

## **Making VR images**

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I've learned some things over the past couple of years shooting VR images – panoramic, timelapse and object movies. I hope this information is helpful. Feel free to contact me if you have questions.

## **PANORAMIC SOFTWARE and TUTORIALS**

<http://wiki.panotools.org/>

The place to go for information, links and knowledge. Comprehensive and complete.

Note: avoid <http://www.panotools.info>.

<http://tech.groups.yahoo.com/group/PanoToolsNG/>

PanotoolsNG Yahoo group. Newbies who are working and learning are welcome. Don't expect the group to unscrew the top of your head and pour in the know-how, but if you try and show examples of what's working and what's not, the members here are very supportive of beginners. Lots of information for advanced panoramists as well.

<http://panoramas.dk>

A comprehensive clearinghouse for information, galleries and tutorials. If you have questions, you can find the answers here.

<http://ivrpa.org>

An organization similar to NPPA, but concentrating on VR.

<http://www.ptgui.com/>

Cross-platform GUI (Graphical User Interface) for Panotools. Automatic control point generation and blending. For cylindrical and cubic/spherical panos. Generally considered the industry standard.

<http://www.ptgui.com/panotools.html>

<http://www.rogerroger.org/panotools/universal/>

Written by physicist Helmut Dersch, Panotools is the underlying application that stitches the panorama. You'll need it in order to create cubic/spherical panoramas. These are good places to find it.

<http://www.kekus.com>

Mac-specific GUI for Panotools. Active user forum, good help and tutorials. Also versions of the panotools bundle.

## PANORAMIC SOFTWARE and TUTORIALS, cont.

<http://www.azurevision.co.uk/qtvr2mov/>

Ian Wood's application to capture the viewer's path through a pano as an image sequence and therefore a video

<http://www.clickheredesign.com.au/software/>

Maker of the Cubic Converter application that converts the equirectangular image to cube faces. Also offers an application to link panoramas to make tours, and a display app that smooths out presentation on a local machine.

<http://www.pangeasoft.net/index.html>

An indispensable tool for authoring – a Photoshop plugin that allows an equirectangular image to be viewed as a cubic panorama. Use this when PTGui generates a preview image before the stitch. They also make a free browser plugin that accelerates pano display in a web browser.

<http://flashpanoramas.com/player/>

A new product that allows using Flash rather than QuickTime to present panos.

<http://fieldofview.com/spv-gallery>

Aldo Hoeben has developed the SPI-V engine, which allows animation within panoramas and other effects. Requires the Shockwave plugin.

<http://360vr.com/HDRforDummies/>

Jook Leung's HDR action set for Photoshop CS2. A quick way to produce HDR-like images from one RAW file.

[quicktime-vr@lists.apple.com](mailto:quicktime-vr@lists.apple.com)

A message list for QuickTime VR-specific questions.

## PANORAMIC PHOTOGRAPHERS AND GALLERIES

(a VERY short list in no particular order)

<http://www.panoramablog.com/>

Andras Frenyo is a true photojournalist with a panoramic camera. Check out the 2007 New Orleans Jazz Fest panos.

<http://www.szigetpanoramas.com/>

A group of European photographers who document an annual music festival in Budapest.

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## PANORAMIC PHOTOGRAPHERS AND GALLERIES, cont.

<http://360vr.com/>

Jook Leung is a New-York based panoramic photographer that has shot the famous Times Square New Year's Eve panoramas, among other projects.

<http://www.arounder.com>

European travel panoramic site.

<http://www.vrmaq.org/>

Online magazine dedicated to panoramic photography. Check out the interactive table of contents panorama

<http://www.fullscreenqtv.com/>

Hans Nyberg's fullscreen pano gallery site.

## PANORAMIC HARDWARE

<http://www.nodalninja.com>

Inexpensive, durable, light pano head. Perfect for multimedia photojournalists.

<http://www.360precision.com/360/360.cfm>

The gold standard. Create a calibration file and never have to set control points, just stitch. Very expensive. Check out the 10-minute "Make A QuickTime VR" movie.

<http://www.kaidan.com/>

Many different types of panoramic heads for different cameras. Also a one-shot mirror lens for cylindrical panos.

<http://www.kaidan.com/Detail.bok?no=101>

One-shot mirror optic. Gets a cylindrical panorama in one shot, but with limitations.

[http://www.sigmaphoto.com/lenses/lenses\\_all\\_details.asp?navigator=4](http://www.sigmaphoto.com/lenses/lenses_all_details.asp?navigator=4)

Relatively inexpensive and good quality panoramic lens. The f/3.5 version is new. The older f/4 version is serviceable. Has a 180-degree vertical field of view when used in portrait orientation. Suitable for handheld shooting.

[http://nikonimaging.com/global/products/lens/af/dx/af\\_dx\\_fisheye105mmf\\_28g\\_ed/index.htm](http://nikonimaging.com/global/products/lens/af/dx/af_dx_fisheye105mmf_28g_ed/index.htm)

Very sharp, very fast. Has a 180-degree diagonal field of view. Not as suited for handheld use, but it's the gold standard when it's on a tripod. Also, when placed on a full-frame camera (Canon 5D – adapters are available), it will create a circular image of 190 degrees field of view provided the lens hood is ground away. Not an operation for the faint of heart.

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## OBJECT MOVIES

The key here is interactivity. The viewer can manipulate the object on the web page.

Object VR can be made with objects rotated on a turntable, or frames from a timelapse or video.

Use a maximum of 36 frames. They need not be adjacent frames from a sequence, but should be evenly divided to avoid jerky motion.

Light carefully. Examine the object from all rotation angles.

Examples:

- An item ranging from size from a car to a camera. As big as your turntable will allow.
- A building implosion. Bring the building up and down.
- Fruit ripening (combining timelapse and object movie). Put the green bananas on a turntable, and shoot it every three hours, rotating one increment between shots.

Software:

<http://www.actionscript.org/resources/articles/164/1/Object-VR-In-Flash-MX/Page1.html>

How to produce object movies in Flash instead of QuickTime

<http://www.vrtoolbox.com/vrthome.html>

VRWorx is an excellent and intuitive tool for stitching object movies as well as cylindrical panoramas.

<http://www.versiontracker.com/dyn/moreinfo/macosx/21968>

iStill, a shareware product. Simple, quick, but lower quality.

The original QuickTime Virtual Reality Operating Studio is no longer produced or supported by Apple, but it works very well in Classic Mode on OS 10.4.x.

Tutorial:

[http://vrm.vrway.com/issue26/VR\\_TOOLS\\_YOU\\_CAN\\_USE\\_QUICKTIME\\_VR\\_OBJECT\\_MOVIES.html](http://vrm.vrway.com/issue26/VR_TOOLS_YOU_CAN_USE_QUICKTIME_VR_OBJECT_MOVIES.html)

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## TIMELAPSE MOVIES

Timelapse movies are very effective in showing change over time.

### Example ideas:

- Flowers opening
- Changes in weather
- Construction projects
- Crowds filling a stadium

Depending on the rate of change, and the desired length of the final movie, shooting settings will change. If change happens quickly, make the duration between frames shorter. If change is slow, make the duration between frames longer.

Calculate the length of your finished movie by dividing the total time of the change you're documenting by the interval between frames. Divide that number by 15 to get the number of seconds of the final movie (assuming your web video frame rate is 15fps).

### Example 1:

One hour for the change. One frame every four seconds.  $900 \text{ frames} / 15 \text{ frames per second}$  equals one minute.

Example 2: One year for the change. Two frames per day.  $730 \text{ frames} / 15 \text{ frames per second}$  equals just over 48 seconds.

If there is just motion in the scene, but no real change, you'll get the anthill effect. (Think a crowded airport terminal). That can be interesting in some respects, but a situation where something changes dramatically makes a better timelapse.

Shoot manual exposure and white balance. Even the best cameras will have slight changes between exposures in Automatic mode. This produces flicker.

Make your exposures as accurate as you possibly can. Adjust contrast and sharpening in the camera. Set up a custom curve if you wish. You want to produce as good an image as possible to avoid post-production of hundreds if not thousands of images.

Use longer shutter speeds. Blur in moving objects smoothes out the movie, eliminating frames where an object appears for a single frame. Neutral density filters are useful.

Timelapses can also be produced from webcams. The software that posts the images from these cameras to the web can also produce a timelapse movie.

### Software:

#### QuickTime Pro

Produces a QuickTime movie from sequence of images. Also used to change the size of the movie for the web and determine an output codec.

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## TIMELAPSE MOVIES, cont.

<http://www.evological.com>

Evocam is a cheap and versatile Mac program for running just about any video or webcam. It has a built-in ftp client for uploading frames. Can be set to shoot at selected intervals, or can be triggered by motion within a defined area of the photo.

<http://istopmotion.com/>

A new product which looks promising. Check it out.

### Photoshop

Use for batch post-production of your images. If exposure, contrast, white balance aren't spot-on when shot, this will clean up the timelapse.

**Video editing program** of your choice. Final Cut Pro or Express work just fine.

### Tools:

- Nikon D2 series camera (built in intervalometer)
- Nikon D100 camera (features variable file size, useful for shooting thousands of frames if needed).
- Apple iSight camera  
These have been discontinued, and are hard to find. Connects to a computer via firewire.
- Other web cameras  
These usually connect via USB. Quality varies widely.
- Pocketwizard MultiMax transceiver and stay-awake cable  
Expensive. Allows timelapses to be shot with any camera with external shutter release.
- Sturdy tripod or clamp.

### Timelapse galleries and tutorials:

<http://www.multimedias shooter.com/wp/?p=206>

[http://www.stclairphoto-imaging.com/pages/gallery\\_timelapse\\_02.html](http://www.stclairphoto-imaging.com/pages/gallery_timelapse_02.html)

<http://www.davehuntley.com/>

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## SOME THINGS I LEARNED THE HARD WAY – A WALK THROUGH THE PANORAMIC WORKFLOW

Feel free to call or write if you have questions. I don't know it all, but I'll try to help.

To start with, some definitions will help:

- Zenith – The shot looking straight up
- Nadir – The shot looking straight down
- Yaw – side to side motion of the camera and lens.
- Pitch – up and down tilt of the camera and lens.
- Roll – rotation of the camera around the axis of the lens.
- Nodal point – the point in a lens where the rays of light cross. Rotating around this point when shooting panoramas prevents parallax error. Very important when objects are close to the camera in a panorama.
- Equirectangular – a conversion of the spherical world to a rectangle in the proportions of 2:1. The stitching programs (PTGui and PTMac) produce an equirectangular image.
- FoV - Field of View

### SHOOTING

#### Framing the pano

Look up, down and around. Try to visualize the space as a flat image. There should be something of interest close (within 3-4 meters) in all four quadrants, plus up and down. You'll get better at this with practice.

Identify the area of most interest in your pano. Shoot that as your first image.

Shoot the equatorial images (rotate clockwise and don't kick the tripod!), then zenith, then nadir.

It's helpful to shoot the nadir and zenith at the same yaw as your first image. Also handhold a nadir without the tripod. This makes eliminating the tripod much easier, and also can help eliminate the photographers' shadow.

#### Use a tripod with a panoramic head adjusted for your camera and lens nodal point

A quick way to find the nodal point:

Place the pano rig in a doorway with the door frame about 12 inches away. Beyond the door frame, there needs to be a background at least 15 meters away.

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## Shooting TIPS, cont.

Swing the lens from side to side, placing the edge of the door frame at the edge of the image. Look through the viewfinder and note how the relationship of the doorframe and the distant background changes. If the doorframe shifts against the background, you're not at the nodal point. Adjust the pano head until there is no shift. (NOTE: on the Sigma 8mm f/4, the nodal point is at the gold ring).

On the Nodal Ninja website (<http://nodalninja.com/>) there is a chart of nodal point settings for different lens and camera combinations on the Nodal Ninja head.

### Shooting handheld

Use a lens such as the Sigma 8mm in portrait orientation. Visually identify four points in the scene that are 90 degrees apart. Plant your right foot about a foot in front of your left. Position the camera over your right foot and rotate clockwise, keeping the ball of your foot in the same location. Try to keep the camera vertical and flat. A hot-shoe bubble level may help.

Also shoot a nadir and zenith.

Stitching this will be more difficult than a tripod shot, but it's doable. It's the best technique for fluid situations – you can shoot a pano in under 10 seconds.

You can also hold the camera above your head and rotate.

### Shoot RAW for best quality

Shooting RAW allows for custom white balance, camera calibration, precise exposure control and noise reduction. It also allows the use of the HDR for Dummies Photoshop action.

Apply changes to one image that is the best representation of the entire scene in terms of color balance and tonal scale. Select all the images and synchronize them to the first image.

Output the images as .tif files.

RAW takes longer, uses up more disk space, but it's worth it.

If you're not familiar with Adobe RAW Acquire, here are some basics.

In Adobe RAW acquire:

- In the adjust tab, carefully set endpoints and color balance in the frame which best represents the tonal range of the scene, i.e. has both bright and dark areas lit by the primary light source. Also, use the grey eyedropper to establish a white balance. (hint: click on a neutral midtone, not shadow or highlight).
- In the detail tab, use luminance smoothing and color noise reduction here. If you feel that Noise Ninja does a better job, use it after RAW acquire. Leave sharpen at the default - you'll sharpen much later in the process.
- In the curves dialog, consider setting the curve for linear. It may help hold shadow detail.
- Select all and synchronize. This applies the settings to all the images

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- Save all the files in .tif format. Name them in sequence (01.tif, 02.tif, etc.), starting with the first equatorial image. Acquire the tifs at the native resolution of the camera. Resist the temptation to res up or down.
- An excellent RAW tutorial from Martin Evening, the author of the Photoshop for Photographers book.

<http://photoshopnews.com/photoshop-cs3-for-photographers/camera-raw-41-update/>

## Stitching the pano in PTGui

I use PTGui. PTMac is similar.

Use the advanced mode to give yourself more information and control. The Project Assistant will work, but if you rely on it, you won't understand how to fix common problems.

### Source images tab:

Click the Add button at lower left and load the source images (this is where the 01, 02, naming pays off).

### Lens settings tab:

PTGui picks up on your EXIF data, and its database should recognize your lens/camera combo and select the correct settings.

### Panorama settings tab:

Select Equirectangular. FoV settings should auto-fill to 360 degrees horizontal and 180 degrees vertical.

### Crop tab:

If you're using the Nikkor 10.5, the crop will be automatically applied.

If you're using the Sigma 8mm. adjust the crop circle so it just touches the color fringe on the edges of the image. (Hint: Write down the cropping settings, you'll want to use them in the future for this particular combination of camera/lens/tif resolution).

### Image Parameters tab:

- This is where you can determine the center point of the equirectangular image.
- Select all the images in the equatorial row (not the zenith or nadir). Click the Fill Yaw button at lower left.
- In the Fill Yaw dialog, set the start angle at 0 degrees, assuming your main image is image 01.
- You have six images in this row, you rotated clockwise, and since you have six images, the increment between them is 60 degrees. Click OK.
- Assuming you shot the zenith at the same yaw as your 01 image, click on the pitch value for the zenith and set it to 90 degrees.
- Do the same for the nadir, but set it to -90 degrees.

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## PTGui TIPS, cont.

### Panorama Editor:

Use the Panorama Editor (apple-E) to check your work. If it appears that there is substantial misalignment of images, go back and recheck yaw and pitch values. This generally happens with zenith and nadir.

Panorama Editor provides a quick way to set the center of the pano, and to correct a horizon line. Editing the pano in PE is tricky, proceed at your own risk.

### Control Points tab:

The Control Point Assistant (shift-Apple-A) is quite good at selecting control points, providing your shooting geometry is reasonably good and there are areas of detail shared by all images.

You will find, however, that you may have to set control points manually between some image pairs.

There should be at least five pairs of control points between images. If you manually set CPs, pick points that have distinct detail - a window in a distant building, a spot on the pavement, a light bulb in the ceiling - look for distinct shapes that aren't moving.

### Optimizer tab:

If you haven't already done so, save the project.

This is where the black magic occurs! The optimizer warps the images, trying its best to put the overlapping control points atop one another.

- Use the advanced mode.
- Uncheck everything under the Optimize Globally option. (FoV, a, b, etc.)
- All the checkboxes for Y, P, R should be checked, except for your anchor image. This is generally the image you selected as your center image.
- Use the control points of all images.
- Run the optimizer. You will get a result pane that tells you the maximum distance between control points, the minimum distance and the average. You will also get a qualitative score (This is bad, not so bad, good, etc.). Click OK.
- Go to the Control Point Table (Apple-B). Sort all the control points by distance. Highlight and delete the worst ones (hint: don't do this all at once - look for large jumps in the distances).
- Run the optimizer again. Eliminate bad control points again. Repeat (3-5 times) until average error drops substantially, or the score is not bad or good.
- Check the FoV box. Run the optimizer, eliminate bad control points. Repeat until the score is good.
- Check the b button. Run the optimizer, eliminate bad control points. Repeat until the score is very good or good. Ideally, your average error will be under two pixels.

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## PTGui TIPS, cont.

### Preview tab:

Set in the preferences to use Photoshop to automatically open a preview file. Size it at 1200 pixels so you can get a good look at the result. Use PanoPreviewer filter to view the images as a cubic panorama.

You may see some odd things - this isn't a final blend, but a quick version. Look for badly mismatched horizontal lines - the intersection of walls and floors, powerlines, fences. Large displacements may be problematic in the final result. Small displacements are usually corrected by the blending process.

### Create panorama tab:

- Select a width and height for your needs. Generally 6000x3000 is a good level for a fullscreen web pano and an 8.5x17 print.
- The Set optimum size options are a bit small. If you want the largest file possible from your images, select the maximum size option.
- File format should be .psd. Settings should be 8 bits, packbits compression.
- Layers should be set to Blended and Layers - this creates a masked layered file that you can edit to correct stitching errors.
- Include all the images.
- Stitch using PTGui, but warp using PanoTools..
- Blend using Enblend (slower but beteter)
- check use fast transform
- Interpolator determines how long it will take to stitch your pano, and the quality of the finished product. Poly3 for speed, Sinc256 for quality. For more information on interpolators, check here:
- <http://www.photocreations.ca/interpolator/index.html>
- Create Panorama: select your destination directory. It's helpful to have hard disk space available. Close other applications to give PTGui more CPU cycles.
- The Batch Stitcher option is convenient when you have multiple panos to stitch, and your deadline isn't tight. Let it run overnight.

## EDITING THE PANO IN PHOTOSHOP

This step lets you correct any stitching errors such as misaligned lines or objects that have moved between images.

- Open the .psd file created by the stitcher. It will be big! Lots of RAM and HD space makes a big difference, as do fast hard drives.
- Open the layers palette. Click the arrow at top right of the palette and select the large view option. Also open the Navigator and History palettes. This will help you keep track of your location in the pano and your changes.
- Select the brush tool. Reset the color palettes (bottom of the tool palette) to black and white. (Hint: when using the brush tool, hitting the X key switches the brush between color palettes). Set the brush to paint white.

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## Editing the Pano in Photoshop TIPS, cont.

- In the Layers palette, click on the mask (it will be black), NOT the image.
- Click in the image and begin to edit the mask, painting white into the black. You'll see the underlying layer appear. It's confusing at first, trying to figure out how the layers and masks interact. Practice makes perfect. (Hint: the Navigator palette will show you where you are in the image, and this will help you determine which layer mask you should be working on)
- Don't do too much at once – if you brush and brush and brush, then make a mistake, you have to start over from the place you started brushing.
- If you have to start over in a layer mask, select the mask and hit shift-F5 to fill a mask with black.
- BE PATIENT! This takes time.

When finished, make sure to save the .psd file to preserve layers and edited masks. Flatten the .psd file and save in .tif format.

Make any tonal adjustments you wish by using adjustment layers. Save the .tif with layers to preserve the toning adjustment layers.

Flatten the .tif. Duplicate the background layer. Sharpen the new layer using USM (high percent, low radius), or a plugin such as Focus Magic (<http://www.focusmagic.com>)

Flatten this file. You now have an equirectangular image that's ready for the next step.

## CREATING THE CUBIC PANO

**Cubic Converter** is the application used to convert your flattened equirectangular file into a QTVR movie by projecting it onto the six faces of a cube. It then outputs a compressed QTVR ready to place on a web page. It also produces individual cube faces which can be edited to add branding or fix stitching errors if needed.

It will also create equirectangular images and individual cube faces from a QTVR movie. Use this if you for some reason don't have the original equi image. However, these images will show compression artifacts from the QTVR movie. It's best to archive the equirectangular images and generate new QTVR from those.

### Conversion tab:

- Drop your final.tif into the Cubic Converter window.
- Select the Convert to QuickTime VR Movie option.
- Use the slider to select the center point of the VR movie, the initial view.
- Click Convert.
- The equirectangular image is converted into a cubic image, with six faces - up, down and four around.

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## Cubic Converter TIPS, cont.

### Movie tab:

Use this to set the compression and opening view of your QTVR movie.

Inside the movie tab are the following settings:

- Codec: Photo JPEG Quality: between Low and Medium (35)
- Size: whatever you prefer in your web pages.
- Pan, Tilt, Zoom: Click and drag to position and/or zoom to set the initial view where you want. Click the Set button.
- Min/Max settings: Minimum and maximum zoom. Setting a high minimum zoom tends to produce too much distortion (the vomitcam effect). Too low a minimum zoom gets you so far into the image that detail starts to fall apart.
- Pan/Tilt: use this to restrict the panning and tilt settings. For instance, if you have a bad nadir or zenith, restrict the tilt to prevent the viewer from being pointed all the way down or up.
- Fast Start Preview: This creates a low-resolution image that helps the viewer understand a movie is loading. A QTVR movie without a preview shows only the blue QuickTime Q until the movie is fully loaded.
- Tiling: This refers to the way the movie is divided by the codec. Auto is fine.
- Data size: Depending on the degree of detail and sharpening, a small pano window in a web page (600x300 or thereabouts) needs a filesize of between 600 and 900K for good quality. A fullscreen pano needs a 1MB to 1.6MB file for good quality. Adjust compression settings to vary filesize.

### Cube Faces tab:

- If you wish to add branding to your nadir, or fix problems in the pano, use the Cube Faces tab to export any of the six faces as a .tif file.
- Select the face you wish to export and click the export image button. Select a destination (Hint: make it the same directory as your original final.tif file).
- You can then open that face in Photoshop (if you are using color management, don't color manage the file - leave it as is), make the changes you want and save the face.
- To bring the face back into the pano, click Choose Image, and select the edited face. Convert the pano and your edited face will appear.

### Branding your panos:

I edit the bottom face, adding a logo and information about time, date and place, as well as a credit and short caption.

- Create a layered .psd file from the exported bottom face, and add your text and logo.
- Save the layered .psd in case it needs editing. Double-check your spelling!

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## Cubic Converter TIPS, cont.

- Flatten the .psd and save it, replacing the original bottom.tif file.
- Import the new bottom.tif into Cubic Converter and Convert. The branded bottom face will appear.

### Save As:

The Save As dialog box allows you to save your QTVR in several different forms. The simplest and most useful for our purposes is to choose the QuickTime VR Movie + HTML template option. This creates a .mov file, and the html code necessary to embed the QTVR in a webpage.

## EMBEDDING PANOS IN A WEB PAGE

The last step from Cubic Converter creates an html document which has the code necessary to put the panorama in a web page. Formerly, an object/embed tag was used, but due to a patent dispute, IE versions 6 and 7 will display a dialog before media using these tags will load. The html produced by cubic converter includes a javascript (embedfunctions.js) that should eliminate the dialog. Make sure to include the script in the same directory as the page html.

Creating web pages with Dreamweaver will also take care of the IE display problem. Dreamweaver also makes creating full-screen panos easier.

## CREATING A FULL-SCREEN WEBPAGE

It's possible to use html code that forces the browser to fill the entire screen. While some viewers don't like this, for the majority it brings the pano to life. This code uses the object/embed tag, which will cause IE 6 and 7 to display a dialog before loading the QTVR. Dreamweaver will automatically create the scripts needed to overcome this problem.

The javascript for the fullscreen code follows. Place this inside the <head> tag:

```
<script type="text/javascript">
    <!--
        window.moveTo(0,0)

        window.resizeTo(window.screen.availWidth,window.screen.availHeight)
    // -->
</script>
```

Inside the <body> tag, place this object/embed code:

```
<object classid="clsid:02BF25D5-8C17-4B23-BC80-D3488ABDDC6B" width="99%"
height="88%" codebase="http://www.apple.com/qtactivex/qtplugin.cab">
```

### Making VR images

Gary O'Brien

October 2007 | NPPA Flying Short Course, McLean VA

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**Fullscreen web page TIPS, cont.**

```
<param name="src" value="MYMOVIE.mov">
<param name="controller" value="true">
<param name="autoplay" value="true">
<param name="cache" value="true">
<param name="scale" value="tofit">
<param name="correction" value="full">
```

```
<embed
src="MYMOVIE.mov"
width="99%" height="88%"
controller="true"
autoplay="true"
cache="true"
correction="full"
scale="tofit"
type="video/quicktime"
pluginspage="http://www.apple.com/quicktime/download/">
</embed>
</object>
```

The percentages in the height and width parameters dictate how much of the screen the window takes up. Don't set these at 100% - leave the viewer a way back to the desktop!

**YOU'RE DONE!**

OK. That's what I know, for the most part.

Please feel free to call or write with questions. I don't know it all, but I'll try to help.

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