**CODE DESCRIPTION:**

All the code of this project was done on MATLAB.

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| **Document name** | **Description** |
| GUI\_2cams.fig | This is the GUI for our code. Click on Initialize to set up the parameters such as the cameras and the threshold constants. Then Click Start/Pause Video to start the video feed and the processing loop. Below the buttons there will be a plot that will be generated with the end-effector location plotted in red. To finish Click on Close Video and Close GUI. On the top right corner of the plot, the XYZ positions are displayed. X and Y is the horizontal and vertical value as seen in camera one and the Z position is the horizontal value as seen in camera two. |
| GUI\_2cams.m | This is the main file for our program. This is the main GUI function that allows for initialization of Videoplayer objects, start/pause video stream, image processing, plotting and deleting all variables when closed. |
| plotee.m | This function accepts the EE coordinates, bounding boxes, base coordinates (all in pixels). Using measurements, calculations and assumed distances between the camera and the base, we have obtained the variation of pixels/inch w.r.t distance of object from the camera. The slope of this graph represents the magnification factor. The pixels/inch at a particular depth from the camera is used to calculate the distance between the EE and the robot base in inches, using the coordinate information in pixels. The EE coordinates w.r.t the base, in inches, are plotted in an animated line plot. Finally, the coordinates are returned to the calling function. |
| v2struct.m | v2struct Pack/Unpack Variables to/from a scalar structure. Open source code obtained from the following link. Makes it easy to send/receive many variables between functions by using a custom structure data type.  Source: https://www.mathworks.com/matlabcentral/fileexchange/31532-pack---unpack-variables-to---from-structures-with-enhanced-functionality/content/html/v2struct.html |
| VidProcess.m | This function accepts the videoplayer structure returned by white.m as input. It then tracks the white object (End effector) and the base (Green object), and returns these details to the calling function. |
| white.m | This script creates VideoPlayer object, sets white detection threshold, acquires input stream, defines bounding box and text parameters. Accepts VidId as input which represents the deviceID of the camera being used. Returns VidStr which is a custom structure data type that stores different properties of the VideoPlayer object. |