- Milestones
  - Completed:
    - Chose manny for reconstruction
      - After looking at the options for object reconstruction I have chosen manny. I encountered some difficulties in downloading the images from the google drive, in which not all images from the drive were getting downloaded. For some reason frame_C0_00.png did not want to download from the drive. After a couple attempts I finally had all the images needed.
    - Calibrated left and right camera.
      - I used calibrate.py to get accurate intrinsic parameters for the camera scanner from the images in the calib_jpg_u folder. I then used calibratePose from camutils to get the left and right extrinsic camera parameters.

```
{'fx': 1405.321291016002, 'fy': 1403.9040882554848, 'cx': 962.1638432781476, 'cy': 590.925281441257, 'dist': array([[-5.2361639
8e-03,  8.06252729e-02,  2.04807988e-05,
        -3.90754589e-03, -1.08137120e-01]])}
Camera :
 f=1404.6126896357434
 c=[[962.16384328 590.92528144]]
 R=[[-0.00259819  0.9909686    0.13406892]
 [ 0.99277869 -0.01352313  0.1191956 ]
 [ 0.11993213  0.13341046 -0.98377738]]
 t = [[ 7.50034872  7.20907135 47.76536762]]
Camera :
 f=1404.6126896357434
 c=[[962.16384328 590.92528144]]
 R=[[ 0.03843677  0.98947349  0.13951641]
 [ 0.97735756 -0.00815333 -0.21143728]
 [-0.20807406  0.14448439 -0.96738278]]
 t = [[ 6.86592186 19.52347986 47.34466469]]
```
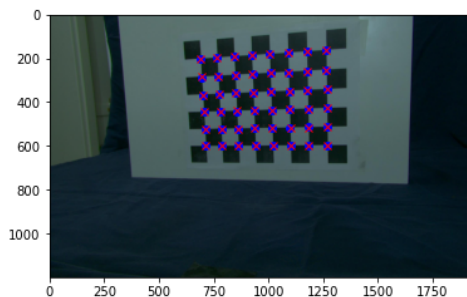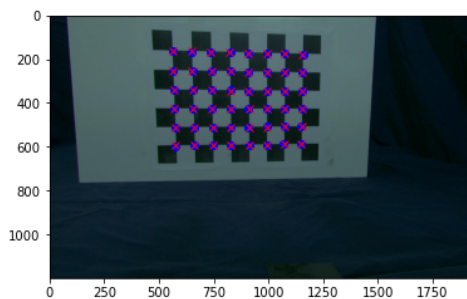
- Modified Reconstruct to get the difference between the object in the foreground and the background.
  - According to the printed masks the function can differentiate between the object and the background, given a threshold value small enough. I am having trouble recording the color pixel in the color image and storing it in a proper array so that the complete mesh has color from the original image. A very small threshold is needed in order to view the object, a threshold value of 0.1 the mask appears black, but .0000001 the mask works, this seems like a bug, but I am not sure.
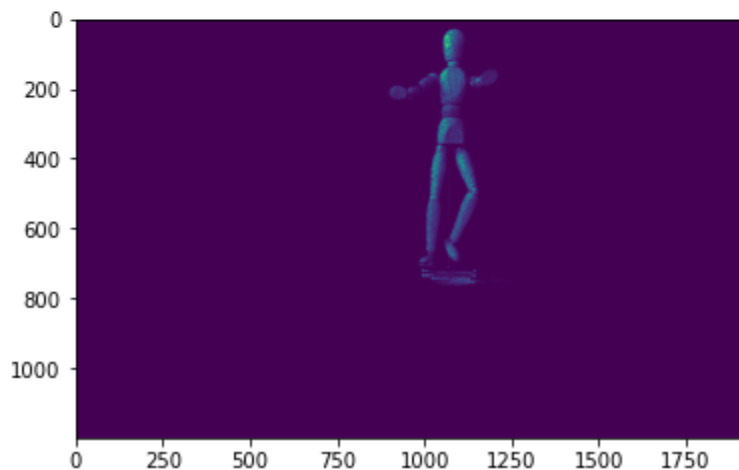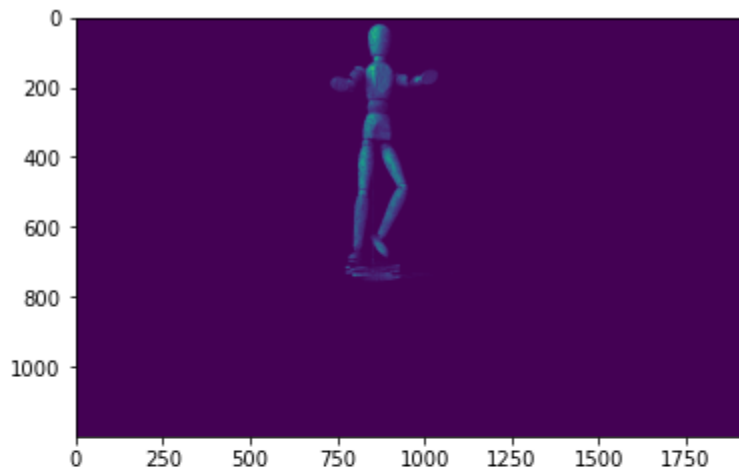
- I have completed a rough draft of the mesh generation function and encapsulate function
  - I adjusted the generation function to cleanup the new colors array of the mesh colors. I have also encapsulated the reconstruction and generation to a creation function that runs both and then uses writeply to send the results to a ply file in

my final project directory. This has helped me notice the errors in my mesh colors array after trying to view a ply in meshlab.

```python
def creation(filename, colorL, colorR, bgL, bgR, imprefixL, imprefixR, threshold, thresholdC, trithresh, boxlimits, camL, ca
    colors, pts2L, pts2R, pts3,_,_ = reconstructColor(colorL, colorR, bgL, bgR, imprefixL, imprefixR, threshold, thresholdC,
    pts3, pts2L, pts2R, tri, colors = meshGen(pts3, pts2L, pts2R, boxlimits, trithresh, colors)
    writeply(pts3, colors, tri, filename)
```

```python
root = "/Users/MatthewWayneAyres/Documents/UCI School Work/Spring 2021/CS 117/finalproject/manny/"

thresh, threshC, threshtri = 0.02, 0.000001, 1
boxlimits = np.array([0, 20, 0, 20, 15, 30])

for i in range(5):
    backgroundL, backgroundR = f"{root}grab_{i}_u/color_C1_00.png", f"{root}grab_{i}_u/color_C0_00.png"
    objectL, objectR =  f"{root}grab_{i}_u/color_C1_01.png", f"{root}grab_{i}_u/color_C0_01.png"
    prefixL, prefixR =  f"{root}grab_{i}_u/frame_C1_", f"{root}grab_{i}_u/frame_C0_"
    creation(f"set{i}.ply", objectL, objectR, backgroundL, backgroundR, prefixL, prefixR, thresh, threshC, threshtri, boxlim
    print(f"done {i}")
```

- ○ Incomplete : Need to do
    - ■ Fix color matching in mesh reconstruction. Attempting to view in meshlab after running a rough draft of the mesh generation function all points appear black, meaning that I am not properly passing the colors along. I must find a fix for this.
    - ■ Once I am happy with my reconstruction and generation function I must clean up the meshes and merge the files into one mesh. My current approach outputs the data into a ply with the assumption that I will correct all the data in meshlab. Once I have all the data from the separate plys combined into one I will use meshlab for Poisson surface reconstruction. From a quick glance at the program it looks like there will be a learning curve.
    - ■ Alternatively I can try to use the SVD approach for combining the scans however this would take some catching up in lecture.