



## Lab Exercise 12: Steganography

### Goal:

The goal is to understand how a photo can hide directly in “plain sight”.

### Hide A Photo

Begin by finding a photo on the WWW. Think of a topic, do a search, check under Images, and select a photo that is (a) less than 700 x 474 in size, (b) is interesting, (c) *suitable for classroom display*. You should not spend more than 10 minutes on this. I will use the photo at right, which is 400x400.



Grab the “Hide” code that comes with this lab. Edit it to (a) change the integer `wid` to be the width of your photo (400), integer `hi` to be the height of your photo (400), and `loadImage( )` command to reference your `.jpg` file, `loadImage(“mine.jpg”)`.

Run the program, being sure your picture and the fog picture (also given with the lab) are in the `data` folder, click the mouse, and notice that you now have a `labFog.png` file. This is the fog picture with your photo hidden inside of it.

### Reveal A Photo

The following Processing code, called Reveal, extracts a photo hidden in the last two bits of the pixels of a `.png` photo. Type this code as a new Processing program, **commenting each line**. **Understanding the purpose of each line of this code is the point of this lab**. As you enter it, adjust the `wid` and `hi` parameters to match your photo.

```
PImage fog;
int flip = 0;
int srcw=700; // width of the source (fog) photo
int srch=474; // height of the source (fog) photo
int wid=400;
int hi=400;
color c, cprime;

void setup( ) {
  size(srcw, srch);
  fog = loadImage("labFog.png");
  image(fog,0,0);
}
```

```

void draw( ) {
  if (flip == 1) {
    for (int i=0; i<srcw; i++){
      for(int j=0; j<srch; j++) {
        c = get(i,j);
        if (i<wid && j<hi) {
          cprime=color((2*(int(red(c)))%256),
                      (2*(int(green(c)))%256),
                      (2*(int(blue(c)))%256));
          set(i,j, cprime);
        } else {
          set(i,j,c);
        }
      }
    }
  }
  flip = 0;
}

void keyPressed( ){
  flip = 1;
}

```

When the program is complete, move the labFog.png image encoded above to the folder of this program, and run it. When any key is pressed, the hidden photo should shift its RGB bits left one position – 6 keys reveals the embedded picture.

**Turn-In:** Submit your commented code (the Reveal program) to the class dropbox.

