



Panorama Photography: An Introduction

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According to *Wikipedia*[®], Panoramic photography is a technique of photography, using specialized equipment or software, which captures images with elongated fields of view. It is sometimes known as wide format photography. The term has also been applied to a photograph that is cropped to a relatively wide aspect ratio.

The very first panoramic images were paintings in the 18th century and were used to show people the world. The first photographs were created using specialized cameras that were invented in the mid 1800's. Some of the early photographs were used during the American Civil War to show fortifications and the terrain.

There are several ways to create panoramic images including purchasing specialized cameras, such as a Hasselblad[®] XPan or Widelux[®] that use film. There are very expensive digital alternatives such as the Seitz[®] which creates a 160 megapixel file. You can also use a simple point and shoot and use the software that comes with the camera and produce images like Taylor Swift does in the TV commercial.

The purpose of this article is the creation of high quality images for wide format printing or electronic presentations using your digital SLR camera and a wide angle or small zoom lens. Longer focal lenses can be used, but smaller focal length lenses such as a 10-20mm wide angle or 16-85mm are used a large majority of the time. Once the images are shot, they are stitched together using software.

It is important that attention is paid to the shooting process because it will make the stitching

much easier and more accurate. There are several details that are imperative including consistent exposure, sharpness, and white balance. A panoramic image will consist of at least 2 images and all 3 settings should be used on manual to guarantee the results are identical. There is a center of interest in every image and the exposure and focus should be based on this frame. The exposure has to have the same f-stop so the depth of field is the same for all the images. When shooting a scene with very little foreground, auto focus will probably work well and will give you satisfactory results. Even though the RAW converter allows you to adjust the white balance, it is still a good idea to manually set it for each series of images. When shooting images with close foreground objects, take the camera off Auto and focus 1/3rd into the scene at a high f-stop (f11, 16 or 22) for optimum depth of field.

Another major consideration is the issue of Parallax. It is defined as an apparent displacement or difference in the apparent position of an object viewed along two different lines of sight, and is measured by the angle or semi-angle of inclination between those two lines. The lines of sight are the multiple camera positions of a multi-shot panoramic photograph. As the camera is rotated, there will be a shift in the foreground objects compared to the background. The ending result will be alignment issues, which will make the stitching difficult. If everything in the scene is approximately the same distance from the lens, or very far away, the parallax effect will be eliminated or at least minimized.



One of the panoramic shooting methods is the hand held technique. A hand held panorama of a distant landscape tends to work quite well. Everything is far away from the camera, and because the distances between foreground and background appear small on the monitor, parallax is negligible. Wide-angle lenses can help reduce parallax effects because a wide-angle lens accentuates perspective, making everything seem further away. Conversely long focal length lenses compress perspective, exaggerating parallax effects. It is possible to shoot vertical (also referred to as portrait) hand held panoramas, but it will be easier in the horizontal position. When shooting hand held be sure to rotate around the camera and not the body. Don't lean forwards or backwards and try to be very still and steady. Another method

would be to use a tripod and a standard ball head. The ball head would ideally have a panoramic axis and allow you to rotate the camera in measured degrees. The images must overlap in order for the stitching software to work. The overlap area is usually between 30 and 50%. The final number of pictures will be determined by the amount of degrees you want to cover in your final image.

The issue of parallax introduces *the best method*, which is the use of a tripod and a panoramic head. The only way to eliminate parallax entirely is to use a panoramic head. This allows you to accurately position your camera so that when you take the pictures you are rotating the camera around the no parallax point of the lens. There are several manufacturers including Nodal Ninja®, Manfrotto®, and Really Right

San Geronimo
Fort, San Juan, PR,
44.8x12.9"

Photos © Brad Ashbrook

Bay at Caribe Hotel,
San Juan, PR,
36.5x13.5"





Monument Valley, UT,
40.7x13"

Stuff® that make panoramic heads. A panoramic head allows the photographer to take a series of pictures at a constant angle with set positions for each rotation angle. Another feature is the ability to shoot with the camera in a vertical position. This perspective allows for multi-row photographic sequences that can be taken accurately and very easily. More frames are required to cover the panoramic landscape when shooting in the vertical position, so the overall resolution is much greater.

Now that we have our images, the individual photos need to be aligned and blended (stitching) to create the final panoramic image. There are a variety of software solutions available, including some which are free such as Hugin®. There is a stitching plug-in included with Photoshop® CS and Elements and it has been available for several

versions. The Photomerge feature first appeared in Elements and has been a part of the CS product line for several versions, and for this article the latest versions are referenced.

It is very easy to access the stitching software within Photoshop® and Elements, but they are done a little differently. Within Photoshop®, go to File, Automate and Photomerge. If you are using the Elements Editor, go to the New menu and select Photomerge Panorama. Both applications offer very similar choices when determining the type of panorama. They both offer an Auto option, which will choose between Perspective or Cylindrical and does a pretty good job. These two settings, which can be chosen individually, determine the mapping of the images when they are merged together. The Perspective setting uses the center



Monument Valley, UT,
47.1x14.1"



Florence, Italy from the Duomo, Handheld, 39.0x10.1"



Durango, CO,
46.1x13.7"

image as a reference and transforms the remaining image files to match. The disadvantage to this option is the bow-tie effect on the outside images. The Cylindrical option usually provides excellent results but it will accentuate the foreground a bit. The Reposition (CS5) or Interactive Layout (Elements) option has some potential because of the ability to place images anywhere on the screen. It would require a bit of planning ahead of time, but it could produce some really interesting results. The one option that Elements does not offer is Spherical. This option is used when making 360-degree panoramas and the final image appears to be covering the inside of a ball.

All the photos in the article were shot with a Nikon® 12 megapixel D300 camera and a zoom lens. Every photograph except for the image on the bottom of page 28 was shot with a tripod and Nodal Ninja 5 and RD16 rotator. The photograph on page 27, *Bay at Caribe Hilton*, was stitched using CS5 Photomerge and it did a very nice job. The final image used 6 photos in the portrait mode and the final image size was 253 megabytes and measured 36.5" x 13.5". The image on pages 26 and 27, *San Geronimo Fort*, used the new version 9 of Photoshop Elements. The new version offers a content aware fill-feature, which can be applied

after the panoramic Photomerge stitches the image. This feature will fill in the outside gaps created during the stitching process. The image from *Florence Italy* was a 3 shot hand held, in horizontal position and a small zoom at 40mm. The final image size was 39.0"x10.1" and 282 megabytes and was stitched using AutoPanoPro.

The AutoPanoPro software is a standalone program that adds the ability to add and delete control points. These are used to align the overlapping areas of the merged panorama. This product also allows the user to preview the mapping choice before the file is rendered. The photograph in the middle of page 28, *Monument Valley, UT*, is a HDR panorama and was also stitched using *AutoPanoPro*. Each of the 8 vertical segments consists of 3 photos that were used to create the HDR with *HDRsoft's Photomatix*.

The final image size of the panorama will vary depending on the number of images and if it was shot in horizontal or portrait mode. Due to the wider aspect, the minimum print size length should be 12 inches. These larger files will be able to easily produce prints that are 3 to 4 feet long. These techniques are enjoyable and using them will have you creating great looking panoramas in no time. ■

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Canyon de Chelly National
Monument, AZ,
39.3x13.8"

