

Assignment 2**Due Date: 25th April****Max Marks: 200**

Programming instructions:

1. Programming language: Python
2. The codes should be written from scratch unless mentioned otherwise in respective questions

Reporting instructions:

1. A single PDF file should be submitted containing all relevant information including data pre-processing, observations, results, and analysis across the problem. Do not put snapshots of code in the report
2. The report should be detailed and clearly explaining every step you have followed. All the intermediate outputs, their inferences should be present in the report
3. The PDF file should be properly named with your complete roll number (ex: "XYZassignment1.pdf"), with your name and roll number mentioned inside the report as well. Please submit your working code as **.py** files. And make sure that the PDF is included in the same zip file as the codes

General instructions:

1. DO NOT plagiarise from the internet or your peers. The institute's plagiarism policy will be strictly enforced.
 2. The assignment will be evaluated out of 50% of the total marks in case a report is not submitted
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Question 1: Creating Panorama using Image Stitching**[30 marks]**

Capture 5 images using your phone. These images should have a certain overlap between each pair of consecutive images. Combine these images into a single image using image stitching. Apply a blending technique for a smooth transition between images. You may use inbuilt functions of the OpenCV library for implementation.

Question 2: Corner Detection**[20 +10 + 10 marks]**

Implement any corner detection technique to detect the corners in the images given in this [folder](#).

1. Report the output corresponding to each image by varying the window size and threshold.
2. Compare your results with the output obtained while using inbuilt functions
3. Are the outputs same in 1 and 2. If not, why?

Question 3: Camera Calibration**[30 marks]**

1. Compute the intrinsic and distortion matrix of the camera using the images given in this [folder](#).
2. After computing the matrices, test on a distorted image (**given as test_image in the given folder**) and show its corresponding undistorted image.

You are free to use inbuilt functions.

Question 4: Morphological operations**[20 marks]**

Perform erosion, dilation, opening, closing, morphological gradient, top hat, and black hat on these [images](#). Draw your inference on the results. Justify your choice of structuring element. You are free to use inbuilt functions.

Question 5: Stereo Vision**[20 marks]**

Click some pictures of different scenes and show their disparity maps. Also, calculate their depth maps. You are allowed to use the inbuilt functions. Explain the working of the inbuilt function you have used in detail in the report.

Question 6: Hough Transform**[10+10 marks]**

The objective of this task is to discover round (circle) objects in a picture utilizing Hough transformation. You are supposed to write a program that takes an input grayscale image (available [here](#)) that outputs the center and radius of all the objects present in the image, which are round in shape. You need to output a single hypothesis for every object. Subsequently, circles that are close concentric ought to be assembled presumably together in your output since, almost certainly, they emerge from a similar object. Your program should also draw the found circles on it to perceive how you are getting along.

Report and Viva = 50 marks