



# ELEC 474

Lab 5 – Stereo Rectification and Block Matching  
Disparity Map Calculation

Lab 5 – Stereo Rectification and Block  
Matching Disparity Map Calculation

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## Contents

1. Stereo Rectification and 3D Reconstruction .....	1
1.1 Fundamental Matrix Calculation .....	1
1.2 Image Rectification .....	1
1.3 Block Matching Disparity Map Calculation .....	2
2. Submission .....	2

## 1. Stereo Rectification and 3D Reconstruction

For this lab you will be performing image rectification on a set of stereo images in order to construct a disparity map.

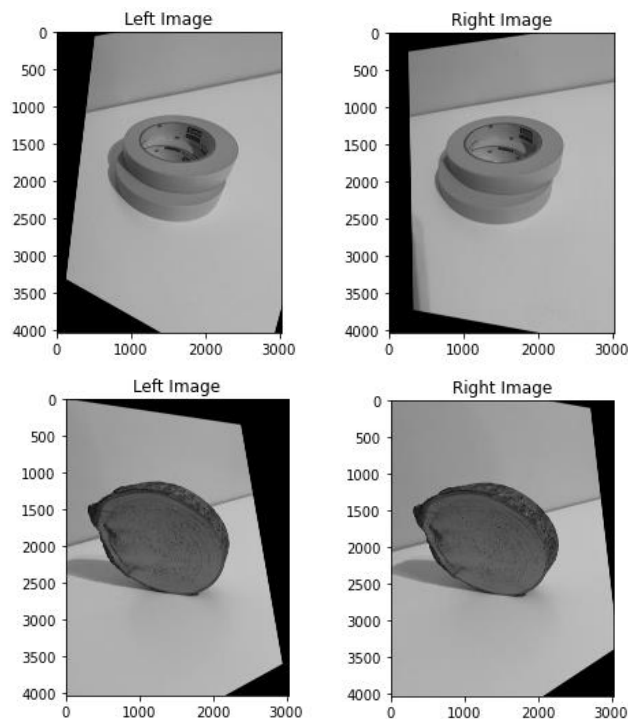
### 1.1 Fundamental Matrix Calculation

Follow the same procedure as in the Prelab to calculate the Fundamental matrix. As an output, return the calculated Fundamental matrix, as well as the inlier matches. The inlier matches should be stored as two lists of corresponding points, one for each image, so that every  $i^{\text{th}}$  point in the left image list corresponds to the  $i^{\text{th}}$  point in the right image list.

### 1.2 Image Rectification

Use the calculated Fundamental matrix and the inlier match lists to rectify the images, using **cv2.stereoRectifyUncalibrated()**. This will return two rectifying transformations (i.e. homographies), one for each image. Apply these transformations to rectify each image, and output the transformed images.

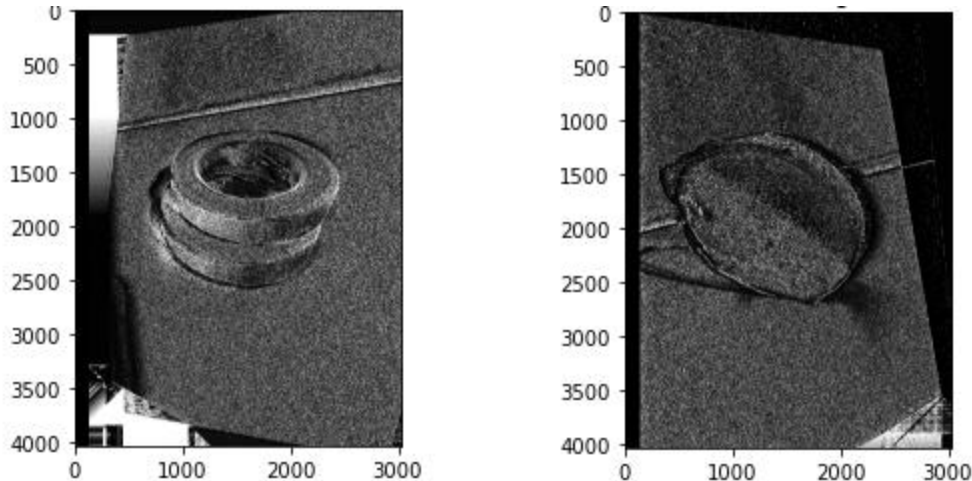
The rectified versions for the tape and coaster images should look something like this:



### 1.3 Block Matching Disparity Map Calculation

From the two rectified images, you can now calculate a disparity map. Use `cv2.StereoBM_create()` to instantiate an OpenCV Stereo Block Matching object. Be sure to set the **numDisparities** and **blockSize** parameters. (You may have to experiment with these two parameter values to get a satisfying result.)

Next, call the `*.compute()` method to calculate the disparity map, and then display the output. The Scaled and displayed as grey scale, the disparity maps for the two test images should look something like this:



## 2. Submission

The submission for this prelab should include a .zip of:

- .ipynb file that includes:
  - Your code for Image Rectification and Block Matching Disparity Map Calculation.
  - Output rectified and disparity map images on the two pairs of provided stereo images. Indicate the values of the **numDisparities** and **blockSize** parameters that you selected.
  - Your code should display images of your rectified images, and the calculated disparity maps.

Your code will be run in Jupyter Lab to test for functionality. The marking rubric is as follows:

Section	mark
1.1 Fundamental Matrix Calculation	0.5
1.2 Image Rectification	1.5
1.3 Block Matching Disparity Map Calculation	1.5
Correct submission format	0.5
<b>Total:</b>	<b>4</b>