Gebze Institute of Technology
Department of Computer Engineering
BIL 665 / BIL 463
(Introduction to) Computer Vision
Fall 2015
HW3
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In this homework, we will locate fiducial marks from the HW3 and draw 3D cubes on the 2D fiducial. These types of applications of fiducials are very common with the Augmented reality applications. One such example can be seen at https://www.youtube.com/watch?v=z2gqshFr4AI or https://www.youtube.com/watch?v=ro_DojAmwLs
Our application will be much simpler because we will draw just one cube with edges only.

Here are the steps of the procedure that you may follow
1- Calibrate your camera with the OpenCv routines to get the intrinsic camera paramters, K.
2- Once you have K, then to obtain R and T matrices (remember M = K[R|T]), you may use OpenCV function SolvePNP, which takes object points and image points. For the object points, you provide the corners of the fiducial as 3D points with Z values as zero. Using more than one fiducial might make your R and T estimation even better.
3- Once you have the R and T values, you can map any 3D points to the image space using projectPoints of OpenCV. Choose the corners of your 3D cuve as you wish, project them to the image coordinates and draw lines between them.

Prepare a report that gives step by step detailed algorithm for your system and show your intermediate results.

You will compile and demo your system at project lab. Your next howework will depend on this homework, so you should submit this homework.

BONUS (50 points): Do not use solvePNP or projectPoints from OpenCV. Use the method descibed in Şamil Karahan's MS thesis at the GTU VisionLab pages.

NOTE: If you do not have any fiducials working, you may use the calibration patterm corners from the OpenCV. However, your homework will be graded out of 60 points if you chose this method.