Rensselaer Polytechnic Institute
Department of Electrical, Computer, and Systems Engineering
ECSE 6969: Computer Vision for Visual Effects, Spring 2014

Homework #2: due Thursday, Feb. 20th, at the beginning of class.
Show all work for full credit!

1. (10 points) CVFX, Problem 3.18. (For this, you can use one of your own images and superimpose an inpainting region, or sketch an image and region by hand.)

2. (10 points) CVFX, Problem 3.20.

3. (20 points)

   (a) (10 points) Write an implementation of Poisson image compositing that takes as inputs an RGB source image S, an RGB target image T, and a binary mask M that is 1 at pixels of S that should appear in the composite. In addition to the description in Section 3.2.1, the small example in Problem 3.8 may help in figuring out the necessary linear system that should be solved. You can use any language you like; if you use Matlab, the command `delsq` may be useful.

   (b) (10 points) Demonstrate your implementation on a couple of (source, target) pairs of your choosing. Critically assess the results.

   (c) (10 bonus points) Further implement the mixed-gradient approach to avoid the problem illustrated in Figure 3.10b. Demonstrate before-and-after images where using mixed gradients improves the composite.

4. (10 points) Download the photomontage code from Agarwala et al. at this link (note that a Windows executable is available). Use it to create a multi-image composite from at least 3 images you took yourself (e.g., replicating the "family portrait" from class with your friends, or something similar). Critically assess the results. Provide the input images, final composite, and the final strokes and labelings that generated the composite.

5. (10 points) Download the Matlab seam carving code from Rubinstein at this link (or, an alternate implementation may be available; if so, let me know which one you used). Demonstrate the results of using it to both shrink and expand an image. Critically assess the results.

Images and code should be provided via a emailed link to a zip file on your homepage or in a shared Dropbox folder (I'm still open to suggestions on the most streamlined way to submit such materials for this class).