

# Virtual Imaging

A new way of presenting high resolution images online for educational and scientific purposes.



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# What is a Virtual Image?

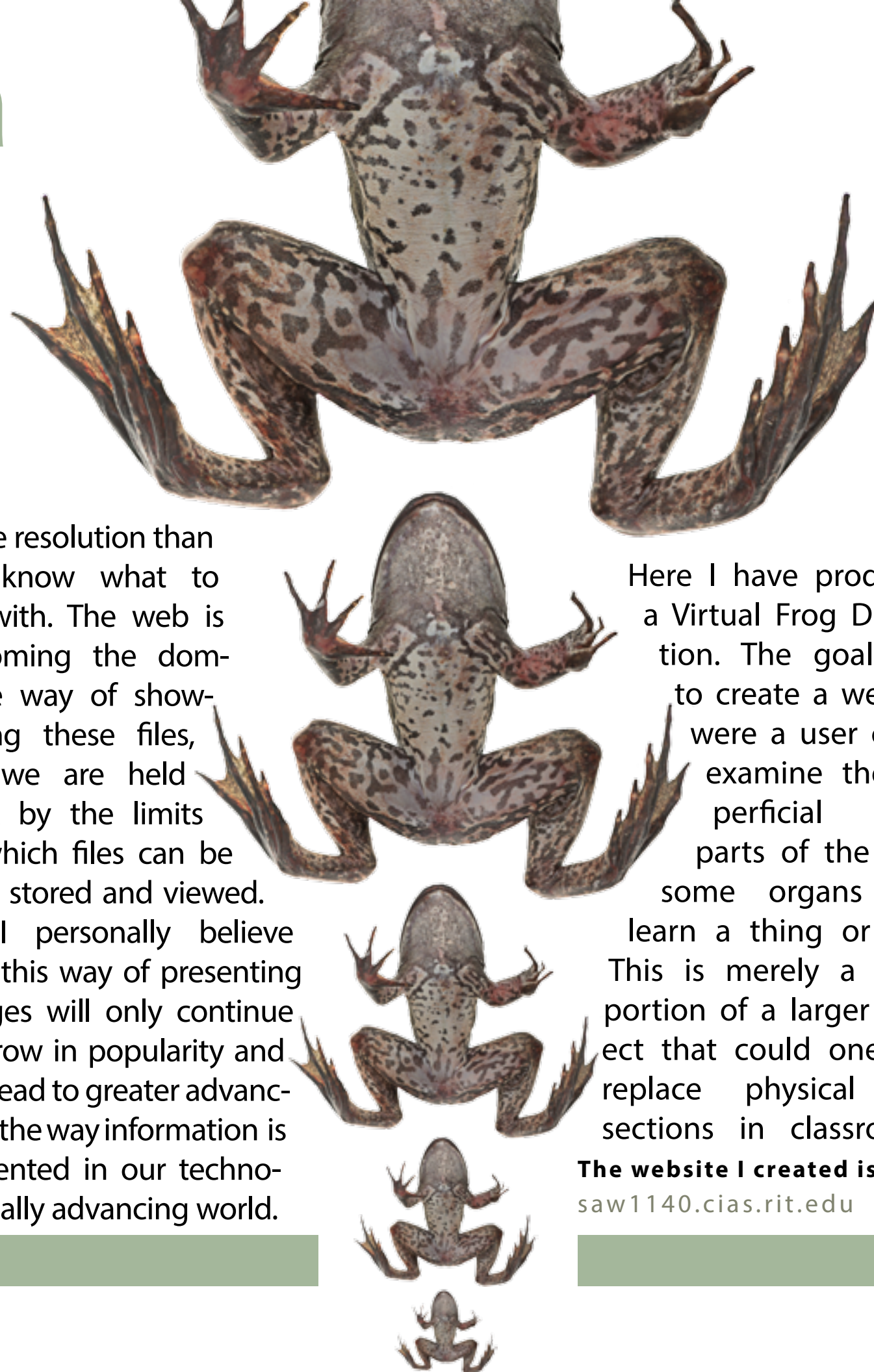
A virtual image is a high-resolution file that can be presented Online. The benefit of this type of presentation is the ability to zoom in and out on small details of the image much like someone could do with a macro lens or microscope.

I believe that this growing technique could become instrumental in teaching environments. Not only does it become a more engaging way of learning about the physical sciences, it can provide an opportunity to communities that do not have funding that allows this type of investigation to be performed.

Using stitching and stacking macro photography we have the ability to create files that have

more resolution than we know what to do with. The web is becoming the dominate way of showcasing these files, yet we are held back by the limits to which files can be sent, stored and viewed.

I personally believe that this way of presenting images will only continue to grow in popularity and can lead to greater advances in the way information is presented in our technologically advancing world.



Here I have produced a Virtual Frog Dissection. The goal was to create a website where a user could examine the superficial body parts of the frog, some organs and learn a thing or two.

This is merely a small portion of a larger project that could one day replace physical dissections in classrooms.

**The website I created is here:**  
[saw1140.cias.rit.edu](http://saw1140.cias.rit.edu)

# How it works

I wanted to create a seamless white background so the frog sat in a white opaque plastic tub with a hand-held flash underneath and pointing up, while two wireless flash units were above facing down onto the specimen. Even if you do not intend on leaving the specimen on a white background, having it free of texture will

## Imaging Setup:



The entire rig was placed under the camera and was able to be moved



# Imaging

To begin, I used a full frame DSLR and a macro lens set to 1:1.5. (Depending on the final file size desired you can image at 1:1 or even further magnification.)

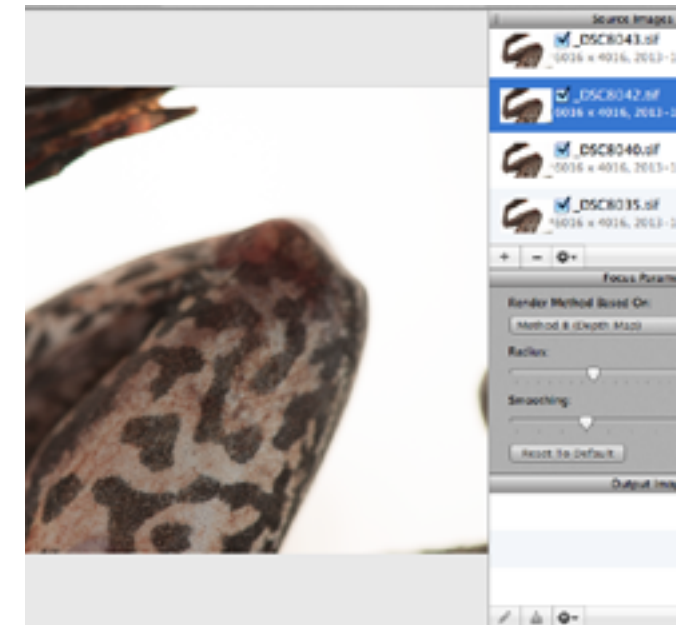
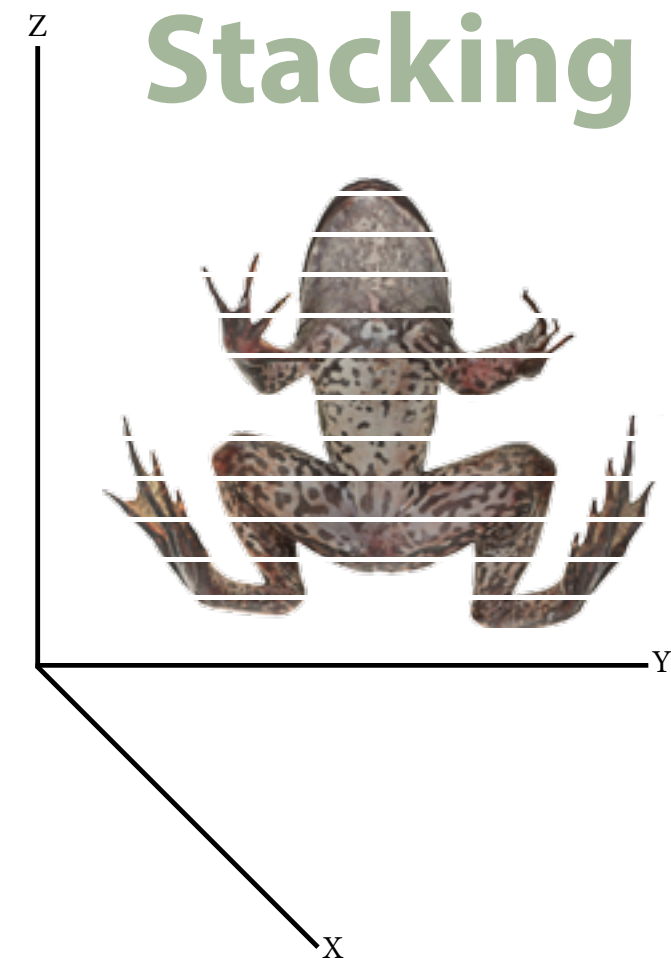
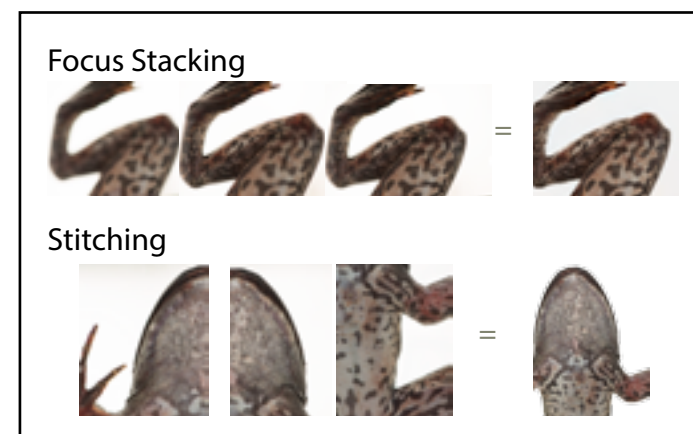
Start at some part of the specimen and take a picture. Depending on the magnification, only a small amount of the specimen will be in the frame.

At each frame you must focus stack. Choose the sharpest F-Stop and start where the top of the specimen is in focus. Take a picture and increase the working distance from the specimen and lens.

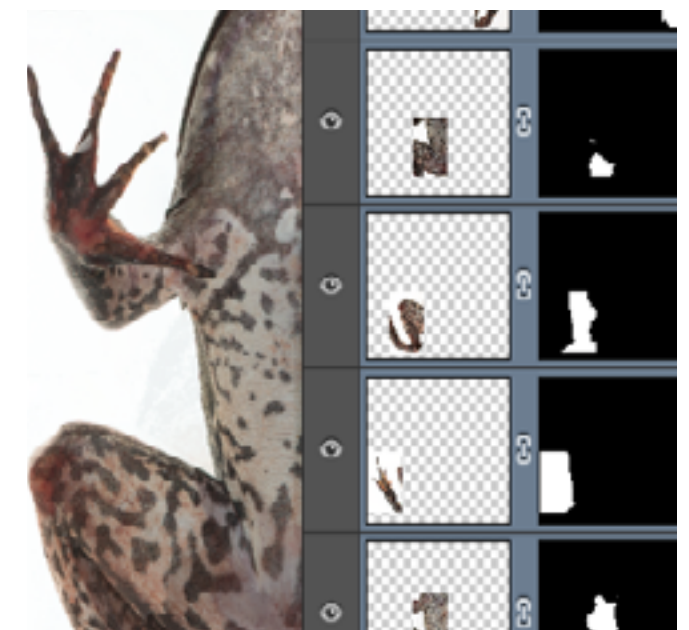
Go through taking a picture at each level of focus until you have captured all of the details. Now move to a new section of the frog with around twenty percent overlap and repeat the process. The result will be a series of sections of the specimen with multiple focus plans. Mine was twelve stitches, and each had around thirty stacked images.

You are going to want to organize all of these images. I chose to do this by creating twelve folders for each stitch that contained the stacked images. Bring these stacked images, folder by folder, into a program such as Zerene Stacker or Helicon Focus to stack the images. Once you have all of the images stacked, you can then stitch them together. To do this you can use PTGui or Photoshop. This software will put each piece together and make the specimen whole. What you are left with is a file of the entire specimen that is highly resolved and the entire field in focus.

## Process:



- After organizing files, bring each folder one by one into a program such as Helicon Focus like I have done above.
- Run the stacking software at highest resolution.
- Go through and manually edit any areas that the software may have missed.
- Save each stitch as a high quality tif.



- Now bring each stitch into software such as Photoshop like I have done above.
- Run Panoramic software with Reposition and blending selected.
- Reposition as needed.

# The End Result

Liver



Heart



Colon

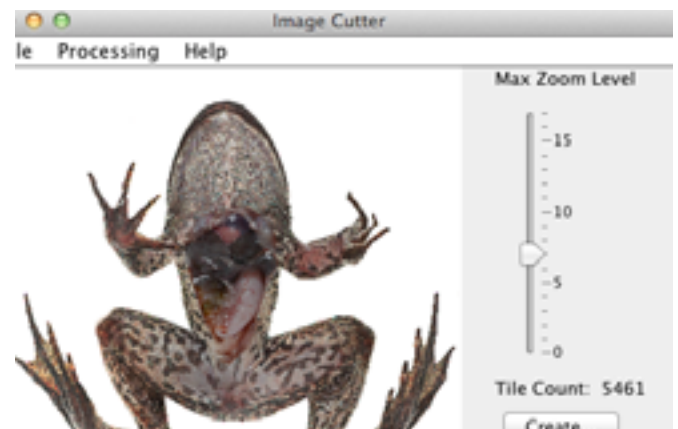


Stomach

Now that you have your high resolution image, you can use Gmapcutter, which can be found here: <http://www.bartlett.ucl.ac.uk/casa/latest/software>.

This software splits the image up into however many tiles you would like, which depends on the amount you would like the user to be able to zoom. The result is an html file that

can be opened with a web browser or added to a website.



You can choose the number of tiles by setting the max zoom level. The software outputs an HTML file that you can add to a website.