Avoiding Parallax in Panoramas

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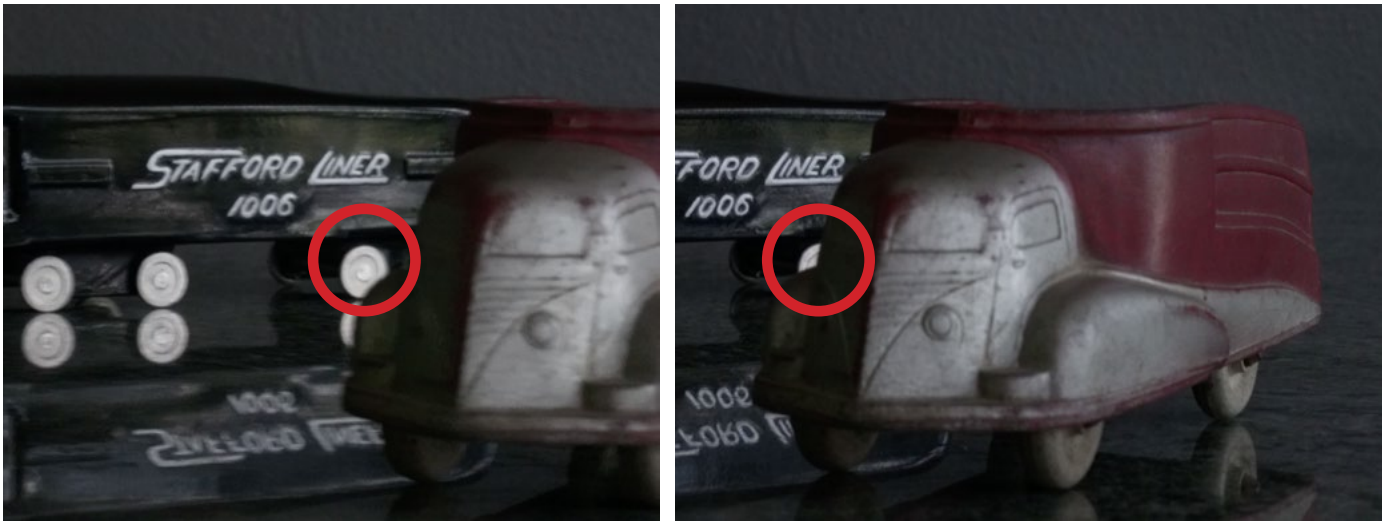
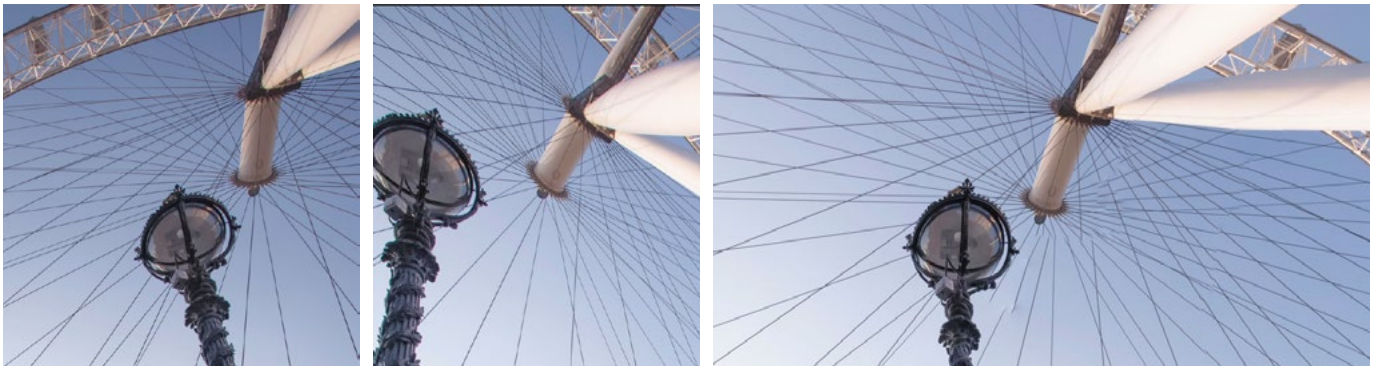
In this lesson, we're going to talk about a problem that you might run into when shooting panoramas. This issue has to do with parallax and it mainly occurs when you have objects that are close to the camera. When there is an object that's very close to the camera and you take multiple panorama frames, panning the camera across the scene, the relationship between the near and far objects will change slightly from frame to frame. This will cause alignment problems after the panorama is merged. You can see an example of this effect simply by holding up two fingers in front of your face. Hold one finger close to your nose and the other about a foot away. Close one eye and look at the relationship between your fingers. Then switch which eye is closed. You will see the relationship between your two fingers change. The same thing happens inside the camera when we have near and far objects in the frame.

You can see an example of parallax by holding up two fingers at different distances and then opening one eye at a time. The relationship between your two fingers will change.



This is what the viewfinder sees as I pan the camera from right to left. The camera is on a tripod and the items in the scene don't change, but you can see the relationship between the near and far objects changes as I pan the camera.



The left and center images are individual frames of a panorama and you can see that the light post and central hub of the ferris wheel change in relationship between frames. The right image is the merged panorama and you can see in the broken up spokes that the parallax caused alignment issues.

Let's look at how to eliminate this parallax so that when you pan the camera, the relationship between near and far objects remains the same. When you place your camera on a tripod to shoot a panorama, your camera will rotate around the center of wherever the tripod screw is. That might be where the camera sensor is, but it's not what's known as the optical center of the lens.

When light enters the lens, it comes in and gets concentrated down to a point and then gets flipped upside down and backwards before coming into the sensor. It's that point where the light gets flipped upside down that is the optical center of the lens.

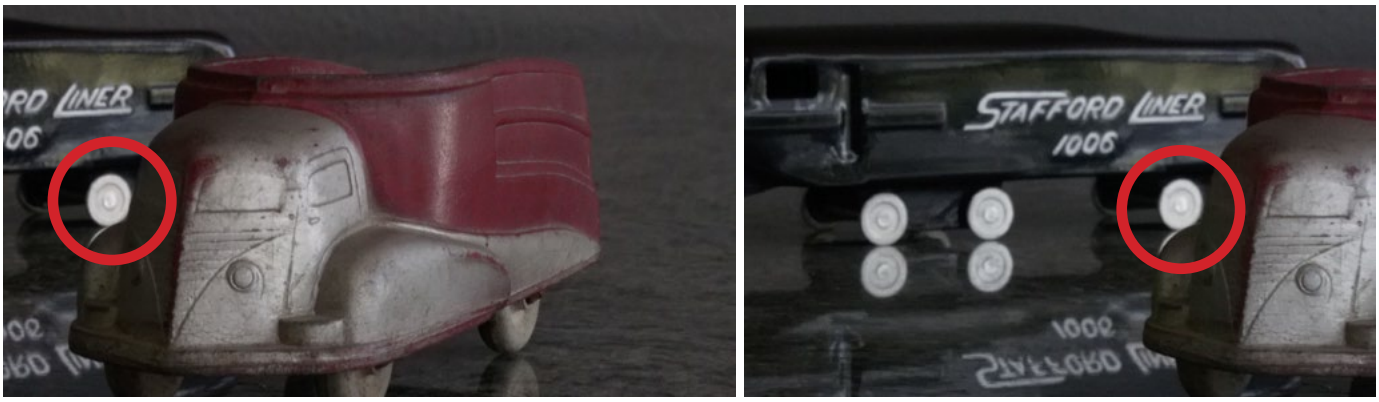
We want to find this optical center and then rotate around that point. This will prevent the parallax shift from occurring when we pan the camera. To do this, we can use what is commonly referred to as a nodal slide. On one end of the slide is a tripod mount that attaches to the camera. The slide end mounts on the tripod and can be shifted forward and backward as needed.

This is an example of a nodal slide.

When shooting on a tripod, we'll first want to take whatever portion of the tripod that's going to rotate and make sure that this part is level. Then we want to make sure that the actual camera is level. This can be done with a bubble level or an electronic level, if that's something your camera has.

Now, we need to move the camera backwards on the slide until the optical center reaches the pivot point. To know when this happens, we need to look through the viewfinder or at the preview on the back of the camera. Each time we move the camera backwards a bit, we'll pan left and right, watching the relationship between near and far objects. We will move the camera backwards until the relationship between these objects remains the same as we pan left and right.

At left, the camera is positioned on the slide where the pivot point is the same as if it were mounted on the tripod head. At right, the camera was moved back so that the optical center of the lens is at the pivot point.



I panned across the same scene as above after positioning the optical center of the lens at the pivot point. You can see that the relationship between the objects now remains the same.