ECE 661: Homework 1

Due September 7th

Problem:

The main goal of this homework is to write a computer program that takes out the perspective distortion in an image of a scene that is mostly planar. This is a three step process:

1. Manually establish correspondences at four points between the image and world planes (pixel coordinates can be obtained using paintbrush under windows or gimp under linux).
2. Solve for the homography between the image and world planes.
3. Transform the image to the world plane (optionally use bilinear interpolation to smooth the results).

You are strongly encouraged to use the OpenCV C/C++/Python library available at http://opencv.willowgarage.com to handle the low-level image and matrix operations. However, you are not permitted to use the OpenCV functions findHomography or warpPerspective.

Solution:

You should turn in a report in pdf format of your homework solution using electronic turn-in (instructions at http://engineering.purdue.edu/ece661/). The report should include

1. A brief outline of your method for finding the homography including relevant equations.
2. A description of how you used the homography to transform the image to the world plane.

3. The original and transformed images for 4 images taken from
   http://engineering.purdue.edu/ece661/homework/ECE661_hw1_images.zip
   The necessary world coordinates are given in
   http://engineering.purdue.edu/ece661/homework/ECE661_hw1_info.pdf

4. The original and transformed images for 2 images taken with your own camera. Don't forget that the scene should be mostly planar.

5. Your source code.

You are permitted to look at sample solutions from previous semesters available at
http://cobweb.ecn.purdue.edu/~kak/courses-i-teach/ECE661.08/index.htm
However, the work you turn in must be your own!