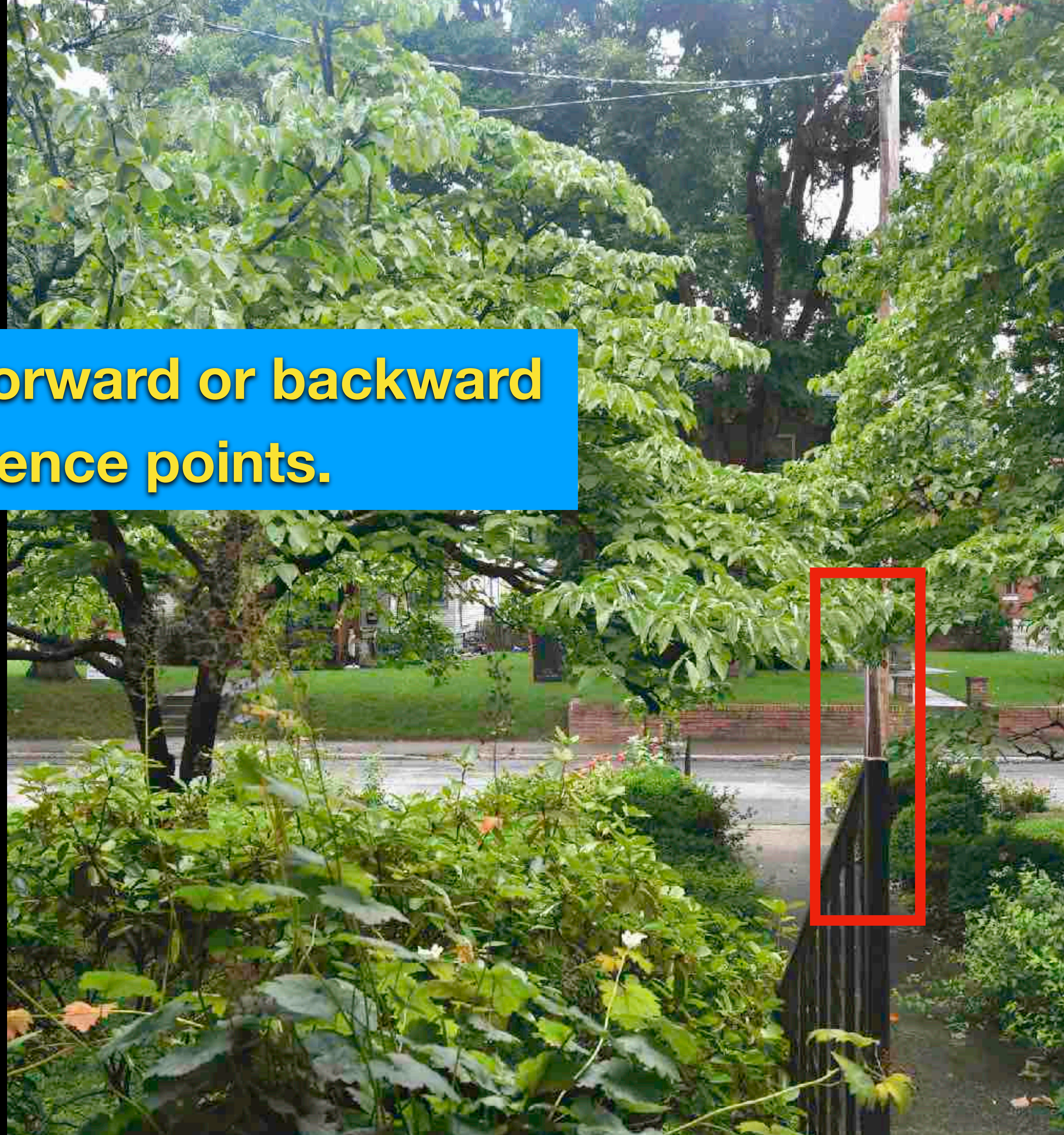
**Align foreground and background points in the center of the monitor.**



**Pivot the camera to the left.**



**Slide camera forward or backward  
to realign reference points.**



**Pivot the camera to the right.**



**Check the reference points to confirm alignment.**



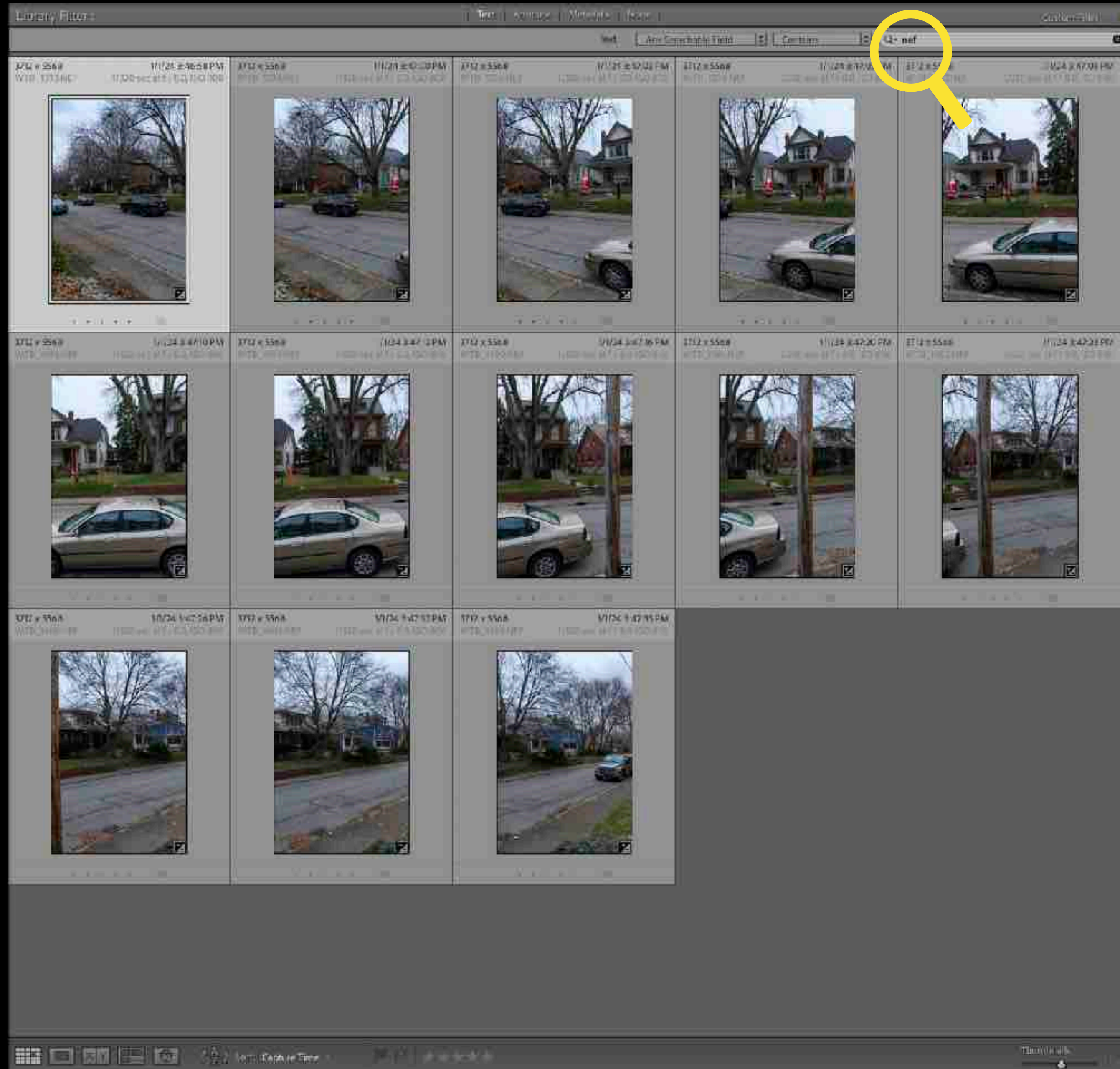


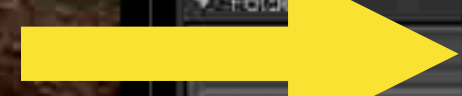
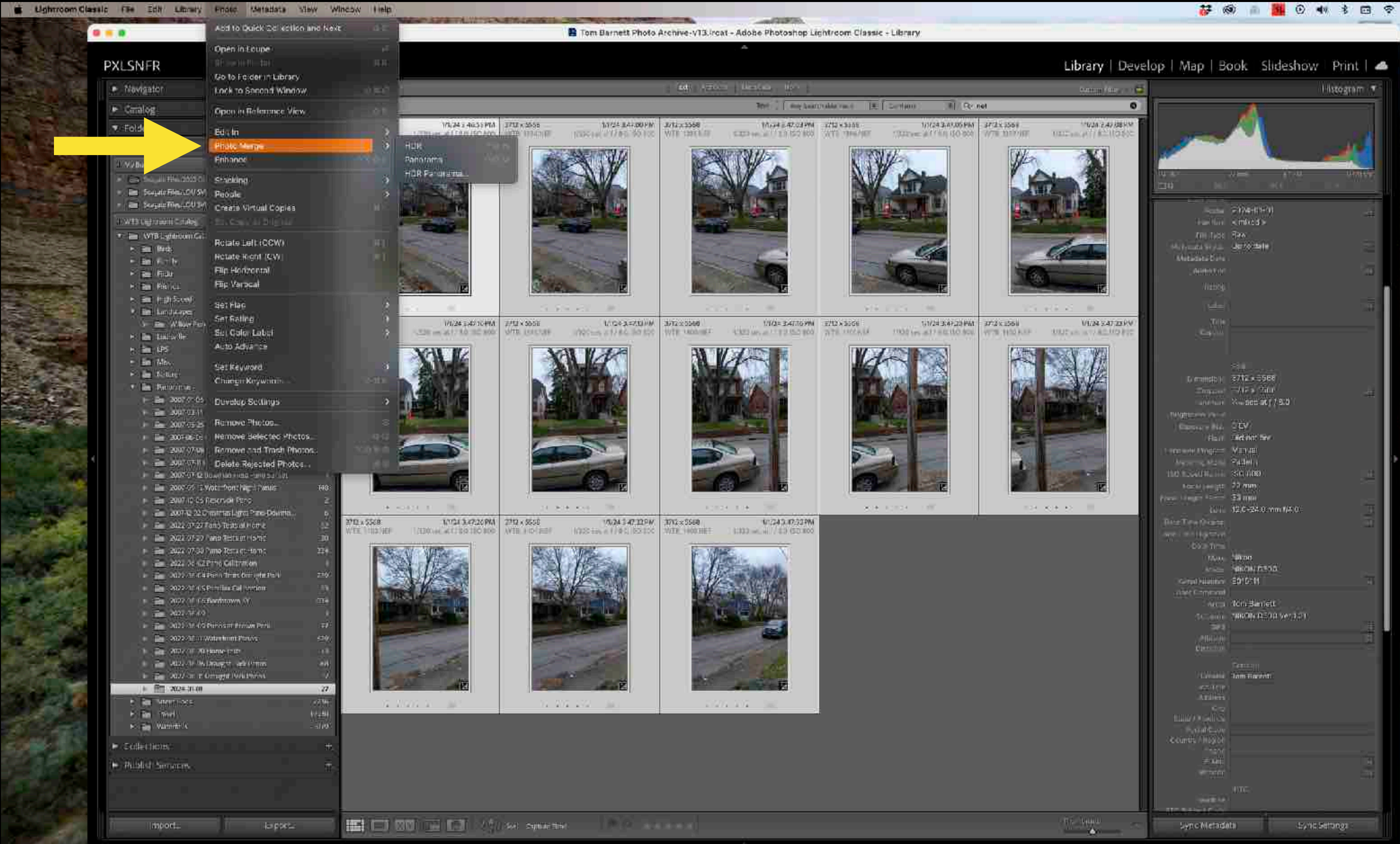


# Merging Images in Lightroom

Photo Merge

Select All





PXLSNFR

Navigator

Catalog

Folders

Grid

Web

Compare

Web

Web

Web

Web

Web

Web

Web

Web

Web

Web

Web

Web

Web

Web

Web

Web

Web

Web

Web

Web

Web

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Web

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Web

Web

Web

Web

Web

Add to Quick Collection and Exit

Open in Loupe

Go to Folder in Library

Link to Second Window

Open in Reference View

Edit In

Photo Merge

Enhance

Shooting

People

Create Virtual Copies

Rotate Left (CCW)

Rotate Right (CW)

Flip Horizontal

Flip Vertical

Set HSL

Set Grading

Set Color Label

Auto Advance

Set Keyword

Change Keychain

Develop Settings

Remove Photos

Remove Selected Photos

Remove and Trash Photos

Delete Rejected Photos

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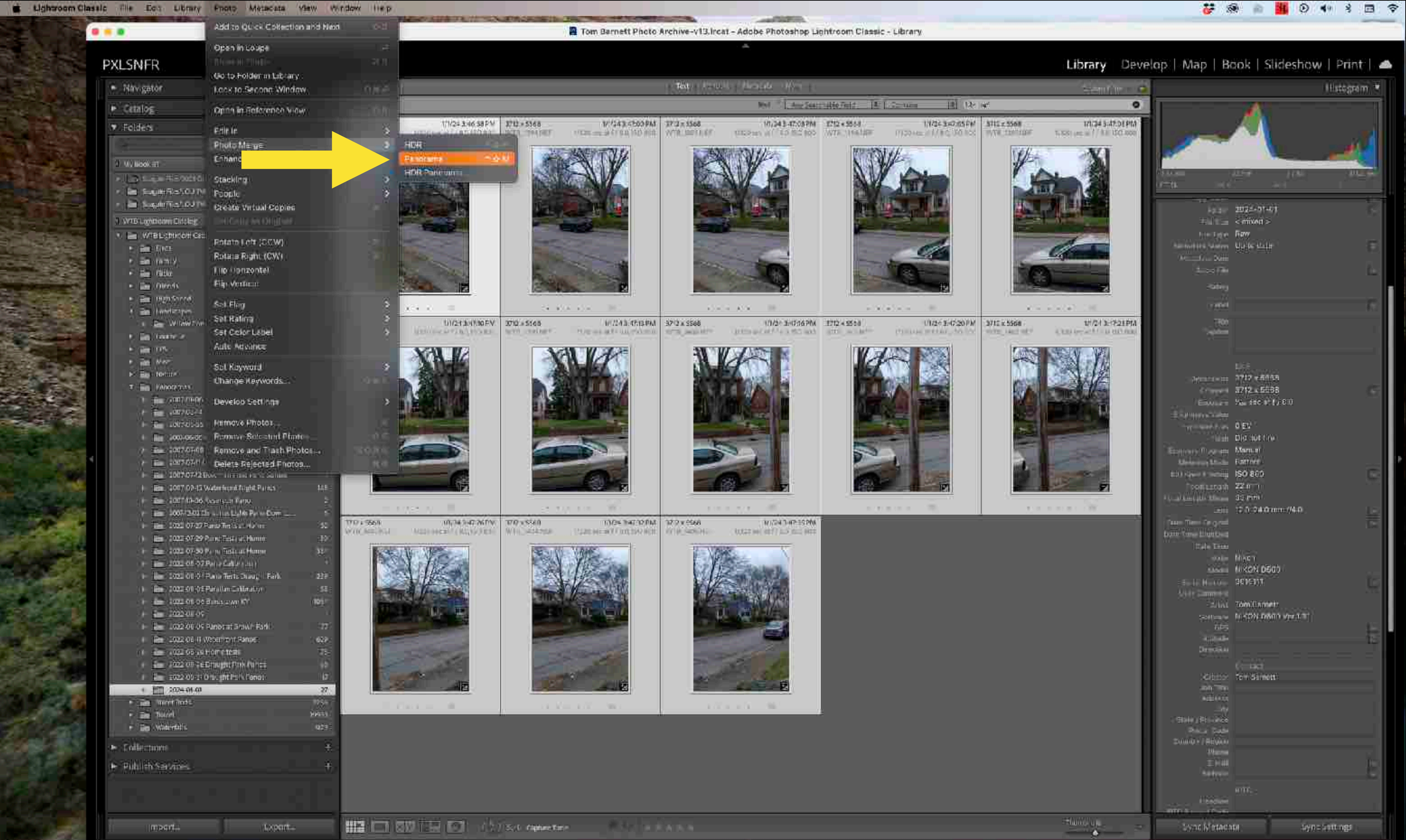
...

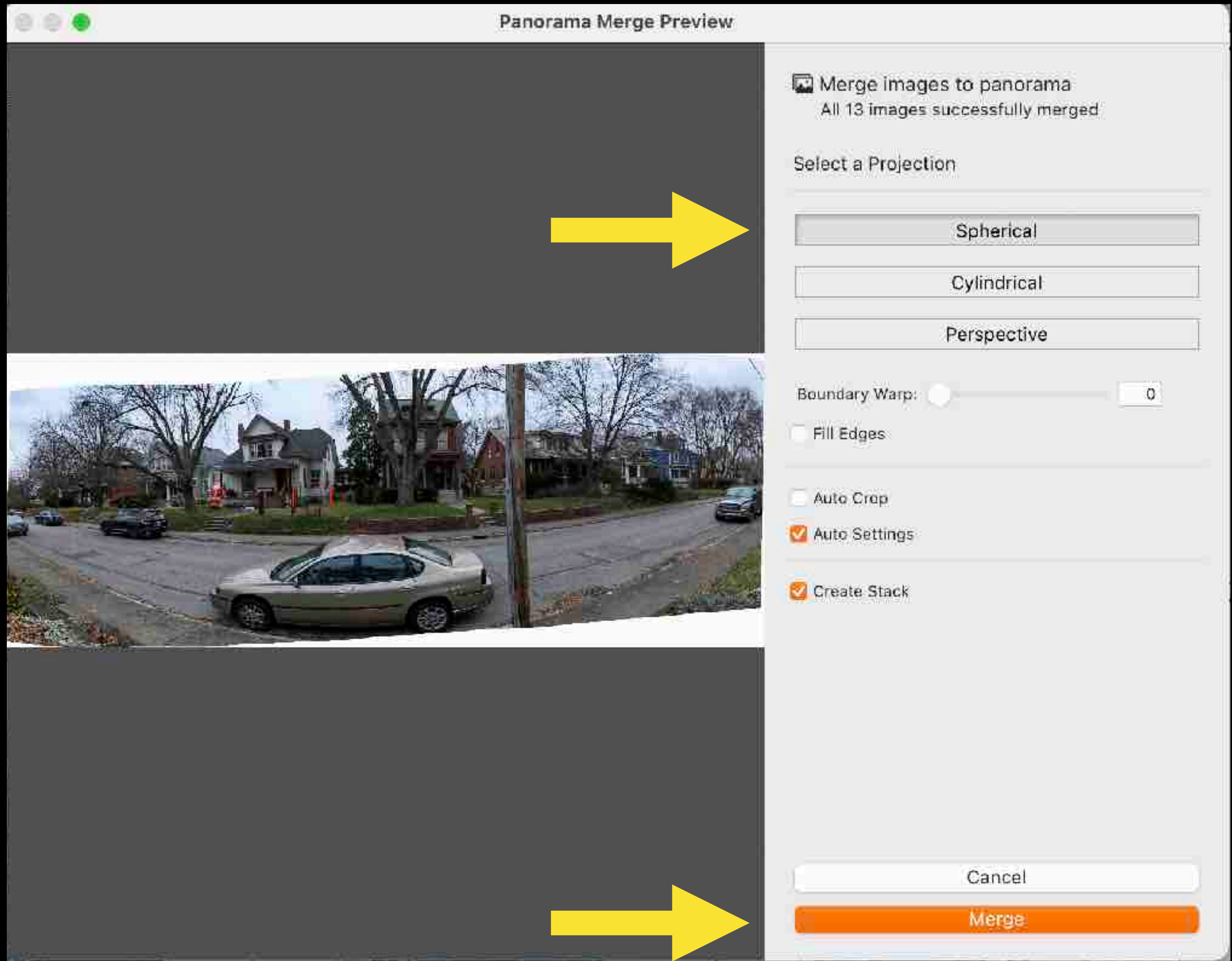
...

...

...

Main interface of Adobe Photoshop Lightroom Classic Library grid. The title bar shows 'Tom Barnett Photo Archive-v13.lrcat - Adobe Photoshop Lightroom Classic - Library'. The top right has navigation tabs for Library, Develop, Map, Book, Slideshow, and Print. Below the tabs is a search bar and a 'Compare' button. The main grid displays a series of photos of a street scene with a car, arranged in a 2x4 grid. Each photo has a small thumbnail in the top right corner. The right-hand panel contains a histogram at the top, followed by a 'Web' section and a 'Metadata' section with various fields like Date, Time, Resolution, and File Name. At the bottom of the right panel are 'Sync Metadata' and 'Sync Settings' buttons. The bottom of the screen has a toolbar with icons for grid, compare, web, print, and help, along with a 'Print' button and a 'Web' button.





WTB\_1393-Pano.dng

1/320 sec at f / 8.0, ISO 800

22 mm (12.0-24.0 mm f/4.0)







Parallax Error







Horizontal offset

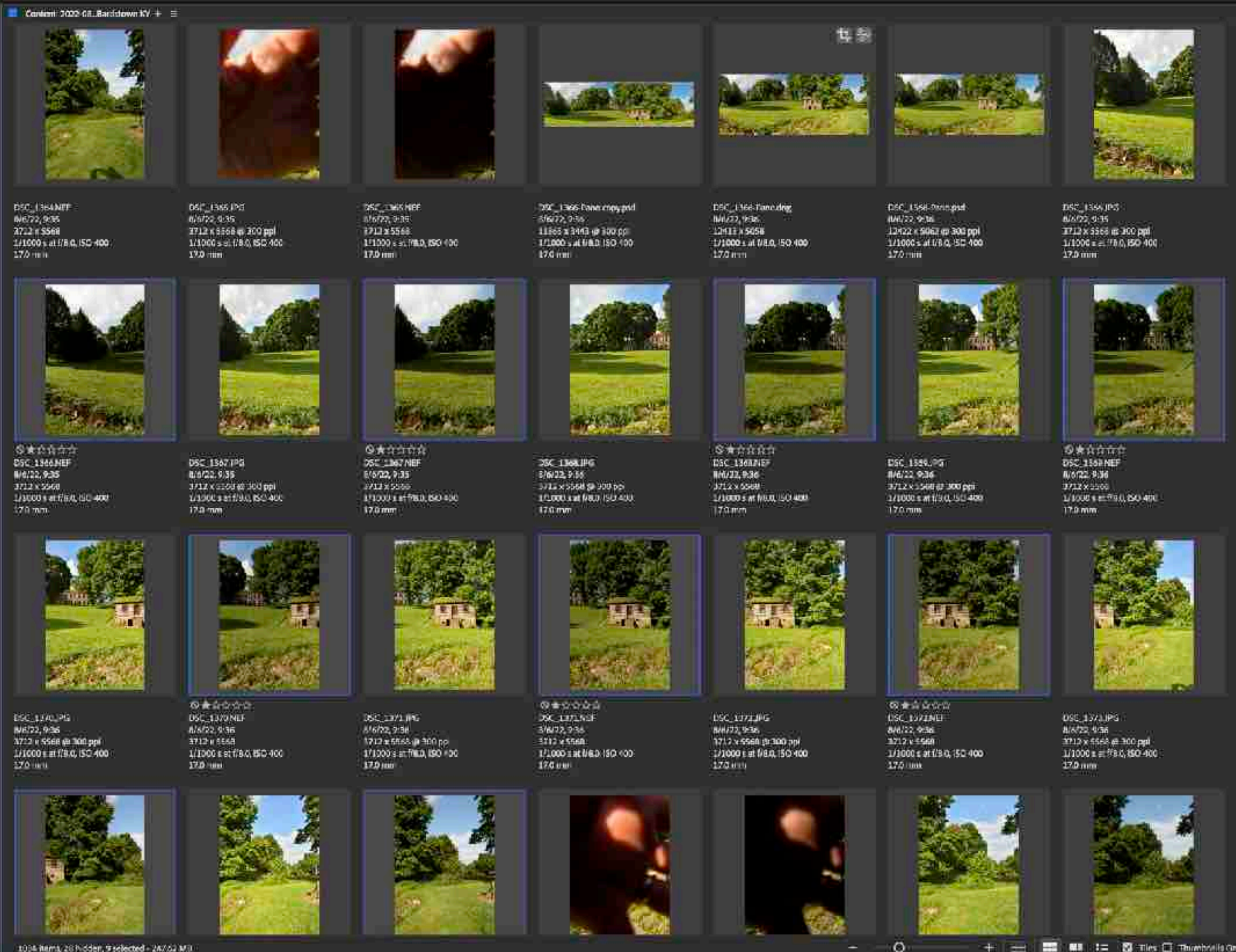
Parallax Errors

Vertical offset

# Merging Images in Photoshop

Computer > WTB Lightroom Catalog > Panoramas > 2022-06-06 Bardonia NY

- PRINTING TEMPLATES - PRO-13
- SLIDESHOWS
  - Tom Jamett - E/O
- LPS IMAGES
  - LR Backlit Videos
- NATURE
- NON-PHOTO
- STREET VIEWS
- Thunder 2007
- TRAVE
- Very Old Mac G3
- VIDEO
  - Video Family
- My Book Studio
- WTB Lightroom Catalog
  - Bills
  - Family
  - Hick
  - Friends
  - High Speed
  - Movie DVO Projects
  - Landscapes
  - Louisville
  - LPS
  - Misc
  - Nature
  - Panoramas
    - 2007-03-06 Louisville Skyline at Night
    - 2007-03-14
    - 2007-05-25
    - 2007-06-06 Chenoweth Run at Seabrook NC
    - 2007-07-08 Hines Mill W/ 340 Garden
    - 2007-07-11 Clark Bridge Sunset Panorama
    - 2007-07-22 Bowman Field Piano Sunset
    - 2007-09-12 Waterfront Night Panos
    - 2007-10-06 Reservoir Panos
    - 2007-12-02 Christmas Light (s Panorama Down)
    - 2022-07-27 Piano 1st at Home
    - 2022-07-29 Piano 1st at Home
    - 2022-07-30 Piano 1st at Home
    - 2022-08-02 Piano Calibration
    - 2022-08-04 Piano 1st at Drought Park
    - 2022-08-05 Parallax Calibration
    - 2022-08-06 Bardonia NY



Metadata Keywords

File Properties

Filename	(Multiple values)
Document Type	Camera Raw Image
Application	Nikon D500 Ver 1.30
Date Created	(Multiple values)
Date File Modified	(Multiple values)
File Size	(Multiple values)
Dimensions	3712 x 5568
Bit Depth	16
Color Mode	RGB
Color Profile	Untagged
Supports ZIP	No

EXIF (IM, legacy)

EXIF Core

EXIF Extension

Camera Data (EXIF)

Exposure Mode	Auto
Exposure Type	Recommended exposure index (REI)
Focal Length	17.0 mm
Focal Length In 35mm Film	25.0 mm
Lens	11.0-24.0 mm f/4.0
Max Aperture Value	f/4.0
Date Time Original	(Multiple values)
Flash	Did not fire
Metering Mode	Matrix
Light Source	Flash
Custom Rendered	Normal Process
White Balance	Manual
Scene Capture Type	Standard
Date Control	0
Contrast	0
Saturation	0
Sharpness	Normal
Focusing Method	One-Shot service
File Source	Digital Camera
Make	NIKON CORPORATION
Model	NIKON D500
Body Serial Number	3011111
Lens Specification	11-24mm f/4

GPS

Audio

Video

Video Name:

Alternate Title Name:

Collections Filter Export

Custom Export

Export To DNG

+ Create new preset

View Progress

1004 items, 28 folders, 9 selected - 247.52 MB

Batch Rename...  
 Create Metadata Template...  
 Edit Metadata Template  
 Append Metadata  
 Replace Metadata  
 Cache  
 Media Encoder  
 Premiere Pro  
 Photoshop  
 Google  
 Illustrator

Computer > WTB Lightroom Catalog > Panoramas > 2022-09-06 Barrowman KY

Favorites Folders

- PRINTING TEMPLATES - PRO-16
- SLIDE SHOWS
  - Tyri Barnett - B.O
- LPS IMAGES
  - UK Rectal Video
- MALLIE
- NON-PHOTO
  - STREET ROOLS
  - Thames 2007
- TRAVEL
- Very Old Macs
- VIDEO
  - Vinny Family
- My Book Studio
- WTB Lightroom Catalog
  - birds
  - family
  - flour
  - friends
  - high speed
  - Home DVD Projects
  - landscapes
  - Louisville
  - LPS
  - Misc
  - Nature
  - Panoramas
    - 2007-01-06 Louisville skyline at Night
    - 2007-03-14
    - 2007-05-25
    - 2007-06-04 Clarendon Hill Run at Seatonville NJ
    - 2007-07-08 Hines Mill Way 360 Garden
    - 2007-07-11 Clark Bridge Sunset Panc
    - 2007-07-11 Bowman Field Pond Sunset
    - 2007-09-13 Waterfront Night Woods
    - 2007-10-08 Reservoir Panc
    - 2007-12-02 Christmas Lights Paris-Downtown
    - 2022-07-27 Panc Tests at Home
    - 2022-07-29 Panc Tests at Home
    - 2022-07-30 Panc Tests at Home
    - 2022-08-02 Panc Collection
    - 2022-08-04 Panc Tests Drought Park
    - 2022-08-05 Pawtux Calibration
    - 2022-08-06 Barrowman KY

Corrections Files Export

Custom Export  
 Export to DNG  
 Create new preset

View Progress

2022-01-09 Barrowman KY - Adobe Bridge

Essentials Library Compare Output Metadata Webhook Center Preview Sorting

Sort by Filename

Metadata Keywords

Fix Properties

Filename	Multiple values
Content Type	Camera Raw Image
Application	NIKON D500 Ver.1.20
Date Created	Multiple values
Date File Modified	Multiple values
File Size	Multiple values
Dimensions	3712 x 5568
Bit Depth	16
Color Mode	RGB
Color Profile	Untagged
Support 8Bit	Yes

IPIC (RAW, legacy)  
 IPIC Owner  
 IPIC Extension  
 Camera Data (Raw)

Exposure Mode	Auto
Sensitivity Type	Recommended exposure index (REI)
Focal Length	17.0 mm
Focal Length in 35mm Film	25.0 mm
Lens	17.0-34.0 mm f/4.0
Max Aperture Value	f/4.0
Date Time Original	Multiple values
Flash	Did not fire
Metering Mode	Matrix
Light Source	Flash
Custom Rendered	Normal Process
White Balance	Manual
Scene Capture Type	Standard
Contrast	0
Saturation	0
Sharpness	Normal
Smoothing Method	One chip sensor
File Source	Digital Camera
Make	NIKON CORPORATION
Model	NIKON D500
Body Serial Number	3015111
Lens Specification	17-35mm f4

EP8  
 Audio  
 Video

1634 items, 28 hidden, 9 selected - 247.62 MB

1634 items, 28 hidden, 9 selected - 247.62 MB



Photomerge

Layout

Auto



Perspective



Cylindrical



Spherical



Collage



Reposition



Source Files

Use: Files

- DSC\_1366.NEF
- DSC\_1367.NEF
- DSC\_1368.NEF
- DSC\_1369.NEF
- DSC\_1370.NEF
- DSC\_1371.NEF
- DSC\_1372.NEF
- DSC\_1373.NEF
- DSC\_1374.NEF

- Browse...
- Remove
- Add Open Files

- Blend Images Together
- Vignette Removal
- Geometric Distortion Correction
- Content Aware Fill Transparent Areas

OK

Cancel



History

- ✓ Untitled\_Panorama-1
- ✓ New Blank Layers

Properties

Fixed Layer

Transform

W: 41.8 in X: 0 in

H: 16.81 in Y: 0 in

0.00°

Align and Distribute

Align

Quick Actions

Remove This Action

Open This Set

View More

Layers Channels Paths

100%

Opacity: 100%

100%

- 050\_106.NEF
- 050\_107.NEF
- 050\_108.NEF
- 050\_109.NEF
- 050\_110.NEF
- 050\_111.NEF
- 050\_112.NEF
- 050\_113.NEF
- 050\_114.NEF





# Focal Length and Curvilinear Lines

Nikon D300s

12-24 Zoom @ 24mm

1/1000 sec,  $f8$ , ISO 400



12 Angles @  $15^\circ = 180^\circ$

13 Exposure Stitch

$(n + 1)$

Nikon D500

35mm  $f2$

1/200 sec,  $f8$ , ISO 100



16 Angles @  $7.5^\circ = 120^\circ$

17 Exposure Stitch

( $n + 1$ )

Nikon D500

50mm  $f1.8$

1/50 sec,  $f8$ , ISO 100



12 Angles @  $5^\circ = 60^\circ$

13 Exposure Stitch

( $n + 1$ )



Nikon D500  
12-24 Zoom @ 12mm  
1/1000 sec, *f*8, ISO 100

4 Angles @ 15° = 60°  
5 Exposure Stitch  
(*n* + 1)























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**Key Features**

- 1/4" x 20mm Thread 1/8" Dia
- Weight: 1.1 lb
- 1/4" x 20mm Thread 1/8" Dia
- 1/4" x 20mm Thread 1/8" Dia

The PG-01 Compact Pano-Gimbal Head from Really Right Stuff is an ultra-portable, lightweight tripod head offered in numerous configurations depending on the needs of

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[Nodal Ninja NN3 MKII Starter Package](#)

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**Key Features**

- 1/4" x 20mm Thread 1/8" Dia
- 1/4" x 20mm Thread 1/8" Dia
- 1/4" x 20mm Thread 1/8" Dia
- 1/4" x 20mm Thread 1/8" Dia

This award-winning **Nodal Ninja Starter Package** from Nodal Ninja makes it possible for you to produce high-resolution single-row or multi-row panoramic photos using your

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[Nodal Ninja 6 with Nadir Adapter](#)

In Stock **\$399.95**

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**Key Features**

- For Panoramic Photography
- 1/4" x 20mm Thread 1/8" Dia
- 1/4" x 20mm Thread 1/8" Dia
- 1/4" x 20mm Thread 1/8" Dia

The **Nodal Ninja 6 with Nadir Adapter** consists of five main Nodal Ninja components: a

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[Sunwayfoto CR-30 360 Panorama Head Kit](#)

In Stock **\$84.95**

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**Key Features**

- 1/4" x 20mm Thread 1/8" Dia
- 1/4" x 20mm Thread 1/8" Dia
- 1/4" x 20mm Thread 1/8" Dia
- 1/4" x 20mm Thread 1/8" Dia

This **CR-30 360° Panorama Head Kit** from Sunwayfoto is a pivoting base with a 360°