User's Manual to Matlab Executables:

1. Copy the folder **EESC6363_DIP_ProjectData_Parth** to the matlab directory on the computer.
    a. Eg for Windows computers, MATLAB directory is usually found at Documents\Matlab

2. Follow steps mentioned below to execute each MATLAB file in the folder: "Codes"

A. ATC Correction Code:
    a. Open atcmain.m file
    b. Pass the blur image and low exposure image, specifying their path in lines 5 and 6 respectively.
    c. Specify a filename at line 13 to which you wish to write the output image on.
    d. Run the file.
    e. Pass a desired tolerance for mean and variance when prompted to do so.
    f. The user defined function [Y,dm,dv] = atcdeblur(blur,lowe,nm,nv) performs the deblurring.
    g. If the code ends in an error, re-run and enter a higher tolerance value.
    h. To be on the safer side, enter a value between 25-30%, the program will itself select the output that corresponds to the lowest possible tolerance below the value specified by user.
    i. The output gets written to the specified file in the bin folder of the MATLAB directory and is displayed in separate windows as well.
    j. To note the percentage error, browse to the command window where both the percentage errors are displayed. Note them down in an excel sheet if desired for further analysis.

B. PSF Correction Code:
    a. Open the psfmain.m file
    b. Pass the blur image specifying its path as mentioned in line 5.
    c. Pass the inertial sensor data file specifying its path as mentioned in line 7.
    d. Provide the column start and end for acceleration in x and y in line 8 and 9 respectively.
    e. Specify a filename at line 29 to which you wish to write the output image on.
    f. Run the file.
    g. Pass a desired value of constant multiplier and inverse sound to noise ratio when prompted to do so.
    h. User defined function [y,psf1] = psfdeblur(blur,x_acc,y_acc,mul,isnr) performs the psf correction on the blurred image passed as parameter.
    i. If the code ends in an error, or in order to get a satisfactory output, the above steps must be reiterated for different values of the constant multiplier and/or the isnr.
    j. The output gets written to the specified file in the bin folder of the MATLAB directory and is displayed in separate windows as well.
    k. Also, the PSF mask is displayed in a separate window.

C. Mean Square Calculation for Objective Analysis
    a. Open the msemain.m file
    b. Pass the blurred image, atc corrected image, image corrected using the proposed algorithm, and the psf corrected image specifying their paths as indicated in lines 5,7,9 and 11 respectively.
    c. The user defined function ‘mse.m(x1,x2)’ performs the calculation of the mean square error.
    d. These values are displayed on the command window to be noted down for further analysis.