SPATIAL 3D PHOTOS

3D Photos with your Phone



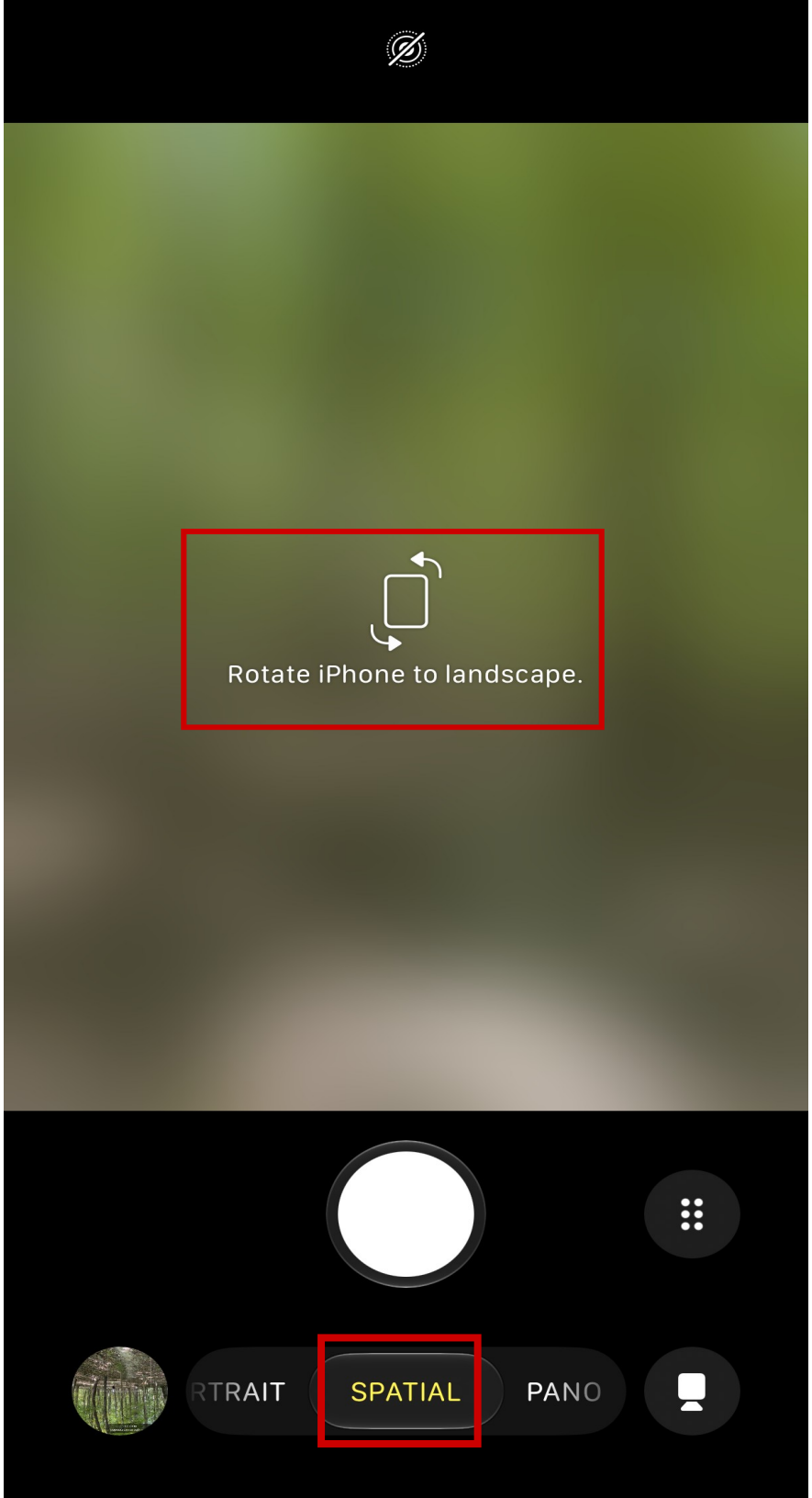
By George Themelis

November 2026

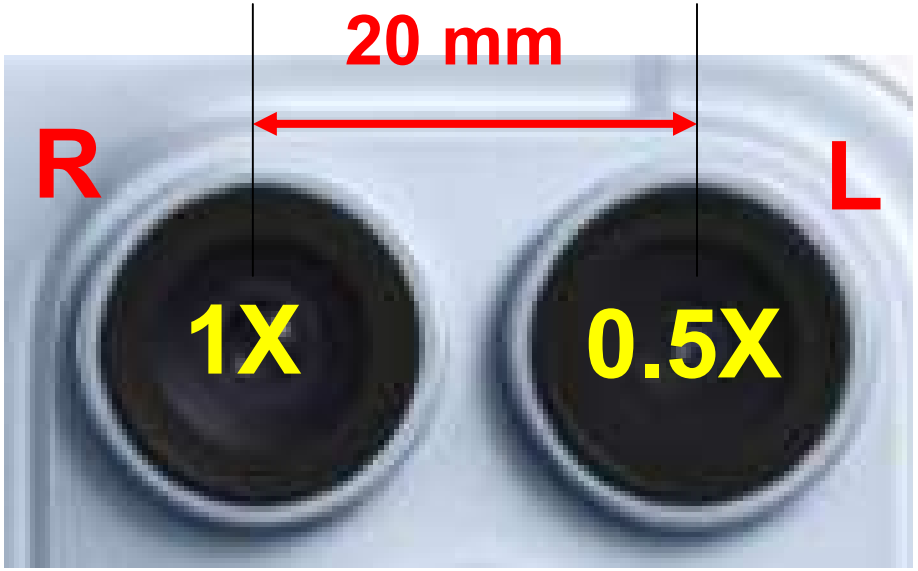
iPhone 18



Setting	*Lens*	*FL*	*f/stop*
0.5X	**Ultra-Wide**	**13 mm**	**f/2.2**
1x	**Main (Wide)**	**24 mm**	**f/1.4-4.0**
2x	Optical Crop of 1x		
4x	**Telephoto**	**100 mm**	**f/2.8**
8x	Optical Crop of 4x		



In SPATIAL Mode, the phone takes **two pictures** using the 1x and 0.5x lenses. It then doubles the size of the 0.5x image and crops it to match the 1x image. The result is a **stereo pair** with **20 mm stereo base**.



Phones Supporting Spatial Photos

The following iPhones support Spatial Photos:

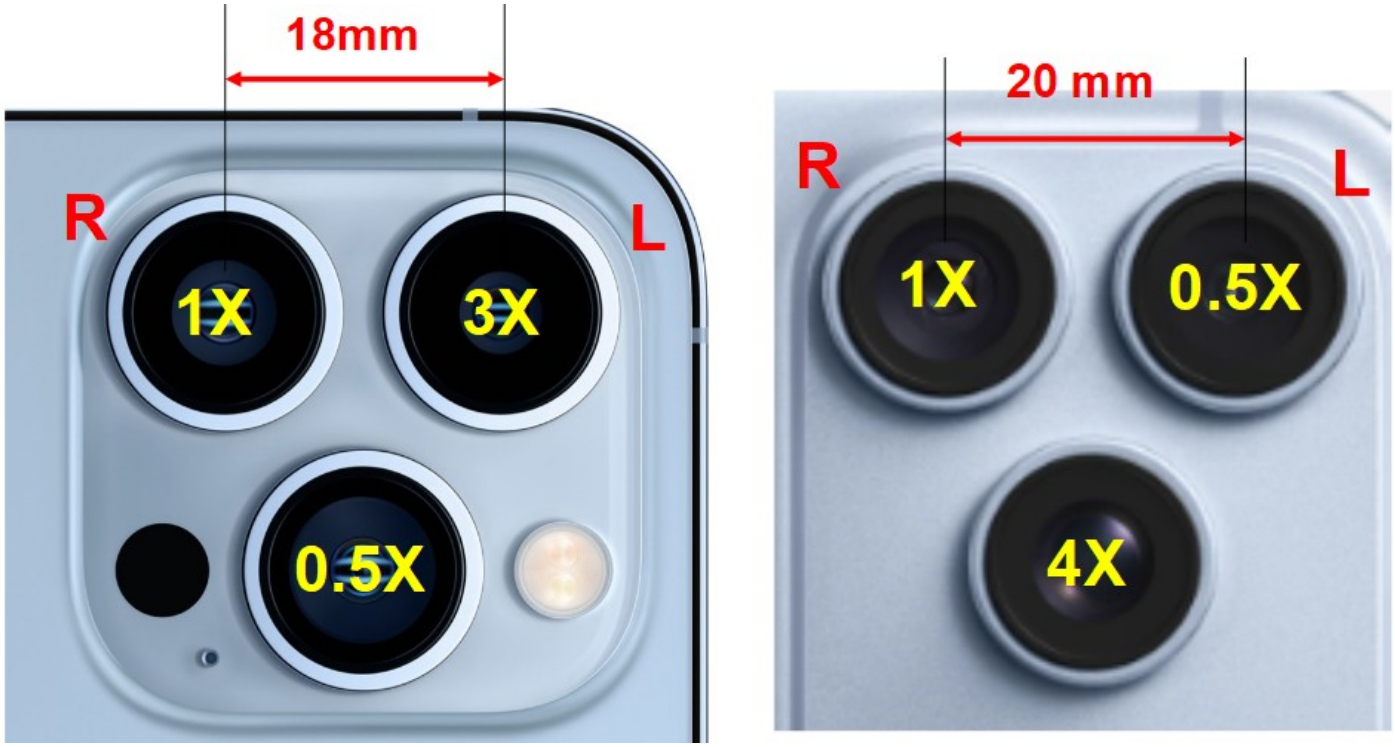
iPhone 15 Pro, Pro Max, iPhone 16, 17 and 18.
These phones require iOS 17.2 for video and iOS 18.1 for photos.

How about Android phones?

"Android is preparing for spatial photos, but full support is still in development and tied to Android XR headsets, with some features already available on select Samsung devices."

Some unique iPhone features (like Live Photos) have been implemented in Android phones, so I think sooner or later Spatial Photos will be available for most Android phones. To check if your Android phone uses Spatial Photos, just google.

iPhone 13 vs. 18

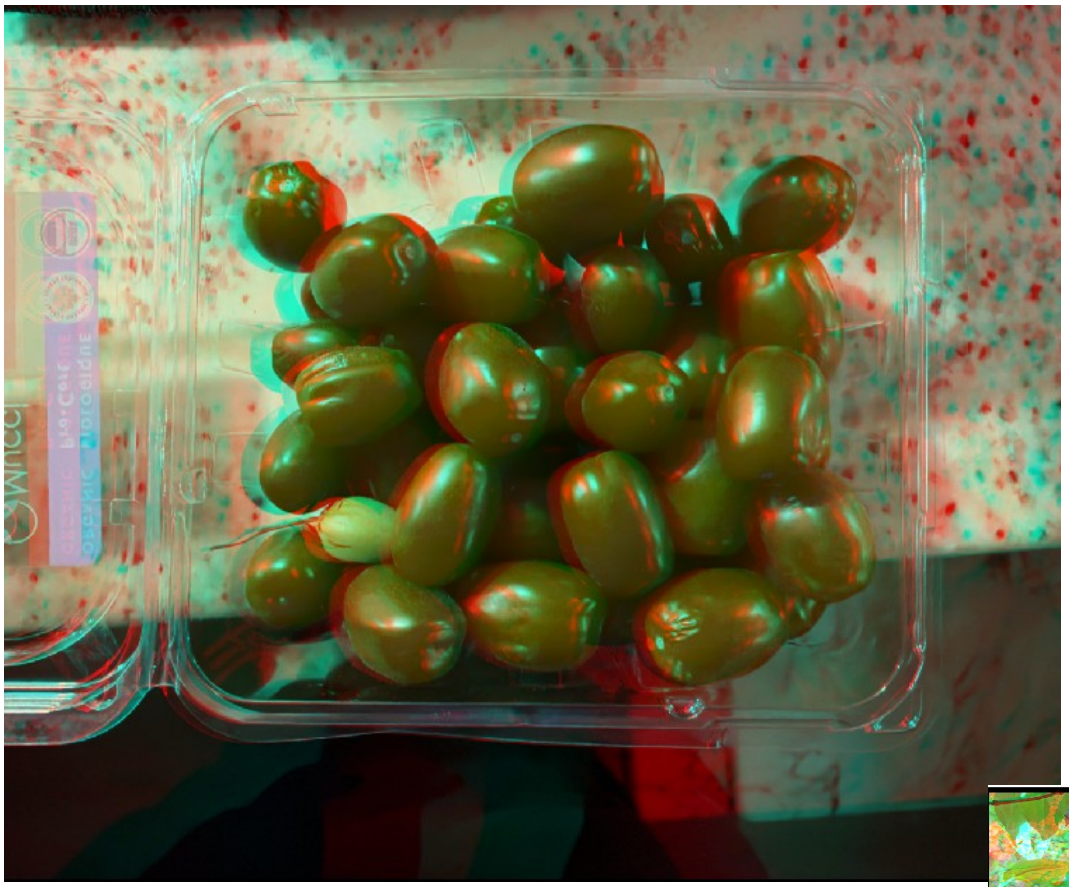


i3DPhotoCam

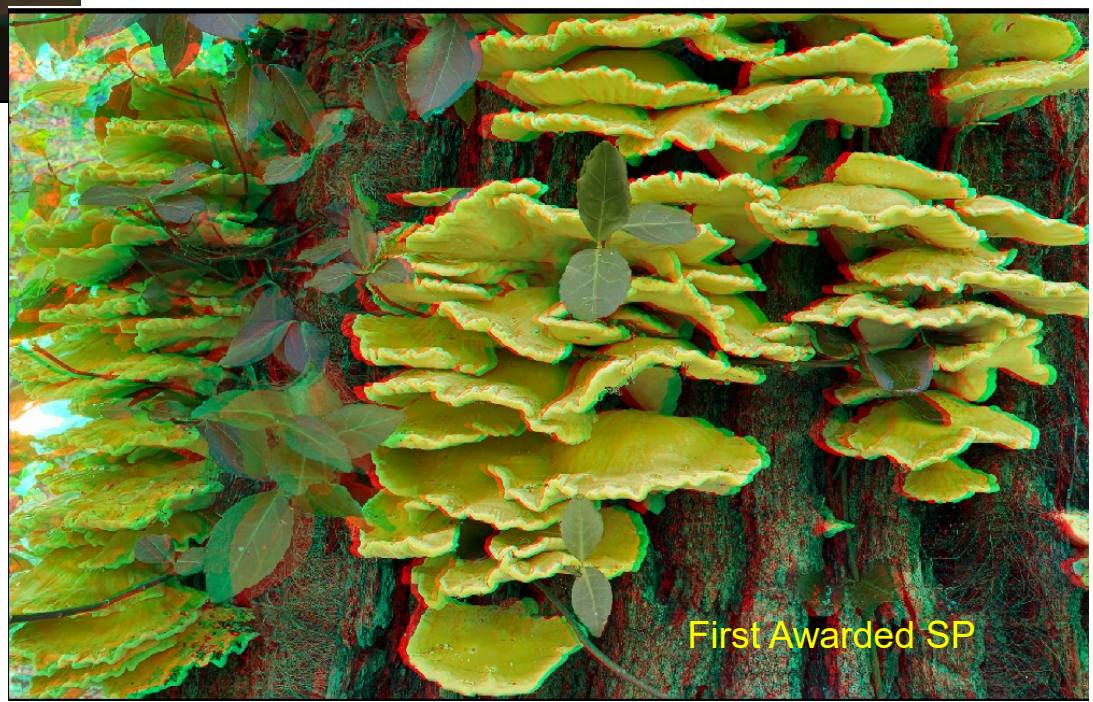
With the iPhone 13 there is an app that will take a stereo pair using the 1x and 3x lenses. This did not work well (1x photo was upscaled to 3x, the result is a telephoto close-up with resolution and DOF problems.

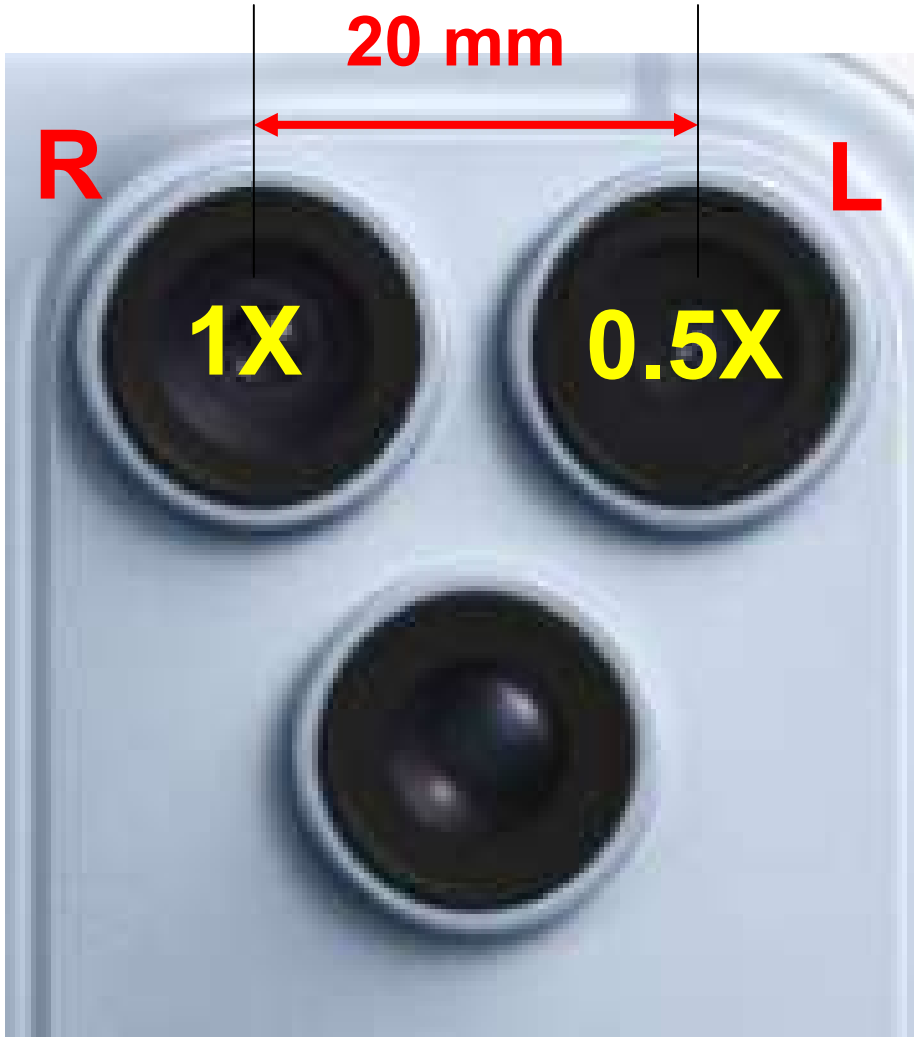
Apple switched the lenses, putting the 0.5x lens next to the 1x and this makes for better 3D pictures. Any phone with similar lens configuration could take similar 3D pictures using an app if it does not have an option for Spatial Photos.

First Spatial Photo with my new iPhone 18









Wait? You are telling me that my iPhone is also a 3D camera?

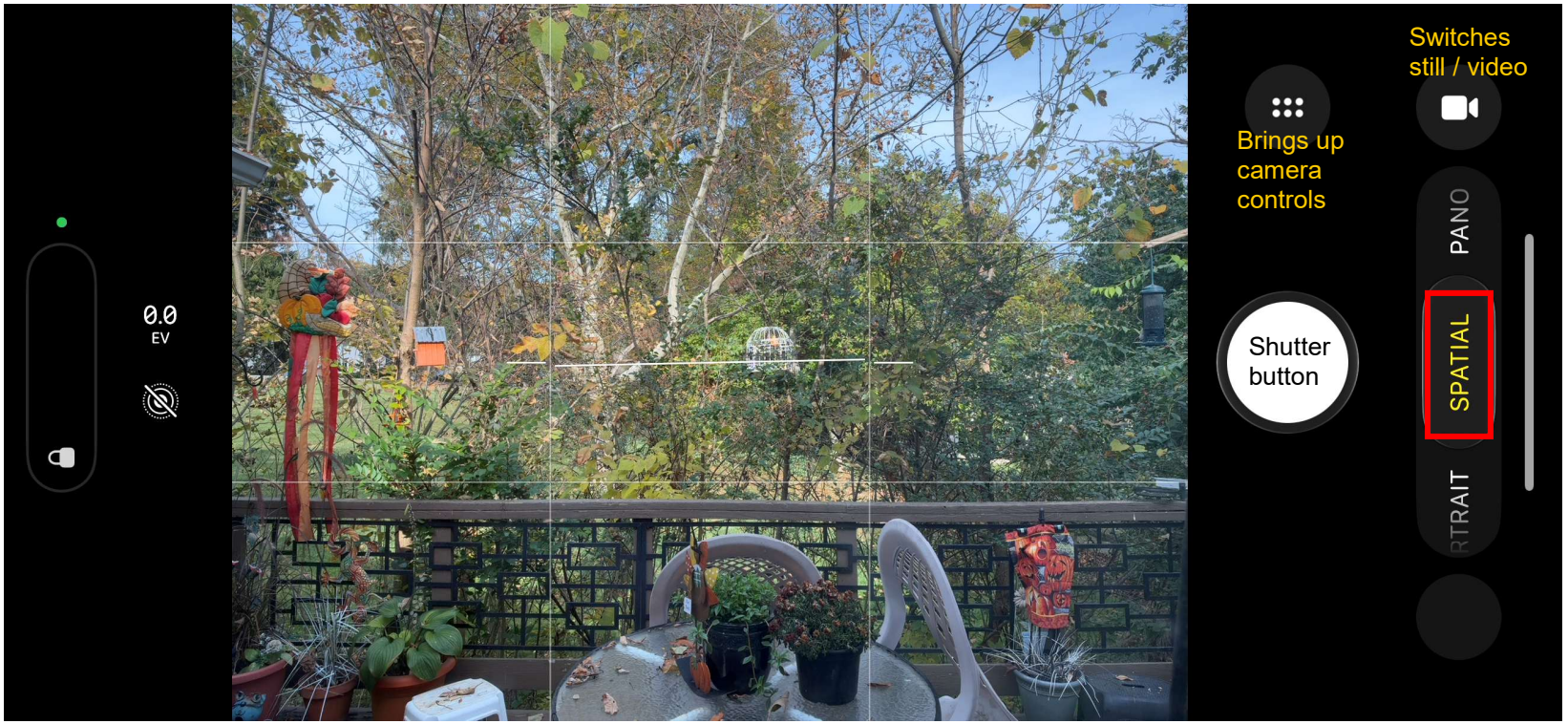
Yes!

It is a stereo camera that you most likely always carry with you and you can use it to take 3D pictures.

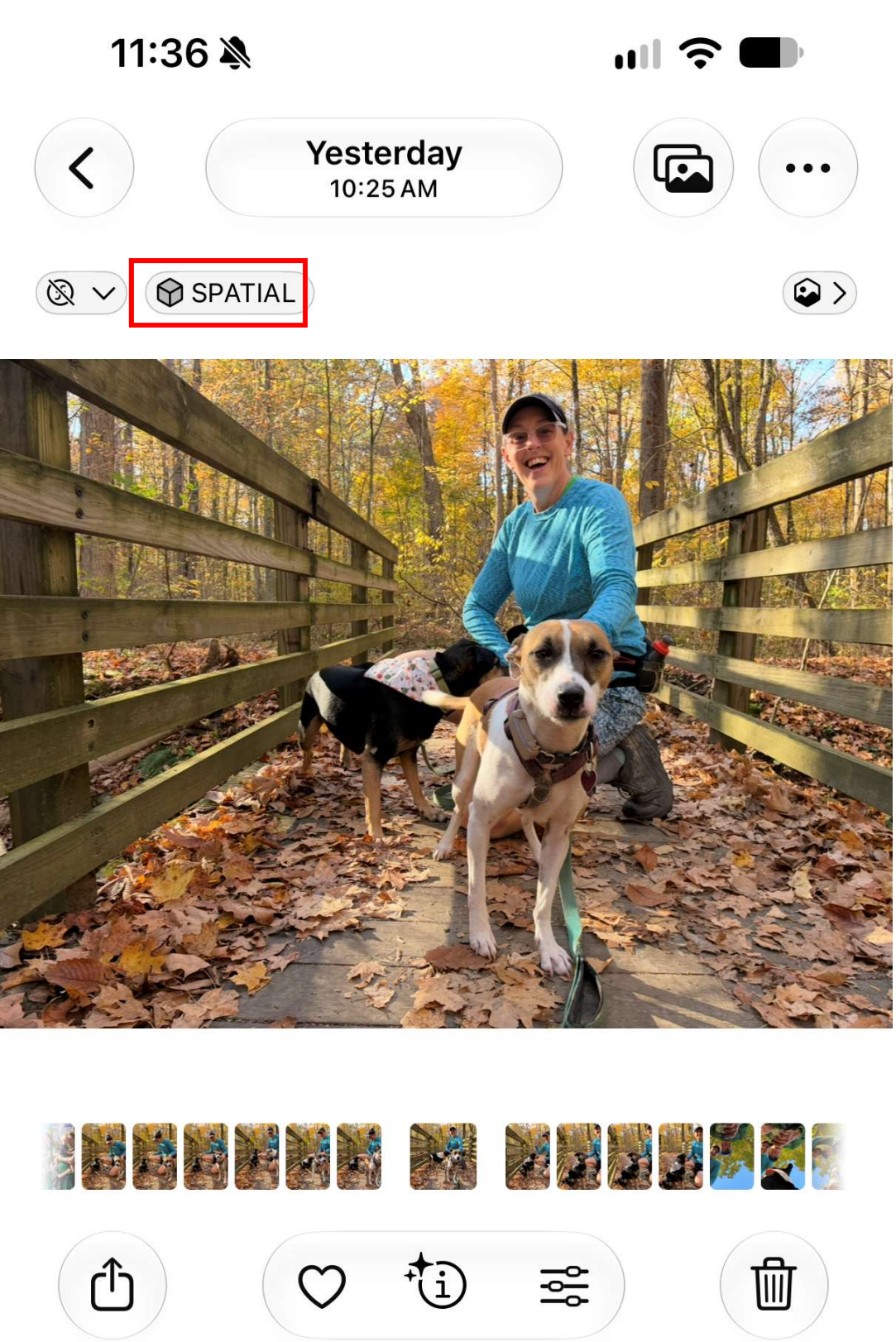
What are the drawbacks?

- **Loss of resolution:** Left image is affected because it is upscaled and cropped.
- **DOF issues:** The DOF from each lens is different; the background from the 0.5x (right picture) looks sharper. This issue is minimized in the iPhone 18 because it can close the aperture (from 1.48 to 4.0) and increase the depth of field.
- **Not a "normal" 3D camera.** With a stereo base of only 20 mm, this is a close-up camera.

How to RECORD a Spatial 3D Photo



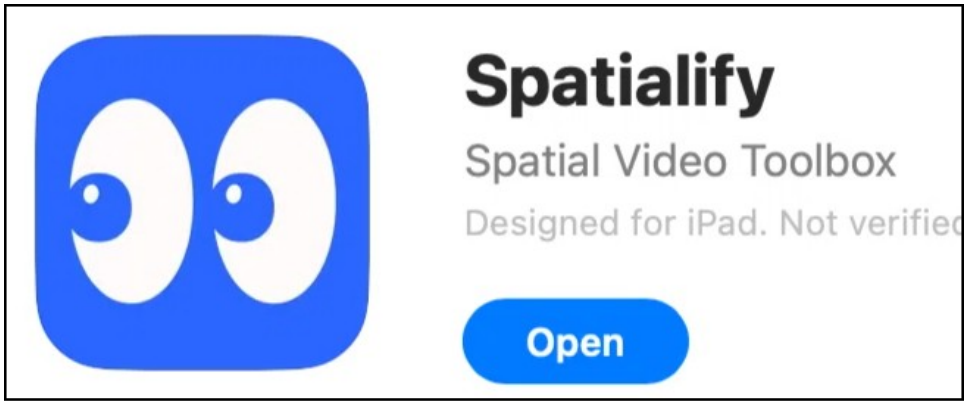
- **Open the Camera app on the iPhone.** Note: some iPhones have a dedicated camera button which will bring up the camera quickly and fire the shutter.
- Swipe below the viewfinder to **select SPATIAL mode.** This is between PORTRAIT and PANO. Often the phone goes back to PHOTO mode so make sure you are on SPATIAL mode.
- Rotate the iPhone into **landscape** orientation and compose the picture.
- **Tap the shutter button** to take the picture. You can also use the camera button, a remote release, an Apple watch, etc.



How to VIEW a Spatial 3D Photo

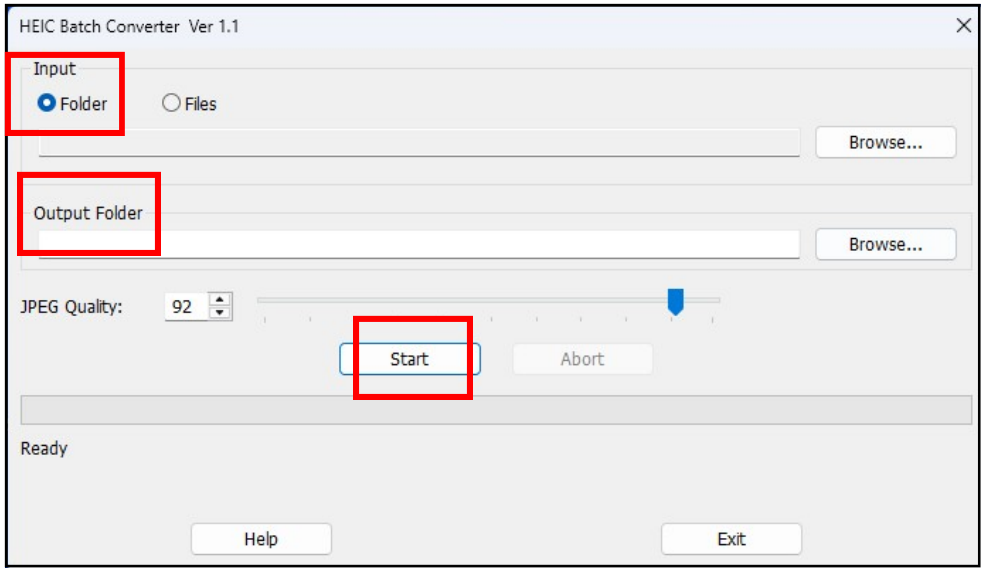
- When you record a Spatial Photo, the phone shows you **only the right (1x) picture**.
- This looks indistinguishable to any other picture, **except for a little marking** on the upper let corner “**SPATIAL**”
- The actual image file is in **HEIC format**. An HEIC file is a “high-efficiency image container” file format used primarily by Apple devices to store high-quality photos in smaller file sizes. A single HEIC file can store multiple images, making it suitable for live photos or bursts and Spatial photos. The idea is similar to the **MPO** files/format.
- To view a Spatial Photo, Apple suggests to use the **Apple Vision Pro**. I work with side-by-side images which I view on my computer 3D screen, 3D TV, and other viewing methods. So **I need to convert the HEIC spatial image files to side-by-side JPG files**.

How to VIEW a Spatial 3D Photo



To convert the Spatial Photo to a side-by-side 3D pair, I use an app called "**Spatialify**." It costs $2.99 and it is well worth it. I use this in the field if I want to check out the 3D effect.

Batch Conversion is possible using a **HEIC Batch Converter**. This is a program offered by **Masuji Suto** (the creator of SPM and other useful programs). It is a very compact utility very simple and fast to use.



My routine after I come home from a photoshoot:

1) Connect my Apple phone to my Windows computer with a USB cable.
2) Copy the images that I shot that day to a computer folder.
3) Run the HEIC Batch converter to convert all the Spatial photos to side-by-side JPG files.
4) Use SPM to view them and edit them.

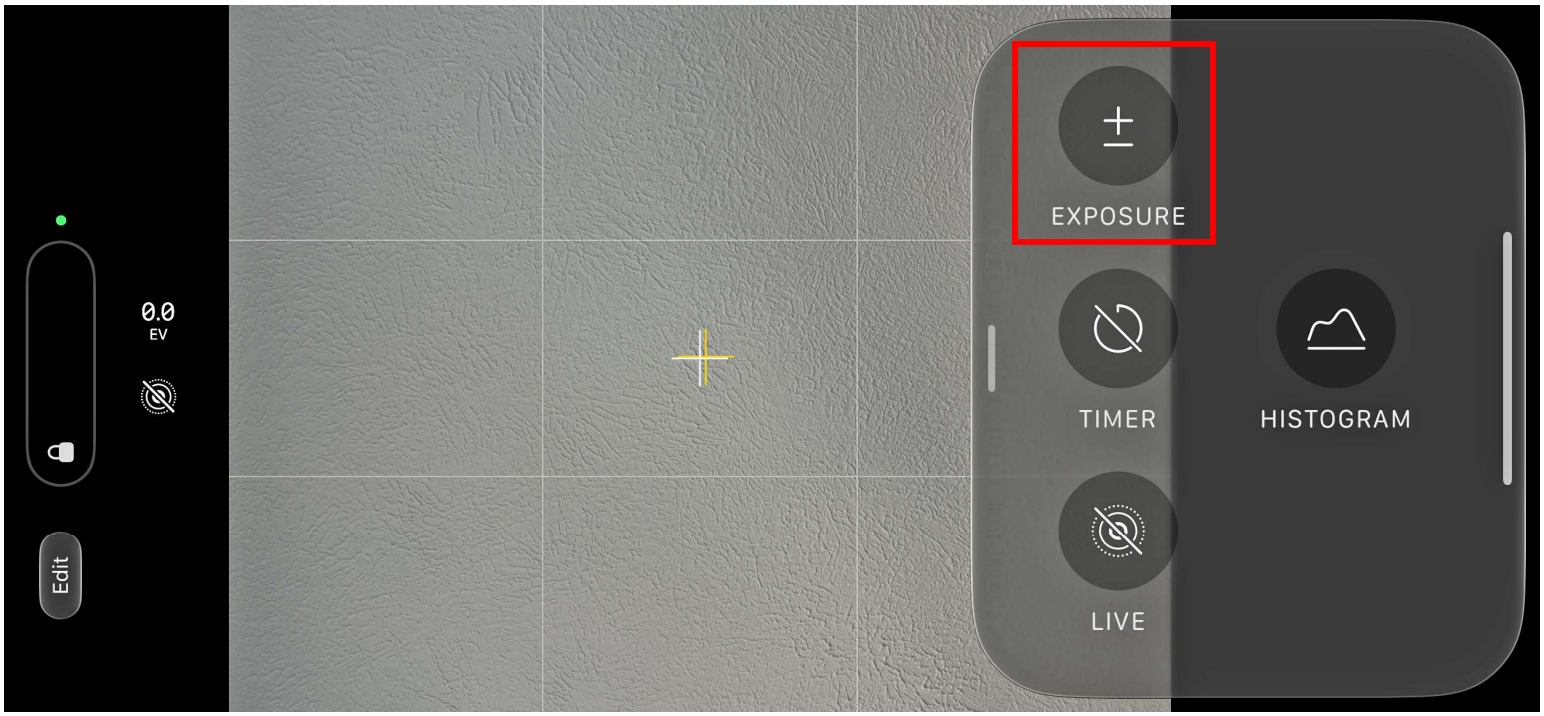
There are other ways to view Spatial Photos without converting them to side-by-side or using Apple's Vision Pro, but I do not have any experience with these.

Camera Controls

PHOTO Mode



SPATIAL Mode



Spatial 3D Photos

- What is a Spatial Photo
- How to Record a Spatial Photo
- How to View a Spatial Photo
- How to Compose a Spatial Photo

SPATIAL 3D vs. Other 3D Cameras

Camera /Lens	*Stereo Base*	
Panasonic 3D lens	**10 mm**	
iPhone SP	**20 mm**	
Panasonic 3D1	**30 mm**	
XREAL BP	**50 mm**	
Fuji W1/W3	**75 mm**	

When evaluating a stereo camera, I take into account two things:

1) Stereo Base

2) Focal length

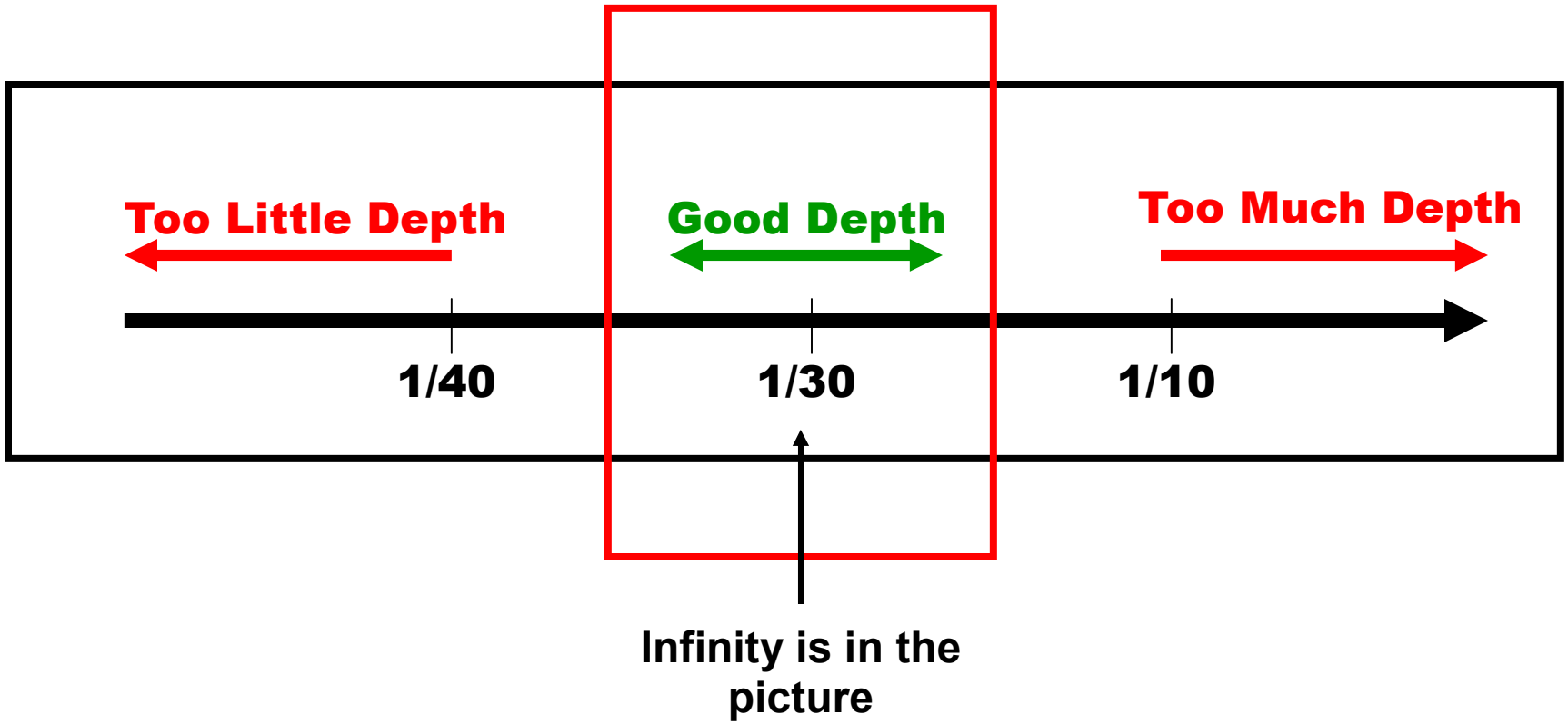
The focal length is around 24-35 mm for most stereo cameras *(the XREAL Beam Pro is an exception, with a much wider FL)*.

This leaves the **Stereo Base as the most important variable** that will determine how the stereo camera is used.

Looking at the Table here, the iPhone SP with 20 mm stereo base fits nicely between the Panasonic 3D lens (10 mm) and the Panasonic 3D1 camera (30 mm).

This stereo base (20 mm) is too narrow for everyday normal photography but it is **well-suited for close ups**.

How Close can I get to the subject?



My rule of thumb:

1/30 - If Infinity is in the picture

1/20 - 1/15 - If it is a close up

1/10 - Limit of close up

Depth Range for SPATIAL Photos

Camera /Lens		Stereo Base	Near Distance
Panasonic 3D lens		10 mm	0.3 m *(1 ft)*
iPhone SP		20 mm	0.6 m *(2 ft)*
Panasonic 3D1		30 mm	0.9 m *(3 ft)*
XREAL BP		50 mm	1.5 m *(5 ft)*
Fuji W3		75 mm	2.2 m *(~7 ft)*

A rule of thumb is that the distance of the lenses / recording points should be ~ 1/30 x distance to the near subject.

For a 3D cameras with a fixed stereo base (distance of lenses), this gives: **Near Distance ~ 30x Stereo Base**

This near distance assumes that **there is infinity in the picture**. If there is no infinity, then we are talking about a close-up.

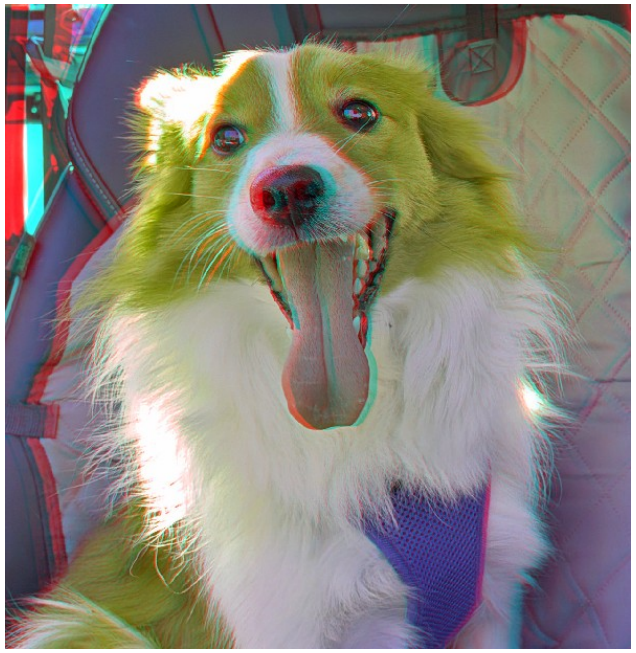
For a close-up, we can get closer. How close depends on how much depth the subject has.

My rule is that one could get about **1/2 as close** as if infinity was in the picture. For the Spatial Photos, this is then 0.3 m (1 ft, 12 inches). I have taken close-ups as close as 6-8 inches.

Good SUBJECTS for SPATIAL Photos

- Portraits
- Selfies
- Pets & other animals
- Many nature close-ups
- Close-ups in general







TIPS for better SPATIAL Photos

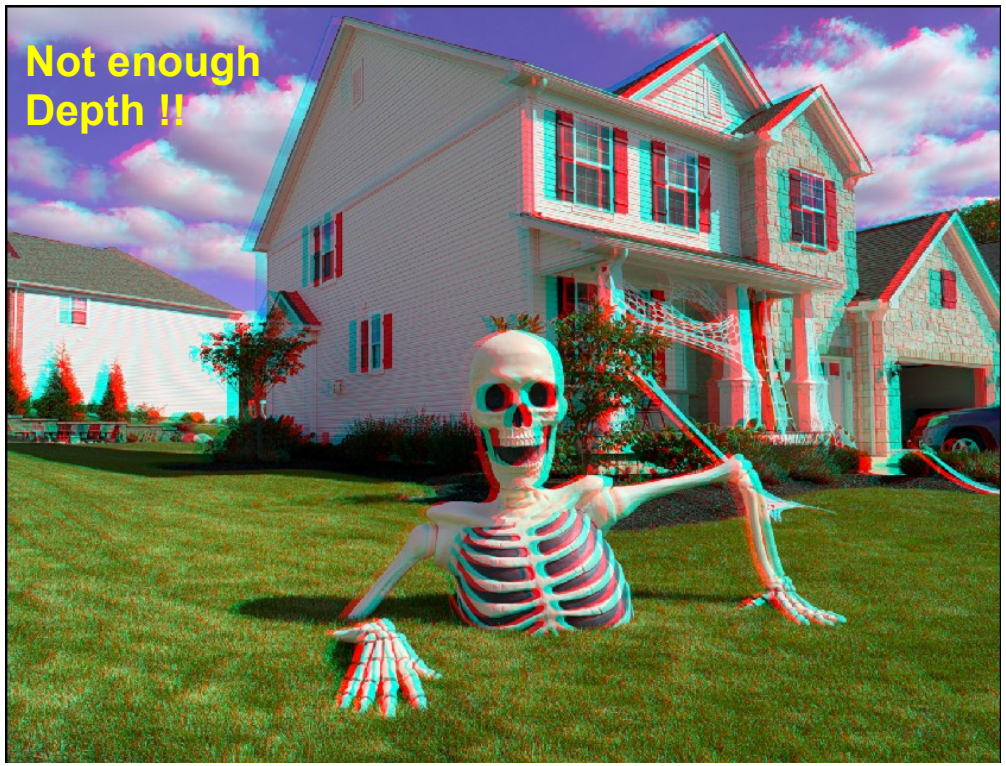
Warning messages





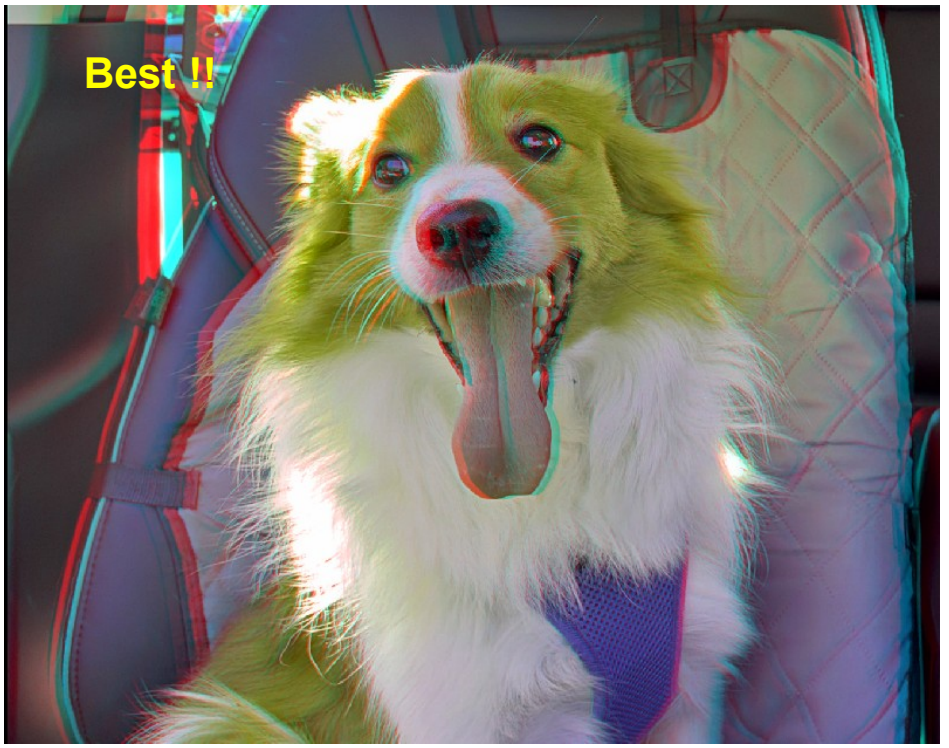
- Keep the camera horizontal and leveled
- Look for **good light**. Experiment with external sources of light (usually LED lights)
- Frame the subject to **include foreground, middle ground, and background**. This is good advice in general, but even more important for a camera with a short base.
- Make sure the **near object is close enough** to the camera (2 ft or less).
- For close-ups (no infinity) you should **come closer** (8-12 inches). Make sure you frame the subject symmetrically.
- Experiment by **varying the distance to the subject**. The distance is the most important variable when using 3D cameras with a fixed stereo base.
- Use **exposure compensation** if the picture looks overexposed (details lost in highlights)
- Experiment with varying the **angle of the picture**. Certain angles (looking directly down, for example) do not work very well in 3D. It is better to look straight or slightly up.

Compositions for Good Depth







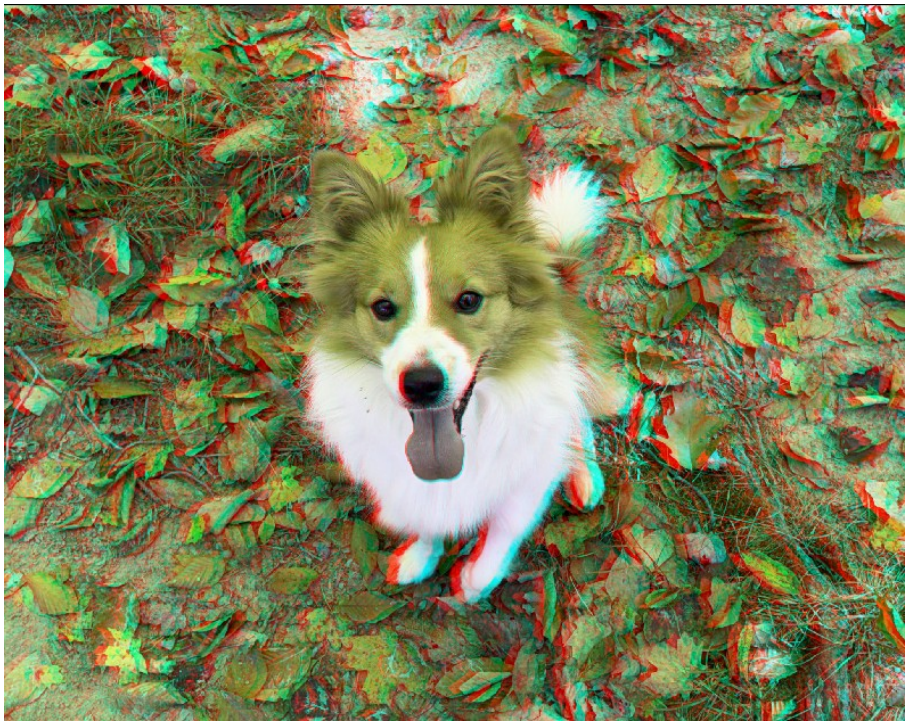


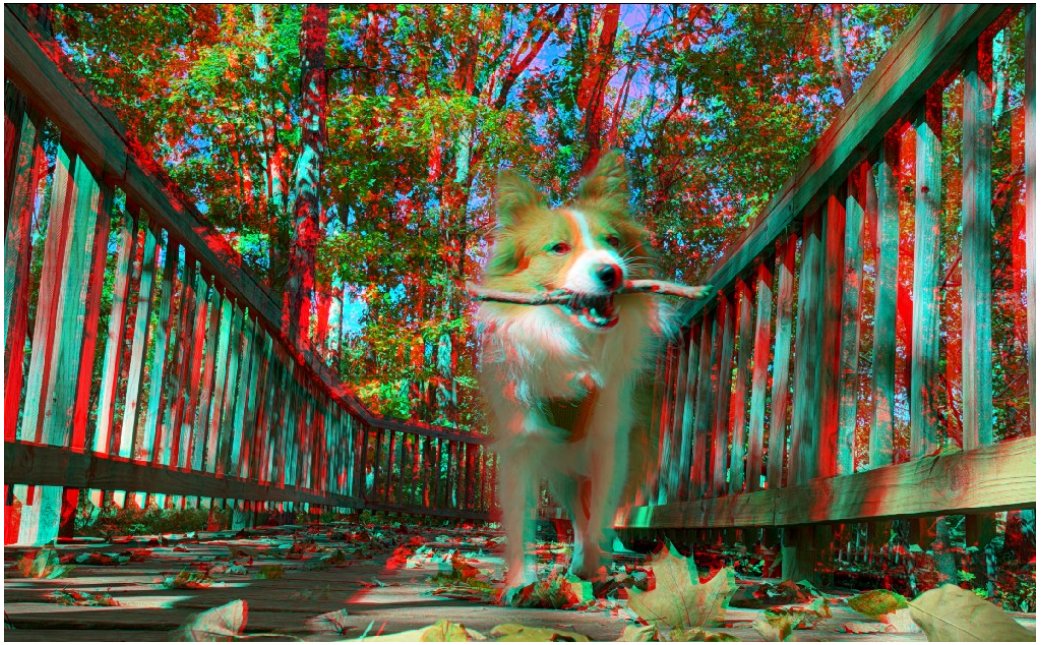
Variety of Subjects Impossible with other cameras

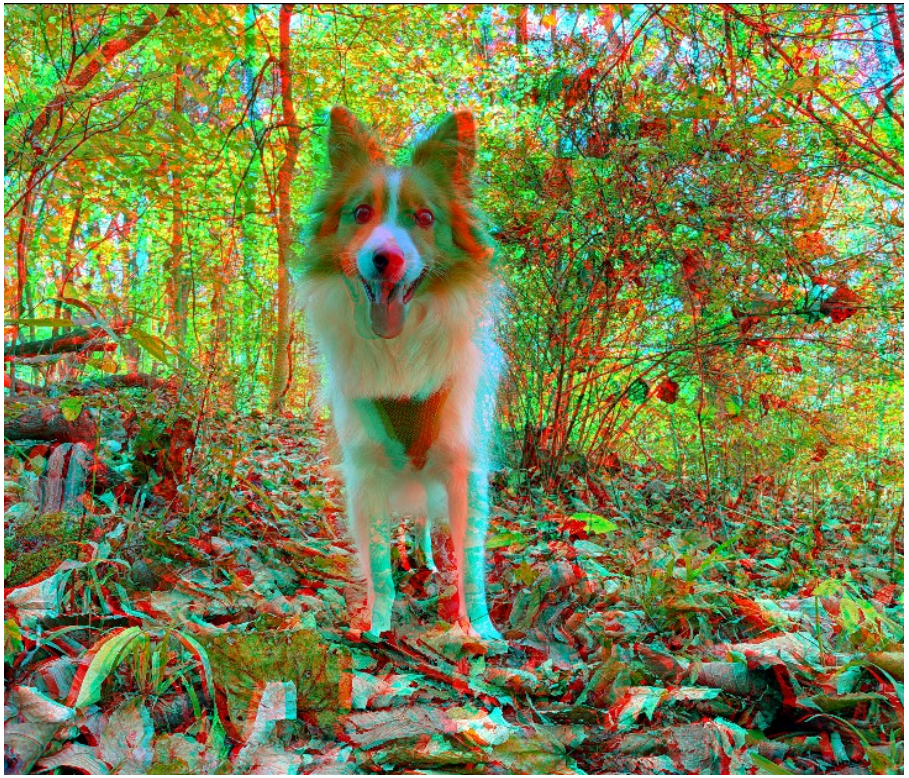


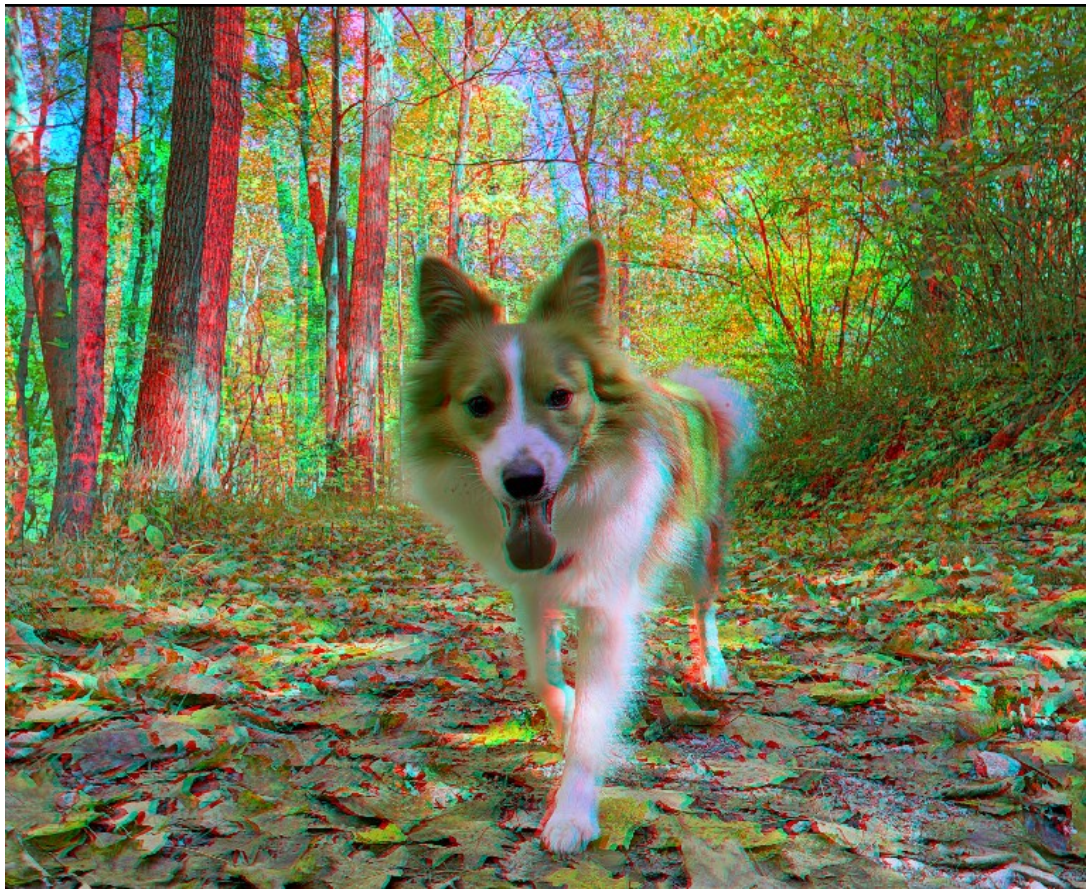


Angle of View (better low & straight)



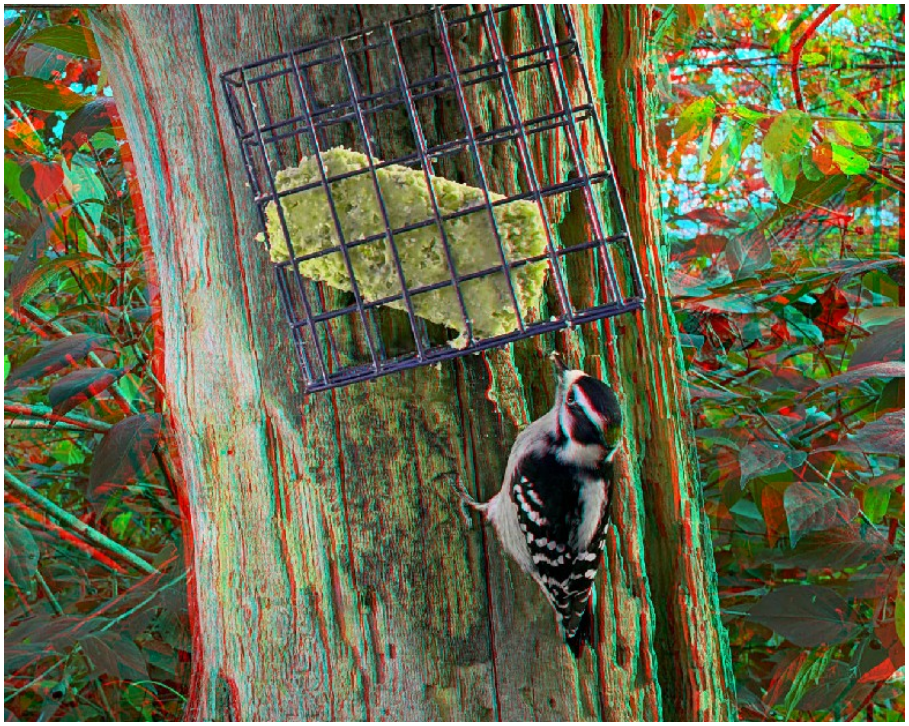






Good Light or Light Control









3-page Tutorial Article from 2017. Selfies in 3D are a lot harder than 2D.
Stereo base and distance are important

How to take Selfies in 3D



By George Themelis

Selfie?

Selfie is a self-portrait photograph. It is usually taken with a digital camera or camera phone, held at arm's length (or supported by a selfie-stick) and often shared on social networking sites (Facebook, Instagram, etc.).

I first became aware of selfies (not called selfies at the time) from a Shutterbug magazine article, sometime in the early 1990s. A photographer was taking a picture of himself in every place that he visited. I thought it was a cool idea.

According to Wikepedia, the oldest selfie dates from 1839 when Robert Cornelius, an American pioneer in photography, produced a daguerreotype of himself. Because the exposure was very slow, he was able to uncover the lens, run into the shot, then run back and replace the lens cap. With the advent of the Kodak Brownie box camera, selfies became more widespread and usually involved using a mirror. Selfies flourished in the 1970s with the instant cameras, a practice that transitioned naturally to digital cameras.

The word selfie first appeared in 2002. Selfies became popular in the early 2010s with photo apps such as Instagram and Snapchat and better mobile phones. In 2012 Time magazine considered selfie one of the top 10 buzzwords. In 2013 it entered the Oxford English Dictionary and in 2014 it was accepted for use in Scrabble. My computer programs however still do not recognize this word.

Selfies in 3D

Like a lot of pictures, selfies are easier to do in 2D than 3D. The main issue is **excessive stereoscopic deviation**. A normal camera with stereo base around 60-75mm will produce excessive deviation if it is too close to the face (**Fig. 1**). These portraits also look unflattering because they show stretch under most viewing conditions.

Fig. 2 shows what I think is a fun vintage Stereo Realist selfie. Most film stereo camera selfies however were taken with the camera on a tripod, using a cable release or self-timer. These are

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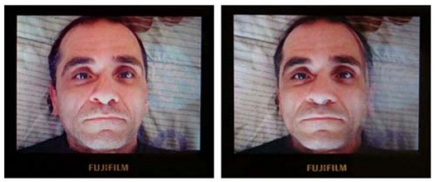


Fig.1: *Early Fuji W1 selfie. (I took this picture by photographing the camera's display.) It demonstrates the excessive stereoscopic deviation. Also, it shows "stretch" under normal viewing conditions. [From Stereogram 14.03]*



Fig. 2*: This charming 1960s stereo pair titled "9 heads, no bodies" was published in Stereogram 5.4 (Dec. 2000) with this comment: "As-recorded, this picture can even be viewed upside down (try it!) and it still makes sense!" It is also an example of an early Stereo Realist selfie. My guess is that the photographer is the gentleman at the bottom and the camera (with flash) was fired using a self-timer.*



Fig 3*: Fuji W1 selfie taken the first hour of using the camera that Jay gave me to review (Stereogram 14.02, Oct. 2009). The caption reads: "An easy-to-use camera encourages experimentation. Here I took this picture of myself in the bathroom. I am shooting facing a mirror. There is a second mirror in the back, tilted to create a long row of reflections."*



Fig. 4*: Selfie from the first day with the Panasonic Lumix 3D1 camera. I comment: "This is the first stereo camera I have used that can take good self-portraits, thanks to the combination of short base and wide angle lens." [From Stereogram 16.7 (March 2012)]*

(Continued from page 4)

self-portraits and not selfies in the way we normally use this term today (i.e. with the camera at arm's length and including some distant background).

A stereo camera with shorter lens spacing would have been more appropriate for selfies, but there were very few film stereo cameras like that. I only know of the rare ISO Duplex Super 120 Italian camera, and the (expensive) Horseman 3D camera, both with 30mm lens spacing. Even though I owned a Horseman, I do not recall shooting a selfie with it.

Things are better today with digital stereo cameras that encourage experimentation and also have a narrower lens spacing and wider field of view.

Digital cameras for Selfies

1) Fuji W1/W3 (lens spacing = 75mm). I am sure most Fuji users at some point turned their camera around to take a selfie. I did this in my first hour with the camera (**Fig. 3**). Considering that the camera has a lens spacing that is wider than the Realist, it is not exactly appropriate for selfies. Nevertheless, the pictures look OK, mostly fun, when viewed in smaller displays, like the back of the camera or a small computer monitor.

2) Panasonic 3D1 (30mm): This, for me, is the ideal selfie 3D camera because of the combination of short stereo base and wide angle lens. I mentioned this in my first review of the camera (**Fig. 4**). According to my calculations, some of the best close-ups with this camera are taken from 24 inches away (0.6m) and this is about the distance of the extended hand from the face, making the camera perfect for selfies.

3) Panasonic 3D Lens (10mm). This is a 3d lens that can be used with Micro 4/3 digital cameras made by Panasonic and Olympus. Despite its short (perhaps too short) stereo base, this lens is not very appropriate for selfies because of the narrow angle of view and small fixed f-stop. Even though the focal length of the lenses is 12.5mm, the field of view corresponds to about a 70mm full frame camera lens, so the Panasonic lens is more like a portrait (medium telephoto) lens and not wide angle. The small f-stop requires the use of flash in most situations, which does not make good

(Continued on page 6)



Fig. 5*: Gallery of Selfies: Top Row pictures are taken with the Fuji W3. Notice excessive deviation and stretch especially in the left picture. Middle row pictures were taken with the Panasonic Lumix 3D1. Less deviation and stretch, thanks to the smaller stereo base (30mm vs. 75mm for the Fuji). Bottom Row left: Taken with a maacrobox and a stereo base of 20mm. Bottom Right: Taken with the Aiptek, an early phone-like video camera with lens spacing of 40mm. (I used this camera, here while running, before the Panasonic 3D1 came out - see Stereogram 15.01).*


dirty
TRAIL SERIES
Sunday, June 25
dirty trail series



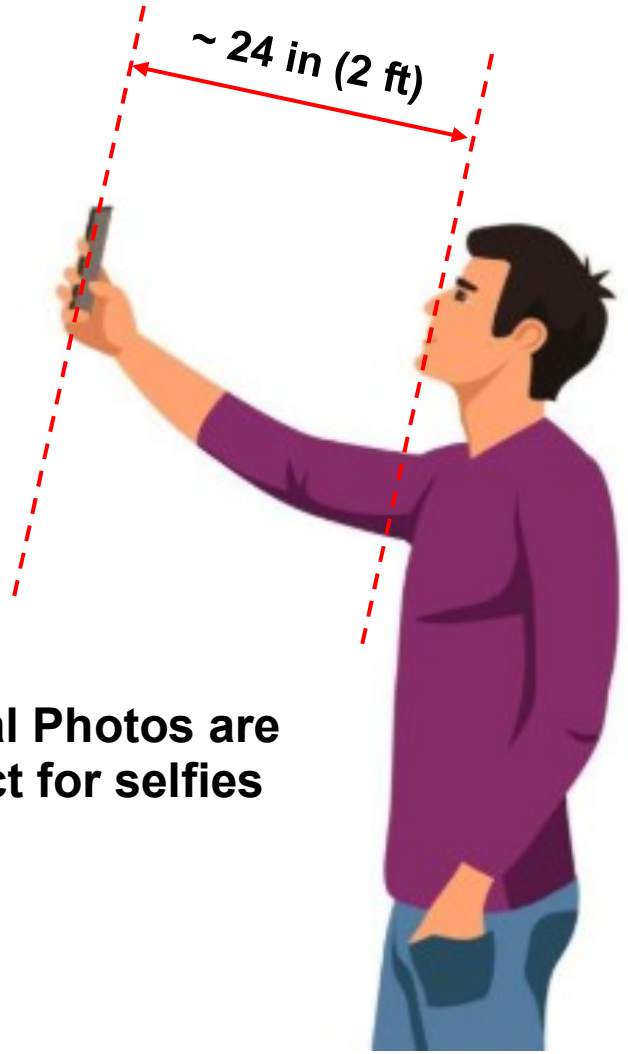

Ursula's
50th



SPATIAL Selfies

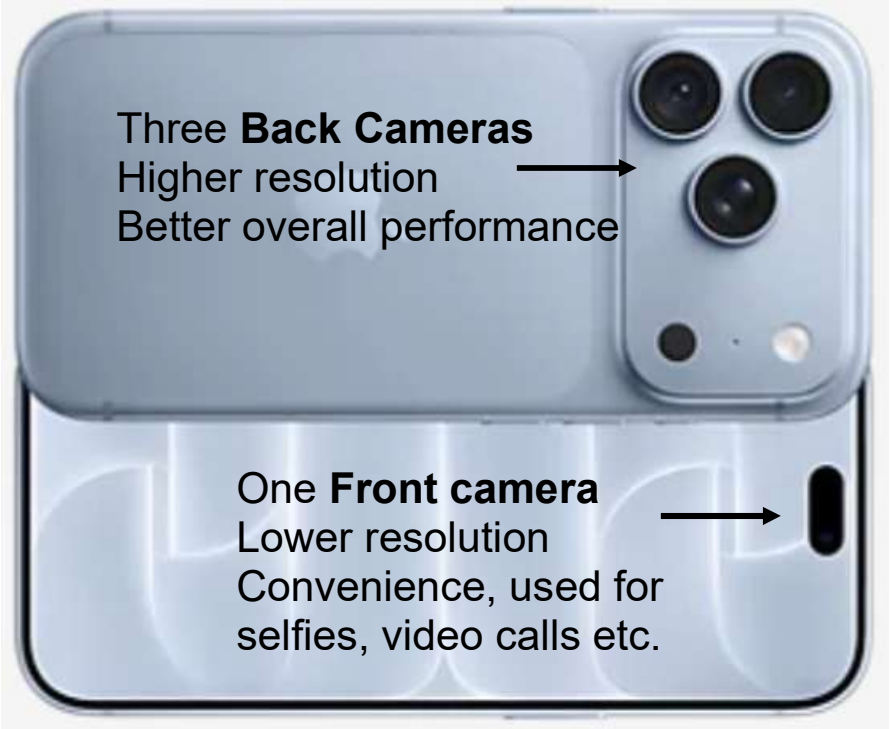
Optimal Phone-to-Face Distance for a Selfie:

For the most natural proportions and minimal distortion, hold your phone about 24–30 inches (60–75 cm) from your face — with 26 inches being the "sweet spot" for many modern front cameras.



Spatial Photos are perfect for selfies

Front vs. Back Cameras



For Spatial Selfies we have to use the back cameras. Two issues:

- How to compose without seeing the screen
- How to fire the shutter

SPATIAL Selfies



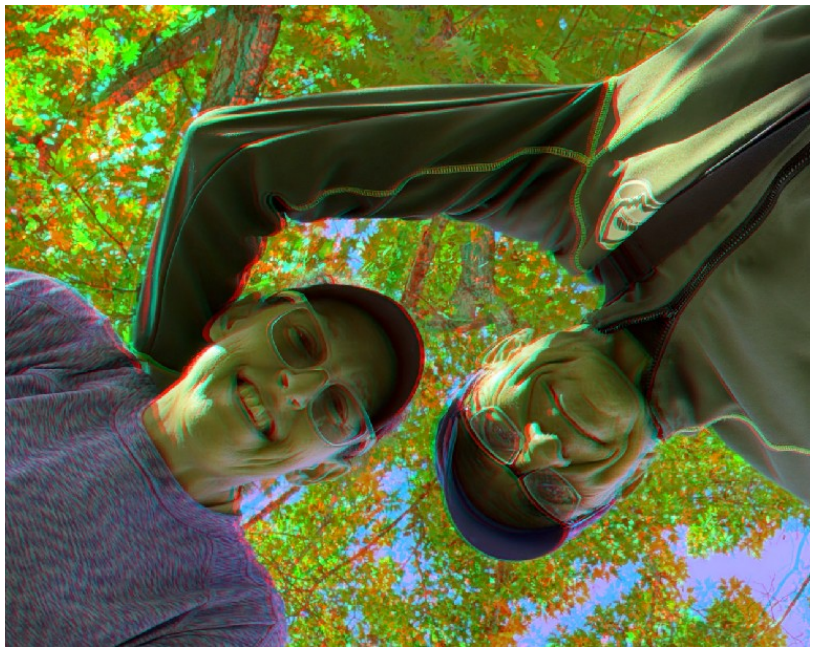
How to Compose:

- Take your chances ($0)
- Use a (magnetic selfie) mirror ($10)
- Use an external monitor ($25+)
  (These can have more uses than just selfies)



How to Fire the Shutter:

- Use the camera button (if available)
- Use the volume buttons
- Use a BT remote shutter release
  (these work by accessing the volume buttons)
- Use an external monitor



Note: If you have an Apple Watch, you can use it as an external monitor.

Is the Honeymoon Over?

One week with the iPhone 18, I used it during a Half Marathon race.

It did not go very well. A number of issues:

- **NO DEPTH!** No matter how close I went to other runners, the pictures look painfully flat. The only pictures that were not flat are selfies.

People Photography: Because of the narrow base SP are not a good choice for a group of people, street photography, etc. They are better for tight portraits and selfies.

- **Motion blur**. Spatial Photos do not freeze motion well.

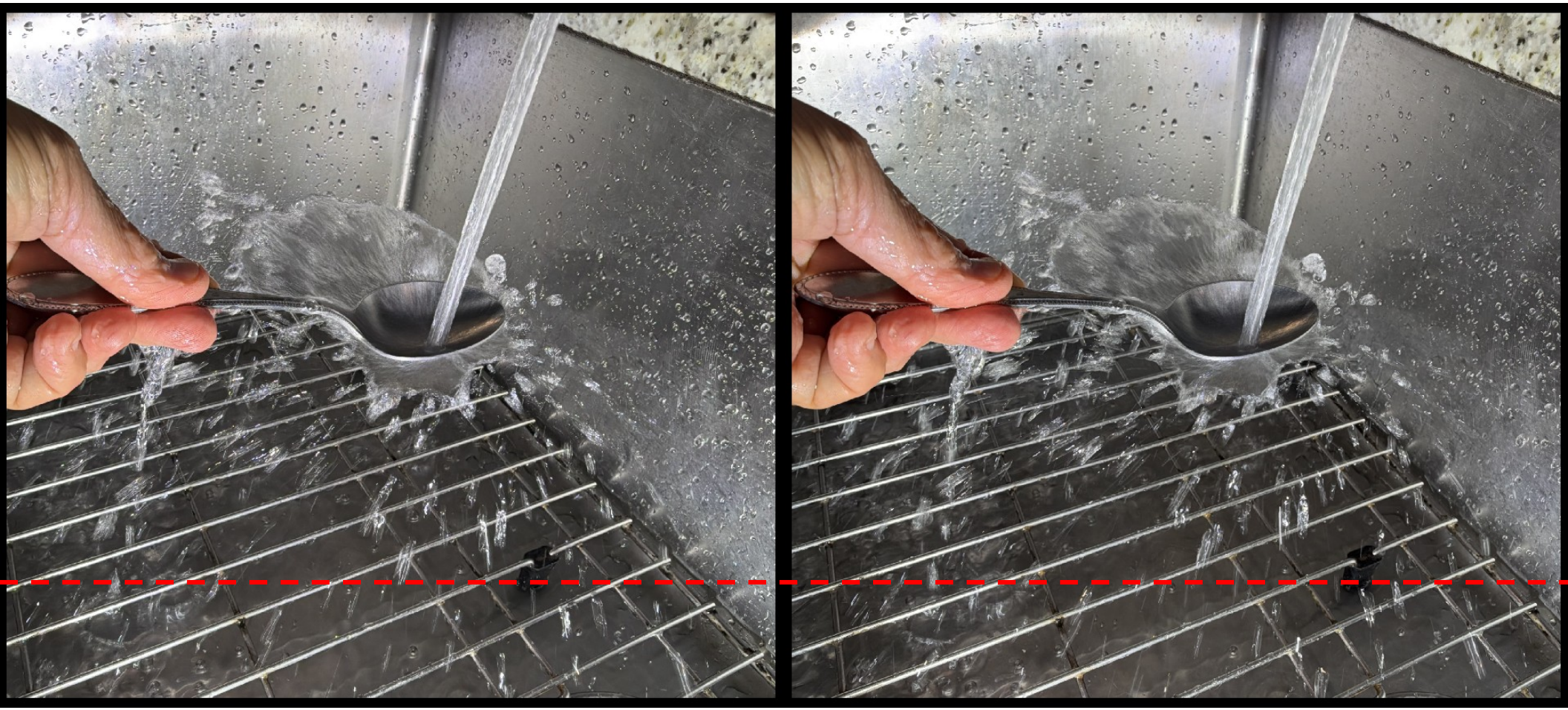
- **SYNC errors!** I really expected the pictures to be perfectly synchronized, but they are not.

Space Zone	Distance	Who it is for
Intimate Space	**0 to 18 inches** (0 - 45 cm)	Romantic partners, children, close family, and pets.
Personal Space	**1.5 to 4 feet** (45 - 122 cm)	Friends, colleagues, and casual conversations at social events.
Social Space	**4 to 12 feet** (1.2 - 3.5 meters)	Acquaintances, strangers, and formal or professional interactions.
Public Space	**12 feet and beyond** (3.5+ meters)	Public speaking, classrooms, and large audiences.

Bottom Line: I will use my phone for selfies before and after the race, but for everything else, I am better off using the XREAL Beam Pro or my twin Sony cameras.

But: For close ups of nature, dogs, cats, selfies, flowers, and a bunch more subjects that **don't move fast**, and **can be approached closely**, Spatial Photos might be just what the doctor ordered.

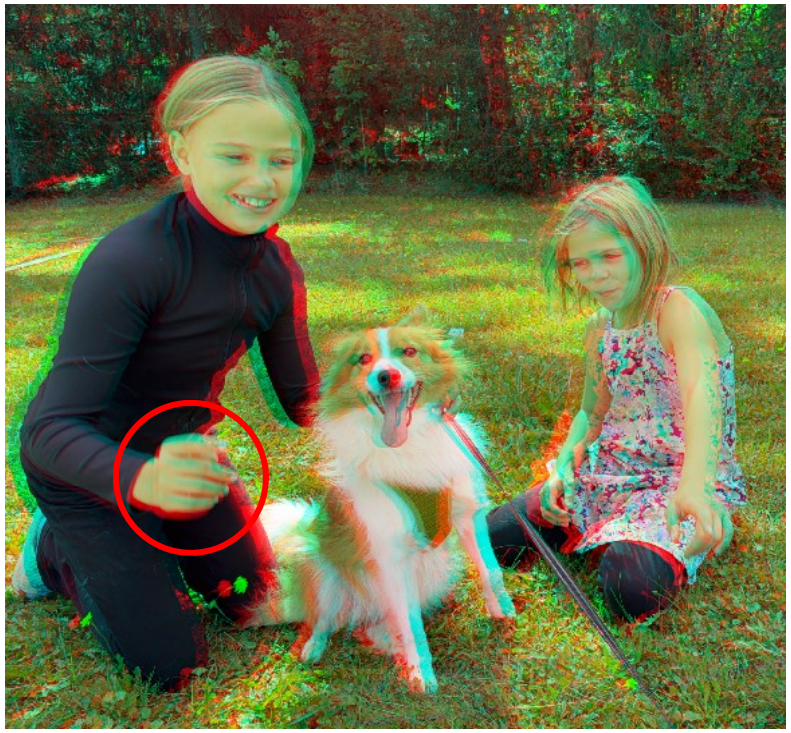
Motion blur and mis-synchronization



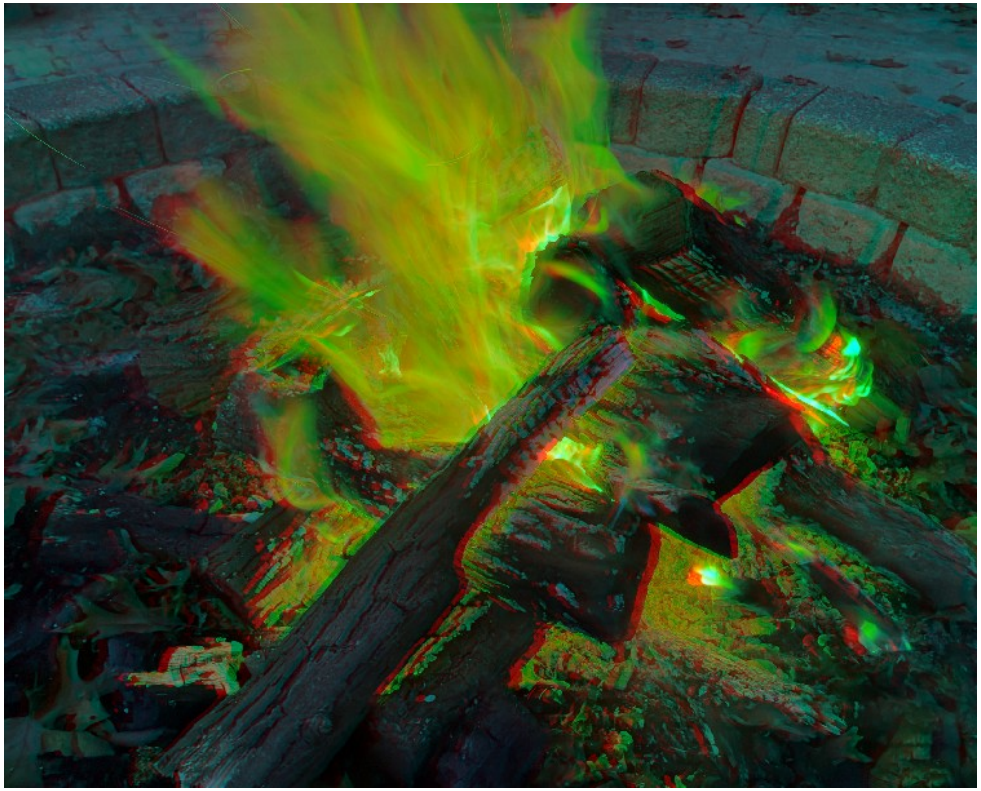
Motion Blur & Sync Errors

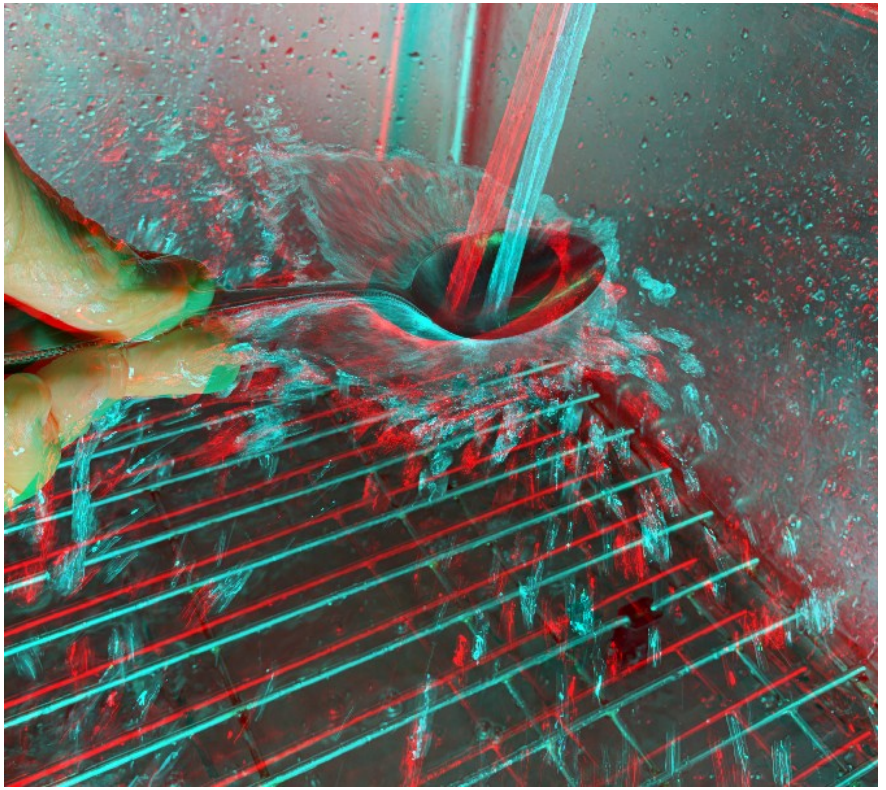
Aperture (f-stop)			
1.4	2.0	2.8	**4.0**
Shutter speed (1/s)			
1000	500	250	**125**

In SP the aperture of the 1x lens closes from f1.4 to f4.0, that's a **loss of 3 stops of light**. To compensate, the speed needs to be reduced by 3 stops. The slower shutter speeds contribute to **motion blur**.



I have noticed that sync errors and motion blur go together. I have no explanation for this observation.





IMPROVING SPATIAL Photos

1. SPM: Crop and adjust stereo window

The pictures are **perfectly aligned** but **the stereo window is at infinity** (*just like the XREAL Beam Pro*) so it needs to be adjusted.

I use the arrow keys to adjust the window **-** (**R arrow** moves subject back / window forward) then save.

2. Photo Editing

As Recorded (Window at Infinity)



Window fixed (hitting R key a few times)



Photo Editing

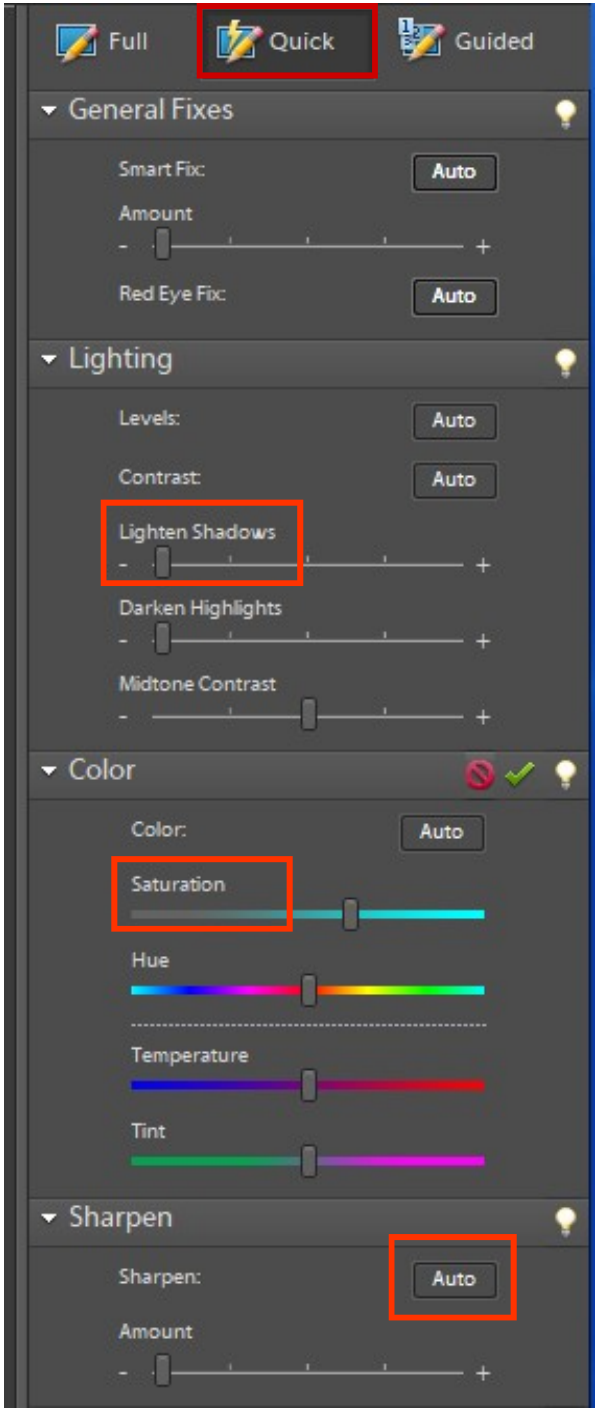
SP lack saturation

In Photoshop Elements I use these three controls:

- **Lighten Shadows**
- **Increase Saturation**
- **Sharpen**







In Conclusion

- **Spatial Photos** have **limitations**. They are only good for **close-ups** and tend to show **motion blur** in low light and **synchronization errors**.

- Despite these issues, they can potentially take some **very interesting** and **creative** 3D pictures. **The stereo base of 20 mm is very well-suited for a number of subjects.**

- The best thing about Spatial Photos for me is that they are a **bonus** for just owning a phone. I need the phone and I carry it with me almost everywhere. This phone comes with a free stereo camera. I might as well use it.

- For most normal pictures I will use my twin Sony cameras or the XREAL Beam Pro. But for close-ups of nature, dogs, cats, selfies, flowers, and a bunch more subjects that **don't move fast**, and **can be approached closely**, Spatial Photos might be just what the doctor ordered!