CET CPET-563 Embedded Systems Design II **Dr. Semeraro**
Lab 1 – Image Projection and Depth Calculation

Introduction:

The first step in finding a tennis ball in 3D space is to determine its Z position relative to your stereo camera. For this lab you will provide tennis ball centroid locations for both the left and right camera, and you will compute and display the Z position of the ball. Your module:

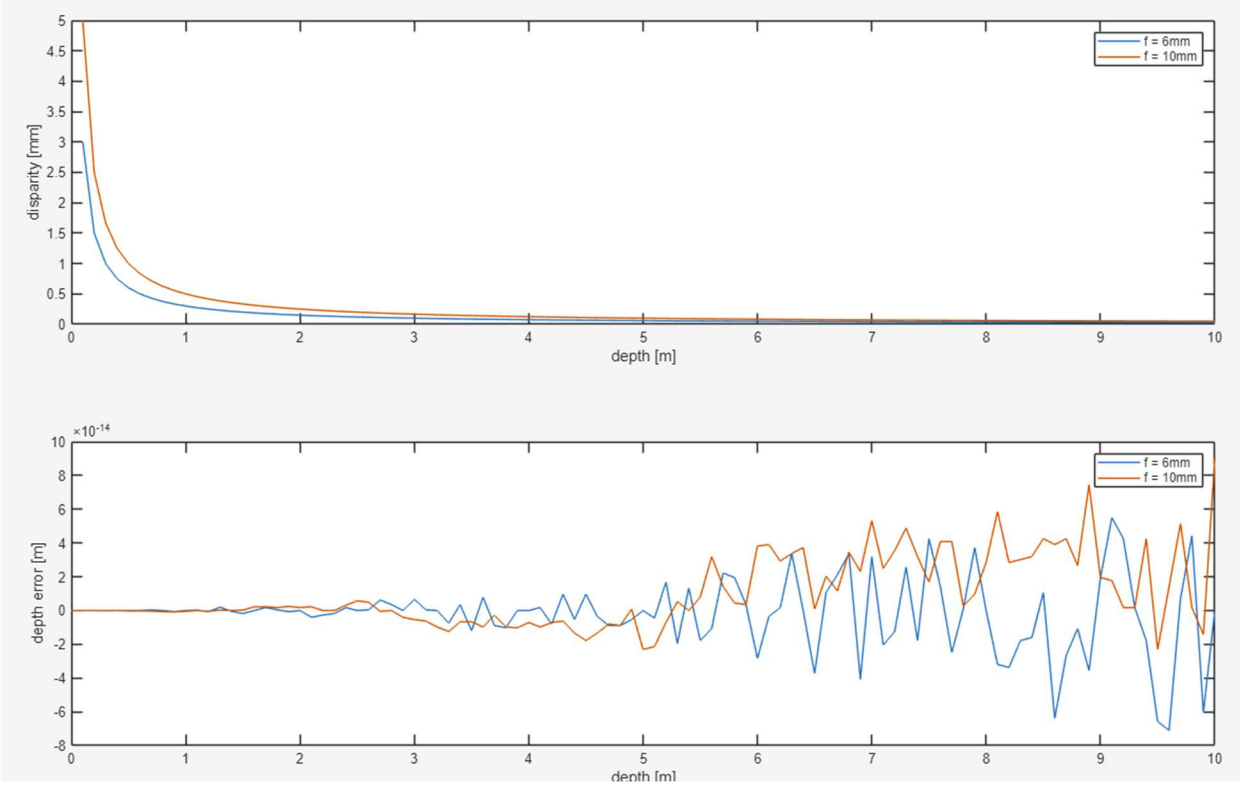
- shall use Peter Corke's toolbox to generate the position of the ball in the left and right images for varying depths
- shall compute and display the Z distance of the ball in meters
- shall use MatLab
- shall output plots similar to the ones below where a parameter such as baseline or focal length is changed

You can hard code the parameters below:

```
b = 50;                 % baseline [mm]
f = 6;                  % focal length [mm]
ps = .006;              % pixel size [mm]
xNumPix = 752;          % total number of pixels in x direction of the sensor [px]
cxLeft = xNumPix/2;     % left camera x center [px]
cxRight = xNumPix/2;    % right camera x center [px]
```

Use the equations below to find depth:

```
d = (abs((xLeft-cxLeft)-(xRight-cxRight))*ps)  % disparity [mm]
Z = (b * f)/d                                  % depth [mm]
```



Lab Submission:

Submit Image(s) of your plot generated by your code to demonstrate functionality

Submit your (professionally commented and structured) .m file(s)

Assessment Criteria:

Grade	Description
0	Lab handed in late, or not handed in
1	Poor quality
2	Good quality