Lenticular Images using Stereo Photo Maker Class 1

1) Discussion on how lenticular 3D works. See Figures 1 and 2.

2) Methods of taking lenticular images:
   a) Take two images and then using a "morphing" program fill in the in-between images.
   b) Use a camera that has many lenses (like the NIshika 3D or Nimslo 3D cameras).
   c) Rig up many cameras on a bar to trigger by one shutter control.
   d) Use one camera on a slide bar at many positions.

3) Two formula for helping set up the multi image shoot.
   a) Camera shift = Distance from point of view / (8 X number of images used).
   b) Maximum distance from closest image to background = Distance from camera / 5.

4) Other helpful suggestions
   a) Make sure nothing moves during all the images you take.
   b) Start on the LEFT moving to the RIGHT.
   c) Try not to tilt the camera L/R differently as you take the each image.
   d) Try not to point the camera up or down too much with different images.
   e) Make sure the zoom, focus or other camera settings don't change each exposure.
   f) Compose the image using the zoom to cover a little more than the image you want to end up with. Lenticulars are best with half the image in front of the screen and half behind the screen.
   g) Pick the point in your object that you want to be at the screen level and always point the camera at the same point in the object. This aiming point should be ~1/2 way between the fore most item and background. This part of the image will be at the lenticular level and it will be the best focused part of the lenticular image.
   h) **For best results**, the printer resolution (e.g. 600 DPI or 720 DPI) divided by the lenticular density of the lens (e.g. 60 LPI) **should** be an integer, and this is the number of images that you need. For example, a 50 LPI lens would work well for a 600 DPI printer, but not for a 720 DPI printer. Both 40 LPI and 60 LPI lenses would work well for either 600 DPI or 720 DPI printers. (For a 60 LPI lens, you would need 10 images from a 600 DPI printer or 12 images from a 720 DPI printer.) Take a few more images that you expect to use.
   i) Save all your images in a new (easy to find) folder on your computer.

Using Stereo Photo Maker to process images

5) Launch Stereo Photo Maker and select – file/Multiple Images/X-Y adjustment and cropping
6) Find and open your new image file. Set "Output File Type" to your preference (I use JPG). Make sure the "Output Folder" is where you want to store the processed images. If you want your results in the same folder, enter a unique prefix name in "file Prefix" (otherwise SPM will overwrite your original images).
7) Select the images you want to look at and click on "Adjust Selected Files" or click on "Adjust All Files"
8) Click on "Test" and SPM will display all the images sequentially (L to R)
9) If your images tilt as they are presented or bounce up and down too much, you need to let SPM align your images. Cancel out of "test" and exit "X-Y adjustment".
10) Select – file/Multiple Images/Auto rotation adjustment (one by one)
11) Before you start, make sure you choose a different "Output Folder" you want or change the "File Prefix" so you don't over write the original images and select the appropriate "Adjust Files" button. This can take several minutes if there are many large images.
12) With the new images repeat steps 5) through 8) and the images should be better.
13) Now click "Set Point" and set the cross hairs on a sharp point in the image that you want to be in the level of the lenticular sheet of your picture (half way between the back most part and the fore most part of the image. Set this same point on each of the images.
14) Click on "Mask" and it will show the part of this image that is common to all the images.
15) Click on "Crop" and select the part of the image that you want.
16) Click on "OK" and SPM will crop all the images to the common point you selected and save them where you said with the new prefix you input. Otherwise it will overwrite the original images.
17) With the new aligned and cropped images repeat steps 5) through 8) and the images should rotate smoothly from left view to right view and these images will be what you will want to print next time. Make sure you save these images and bring them to the next class. If you have time do some more images at home and bring them as well. See you next week, same time same place.

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Other software:

SuperFlip www.vuethru.com/filedownload.html this was freeware

Figure 1: Viewing from two Different Positions

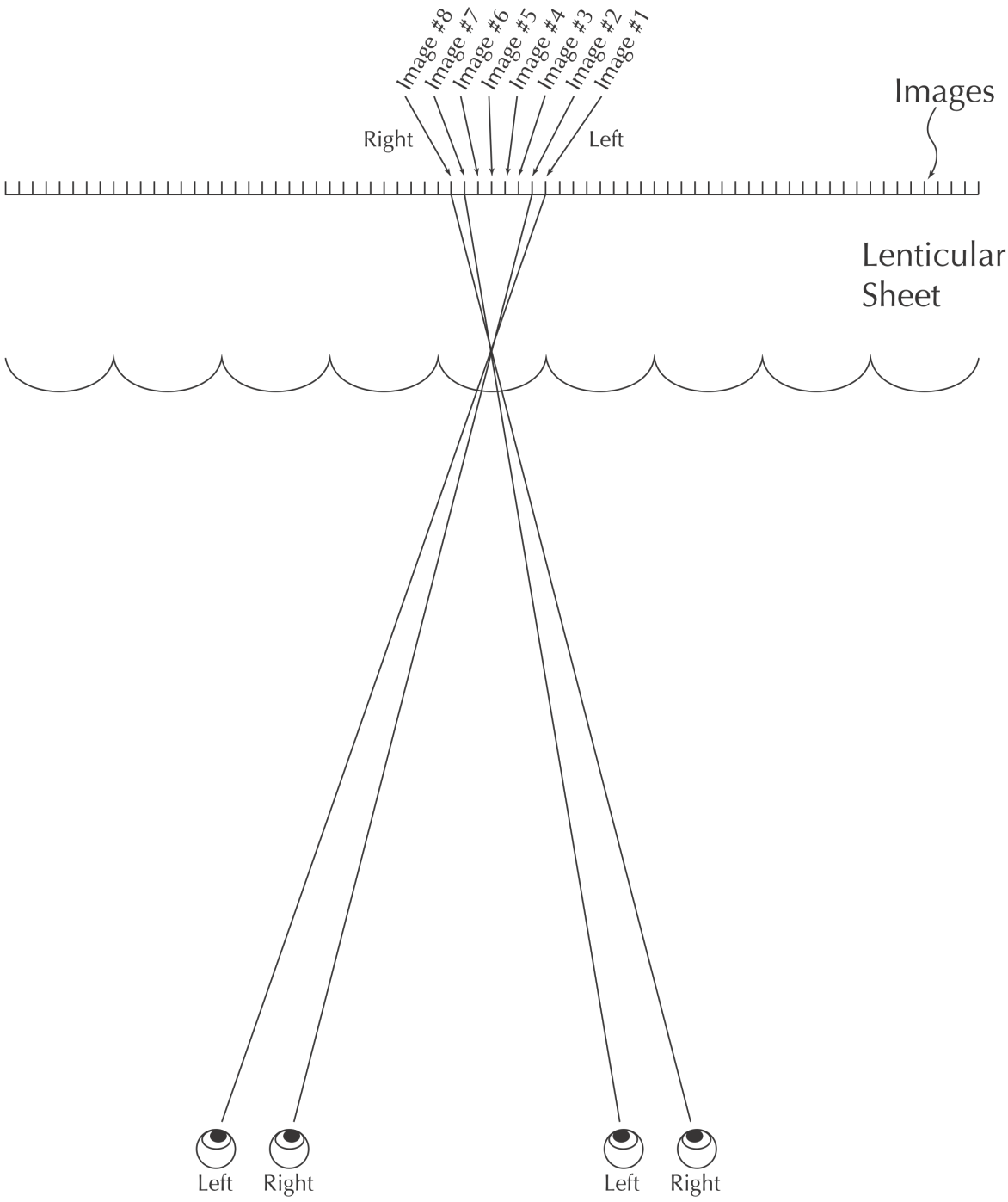
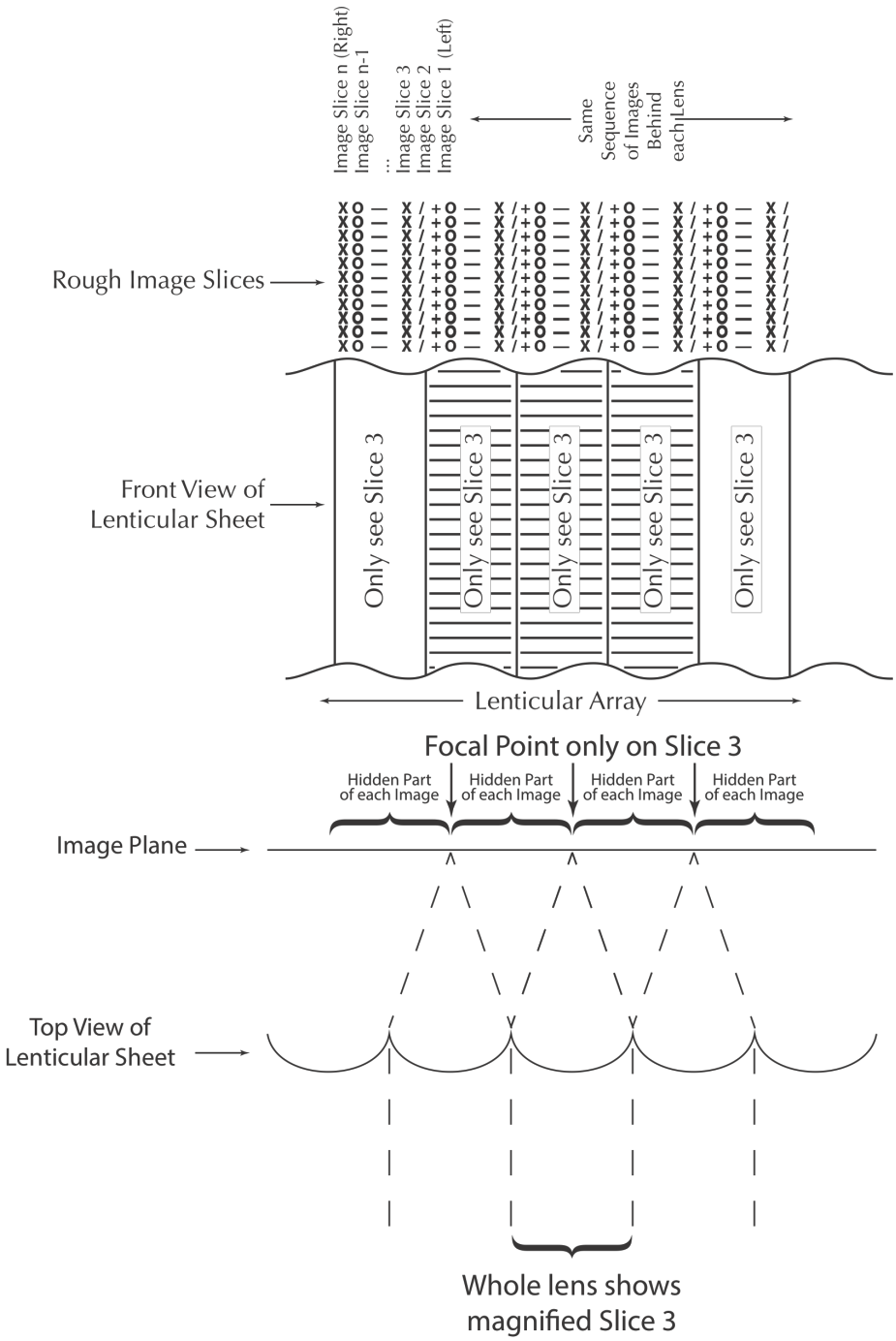


Figure 2: Lenticular Lens Diagram



Lenticular Images using Stereo Photo Maker Class 2

18) From previous class you should have 8 to 12 images that have been aligned and cropped and "test" smoothly in Stereo Photo Maker. If you did more at home, we can print some of them as well.

   a) Start StereoPhoto Maker and select "file/Multiple Images/Create Lenticular Image…." Find your folder with your image files and select the 8 to 12 images you want to use for the lenticular.
   b) Set the box "Lenticular Lens Pitch" to 60 (or the pitch of whatever lenticular sheet you have).
   c) Set the box "Printer Resolution" to 720 (or whatever the maximum your printer resolution is). (See (j) below on Printer Resolution)
   d) Set the box "Print width" to the size of your final print (I would recommend about 7" or less) (see section 4 below for the need of extra paper on each side)
   e) Make sure "Image Direction (left to right)" is checked
   f) Click on "Create With Selected Files" Wait a while and POP! You have the image file to be printed. Save this file with a new name.

19) Printing your lenticular composite image.

   g) Select "file/Print Setup…." From the main Stereo Photo Maker window
   h) Click on the "Printer" button in the lower right to set up your printer
   i) If you have multiple printers, make sure you have the best printer and select its properties. Set to "Best Photo Quality" and "Best Photo Paper". These names may be different with your paper and on your printer. Click OK to get back to the Stereo Photo Maker "Print" window.
   j) Note that Stereo Photo Maker now shows the printer resolution that your printer is set for, up in the upper right corner. **This number (detected by Stereo Photo Maker) is to be used in all previous steps requiring printer resolution!**
   k) Make sure the box "Print dot by dot" is selected. The image should show up in the window the size and position it will be printed. Move the image over to the top, middle of the print page (see section 4 below for the need of extra paper on each side)
   l) Load the good paper and print you image.

20) Mounting your lenticular image
    m) After your image dries (sometimes several minutes) so you can touch it without smearing it, cut the image to size only on the top and bottom. Leave the un-printed sides attached to the image
    n) Cut the lenticular sheet so it is just 1/8" larger on each side than your finished image. There are several ways to cut this material including a good table saw or a fine toothed saw or with a plastic sheet scribe. I use a ruler and X-ACTO knife held backwards to scratch a crack in the sheet (top and bottom) to cut then break sheets. Remember, the material is fragile and can crack or chip when cutting.
    o) Lay your printed image on a table. Lay the cut to size lenticular sheet on top of your image. The lenticular sheet is taller than the image so tape the top and bottom of the lenticular sheet material to the table.
    p) Now you can move the image (by the sides that stick out from the edge of the lenticular sheet) so you can align the image to the lenticular sheet to show the 3D effect.
    q) When it is aligned properly, tape the sides of the image to the lenticular sheet. Now you can lift sheet and image off the table and turn it over without losing the alignment. Tape the top and bottom of the image to the 1/8" overhang of the sheet. After you have checked to see that the image is still aligned properly, you can cut off the sides of the paper image with the knife and ruler, and tape the sides to the lenticular sheet. There is a better way to attach a lenticular sheet that has an adhesive coating on the back; here's a video from VueThru: https://www.youtube.com/watch?v=hiZ1PjLzIhc.
21) You now have a finished 3D lenticular image.

More Notes on Lenticular Printing

1) Lenticular sheets and printers are sometimes not exactly equal to each other in pitch. SPM will only do whole numbers of line pitch – it will truncate a decimal fraction to a whole number to do its processing. Using SPM, if I put in "60.15" it truncates the decimal and does 60Lpi. VueThru's SuperFlip software (http://www.vuethru.com/filedownload.html) will do fractional values of LPI (it works with a number like 60.18).
2) SPM seems to only print "point for point". When you use a 720dpi printer and set SPM to 60LPI everything is just fine – you get exactly 12 images (points) for each lens. See note above about decimal values with SPM. I always use SPM at exactly 60.00LPI for a 720dpi printer and then use Photoshop to change the LPI by printing the picture just a tad larger or smaller as needed for my particular lenticular sheet. Photoshop will blend the adjacent pixels at the edges of each image strip of the lenticular images and it doesn't show like SPM.
3) Lenticular images should be printed with the viewing distance in mind. A small image may be viewed at 10" to 18". A larger image may be viewed at 30" to 40". The angle that

one's eyes see through the lenticular lenses is different at 10" and at 40". When you adjust the print LPI of your image for 3D affect over the whole image, make sure you test it at the distance you expect to be viewing it. Use only 1 eye to pick the proper alignment, because if you use both eyes, one eye sees one stripe and the other eye may see a different stripe 4 or 5 stripes away.

4) Some lenticular software automatically puts alignment strips on the top and sides of an image. (several black and white lines at the lenticular pitch) These are very useful when aligning the image to the lenticular sheet. If you don't have such software, you can do the same thing by making the 4 middle images of your set of 12 images have a small black border and the rest of the images have the same size white border. When it is printed you will have the alignment strips all around your image.
5) The free program "SuperFlip" will only do up to 60Lpi. SPM will try to slice up an image at 75Lpi but it doesn't really work at 75Lpi. As stated above, I only use SPM at 60 Lpi and use Photoshop to re-adjust the final printed (Photoshop printed) image to get the lenticular pitch that will fit the sheets I have. It takes a few tries. If I use the SPM with the settings listed below and then print with SPM with a printer at 720ppi, I can fool the system and get a test pitch that spreads around 60Lpi with 60Lpi in the middle.

   Set lens pitch to "61". If you set the printer dpi in the SPM the following values and then print at 720dpi this fools SPM and gives you the actual Lpi shown in the chart. (Note that 720 x 61 / 60 = 732.)

Dpi in SPM	Actual Lpi printed
736	59.51
737	59.59
736	59.67
735	59.75
734	59.84
733	59.92
732	60.00
731	60.08
730	60.16
729	60.25
728	60.33
727	60.41
726	60.50

6) As I mentioned, neither of the free slicing programs will work at 75Lpi. What I did to get a prepared image at 75Lpi was to process the image set at 60.00 Lpi in SPM and save it at a width of 8.75". I saved it from SPM at 60 Lpi and 8.75" wide. I then used Photoshop and reduced the overall size from 8.75" down to 7.00" and Photoshop did a great job in

making the 60Lpi slices actually be 75 Lpi. It's only simple math 8.75/7.00 = 75/60. If you want other values because your printer is not 720ppi then you can use a different ratio.

7) Of the 2 programs listed, only SPM has a good auto alignment feature. If you use either SuperFlip or SPM to slice up your images, I would use SPM "Auto Rotation and Adjustment" and SPM "X/Y adjustment and Cropping" feature before trying to slice up and print your images. SuperFlip will also print a series of test patterns to check out your particular lenticular sheets. SuperFlip for some reason does not save in .JPG format.
8) There is another software called "3D-Easy" that costs about $50 that it will allow you to manually do the alignment and cropping. I think "3D-Easy" also does 75Lpi. 3D-Easy will put alignment patterns on all sides of your sliced up image and it can print a series of Lpi test patterns to test your particular lenticular sheets.

Lenticular sheets approximate cost

1. I have purchased sheets from two companies: VueThru and Micro Lens Technology. The price for various sheets are in the order of: 8" X 10" with adhesive ~$3.50 each, in quantities of 25 sheets. 11" X 14" with adhesive ~$6.10 each, in quantities of 25 sheets. 16" X 20" with adhesive (if you have that big of a printer) ~$12.00 each, in quantities of 10.
2. When and if we decide to get some sheets, we can group our order and buy the minimum quantities (10 or 25).
3. I have various sizes of 40Lpi lenses with adhesive and various sizes of 60Lpi lenses with adhesive. I have a few 60Lpi lenses without adhesive. Maybe some of the other club members have some lenticular sheets lying around form when we did the State Fair.
4. I talked to the print shop at COSTCO and the larger prints that they can do are only 300dpi. 300dpi would only allow 5 images between each 60lpi lens and would not make a very good 3D image. 300Dpi would allow 9 images if you used 40Lpi sheets and would make a fairly good 3D image.

Several lenticular process videos to watch

VueThru.com sells a lot of lenticular supplies and has several good videos that you can watch to get their suggested process to make lenticular images. They show Flip images but 3D images use same lenticular sheets with Vertical lenses. Go to http://www.vuethru.com/videos.html for the videos.

There are probably a lot of videos on YouTube as well.