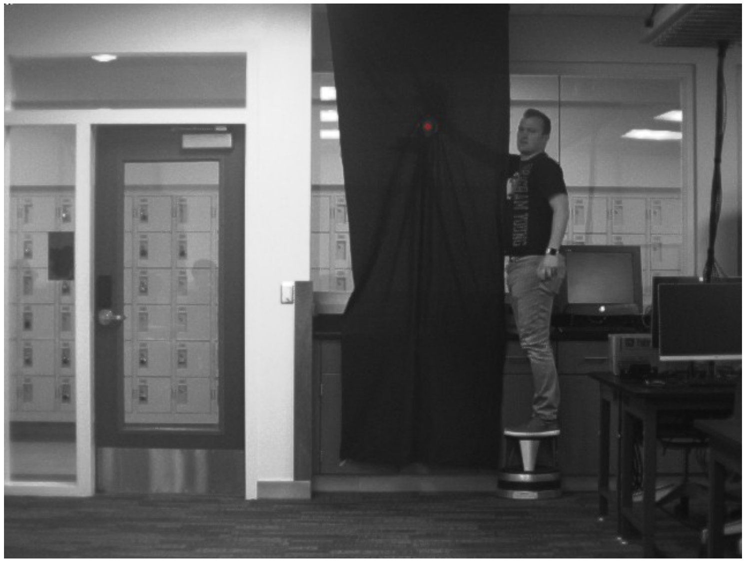
Jaron Ellingson
Robotic Vision
Homework #4

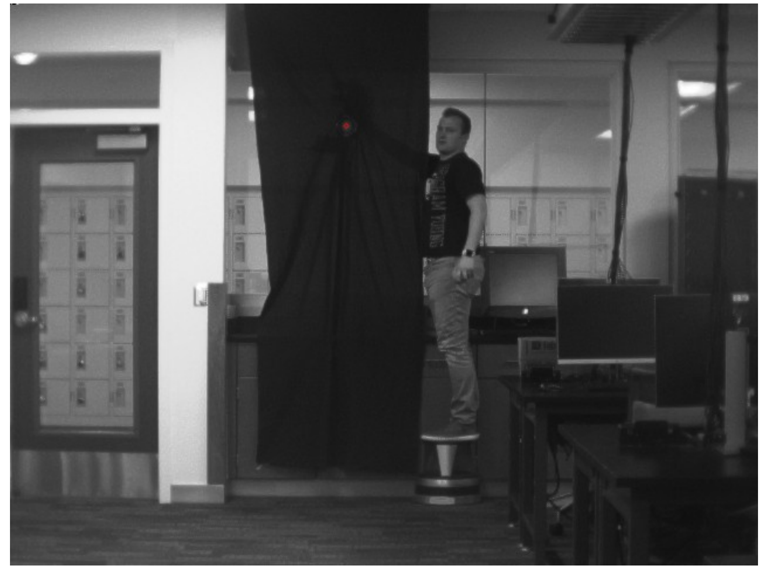
1)

Left 0: [-1.24208, -6.32283, 292.769]
Right 0: [-21.5208, -6.3244, 292.769]
Left 9: [33.728, -6.8499, 291.181]
Right 9: [13.4493, -6.82905, 291.181]
Left 60: [-0.853402, 16.9967, 293.598]
Right 60: [-21.1321, 16.9599, 293.598]
Left 69: [34.1326, 16.48, 292.705]
Right 69: [13.8539, 16.4699, 292.705]

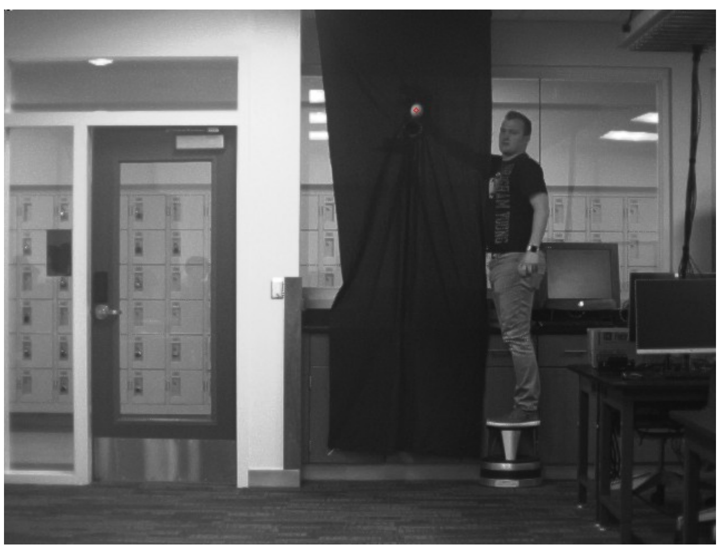
My results are correct because the difference from left to right camera of the same point is exactly the T values found from the stereoCalibrate function. Additionally, the distance from corner 0 to corner 1 is 3.88636*9=34.97724 inches. While the distance from corner 0 to corner 60 is 3.88636*6=23.31816 inches.

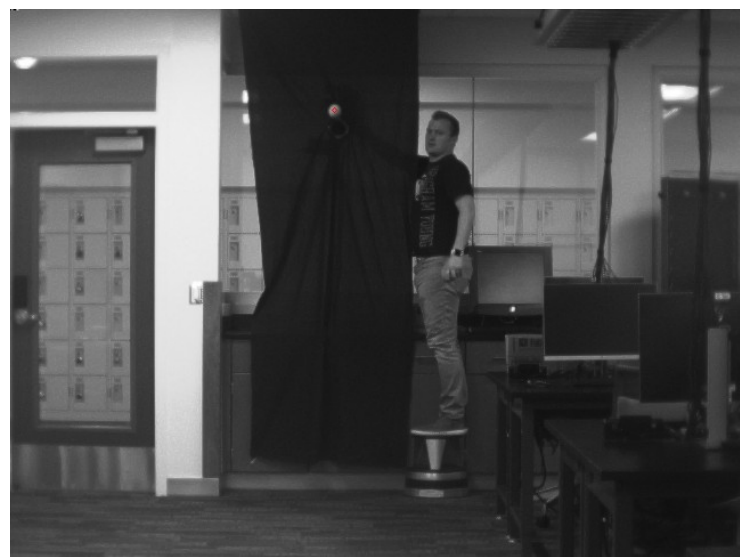
2)
First:



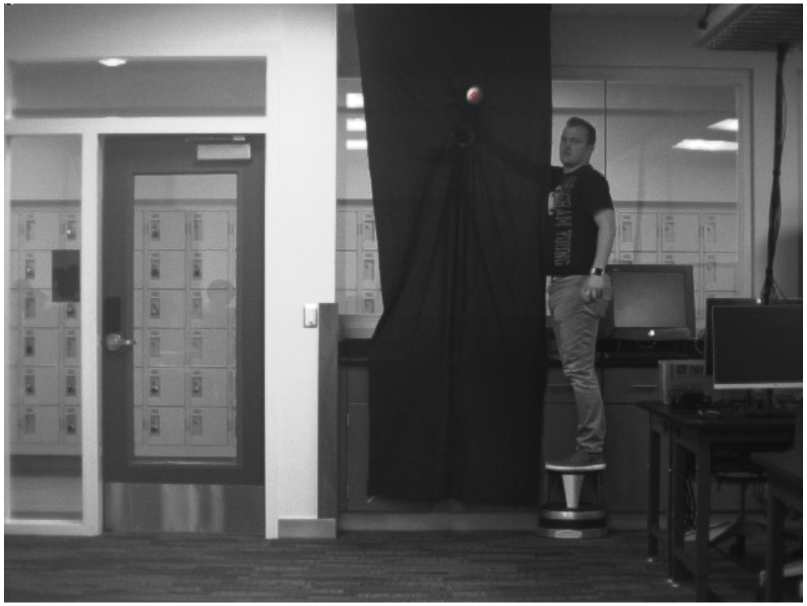


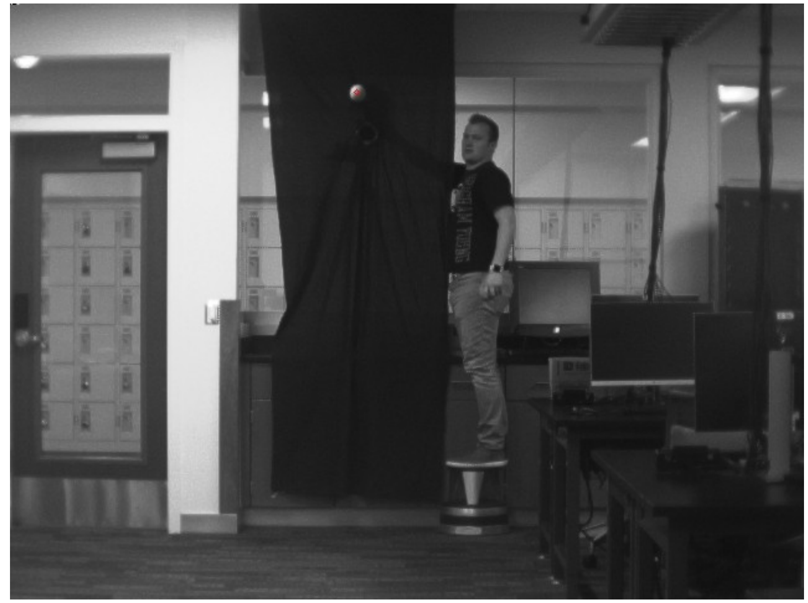
Fifth:



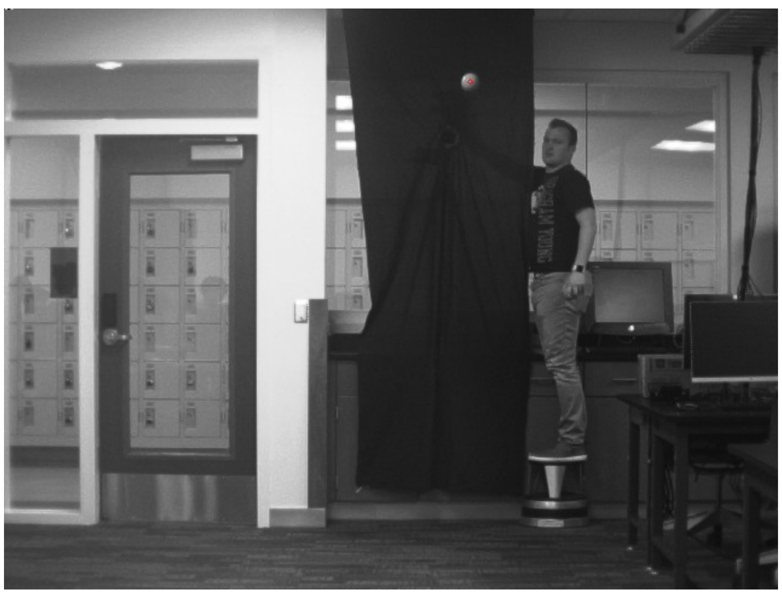


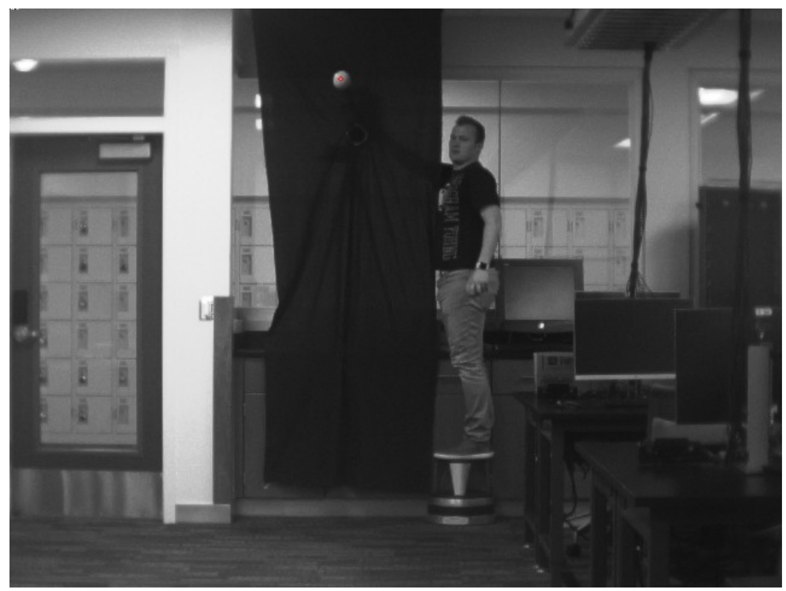
Tenth:



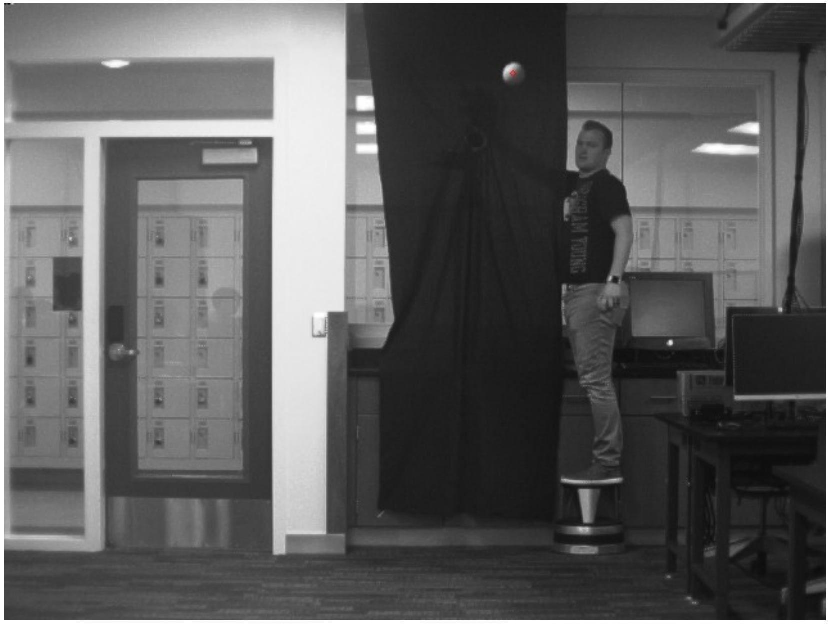


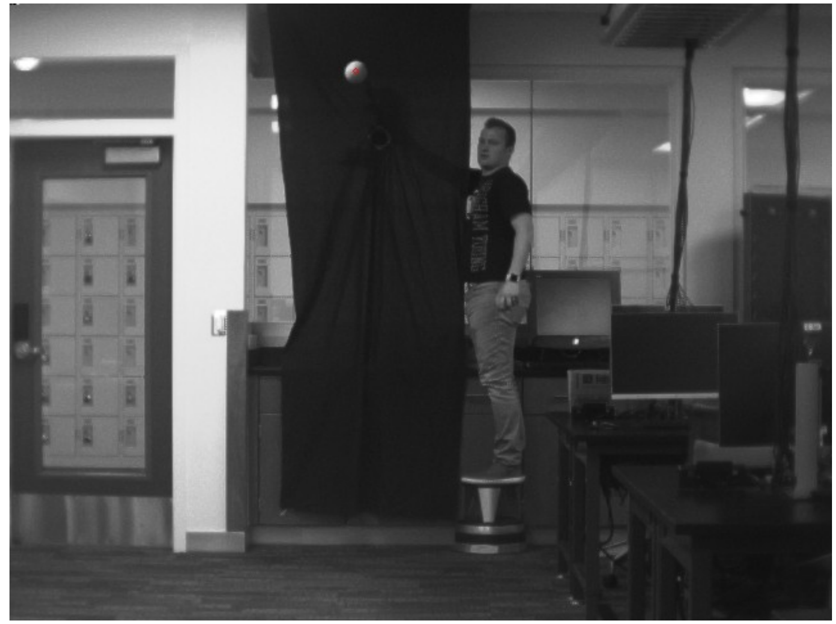
Fifteenth:





Twentieth:

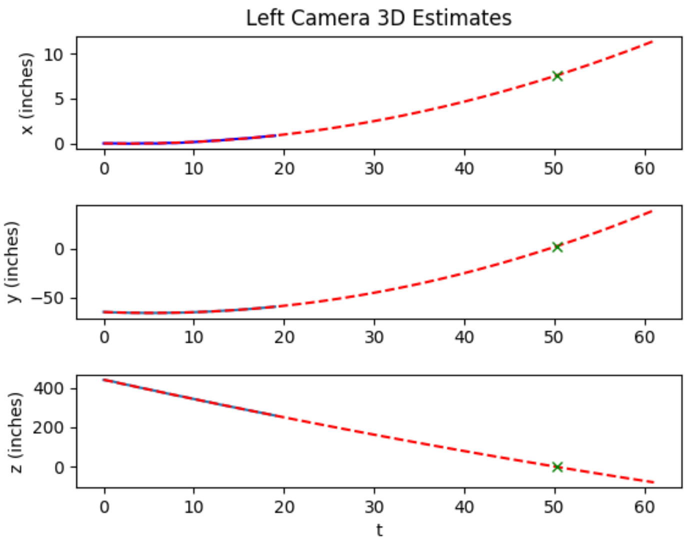


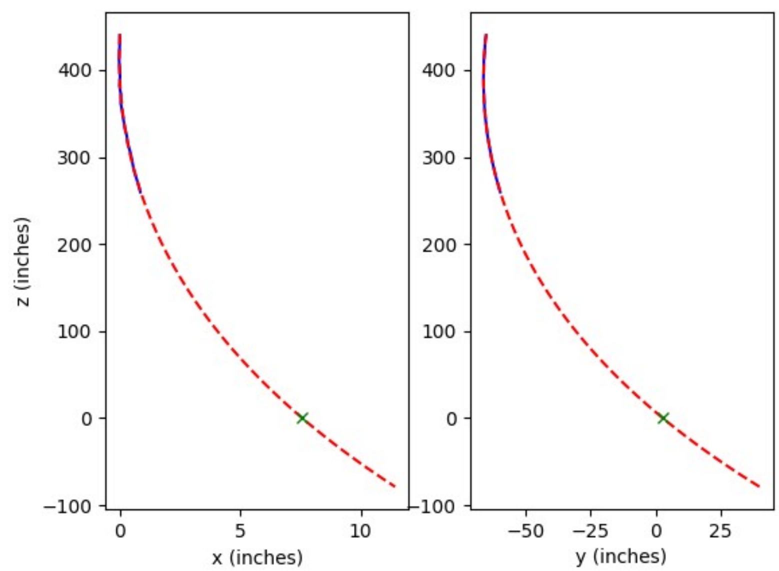


3)
The way that I estimate the trajectories is using a simple least-square estimate for a quadratic system on individual X,Y, and Z data. I choose to include plots of individual X, Y, and Z trajectories and XZ, YZ trajectories at 20, 35, and 42 frames. This is because, I will want to send a motor command half way through the flight of the ball and then once again towards the end of the flight. Since I don't know if the motor will react quick enough after 42 frames (the most frames I was able to track), I also included an estimate at 35 frames. I will need to determine when between 35-42 frames I will want to estimate the final position. I also noticed that tracking towards the end (35-42 frames) the ball starts to get blurry and my measurement is less accurate. If this is the case, 35 frames is definitely where I would want to cut off the estimate.

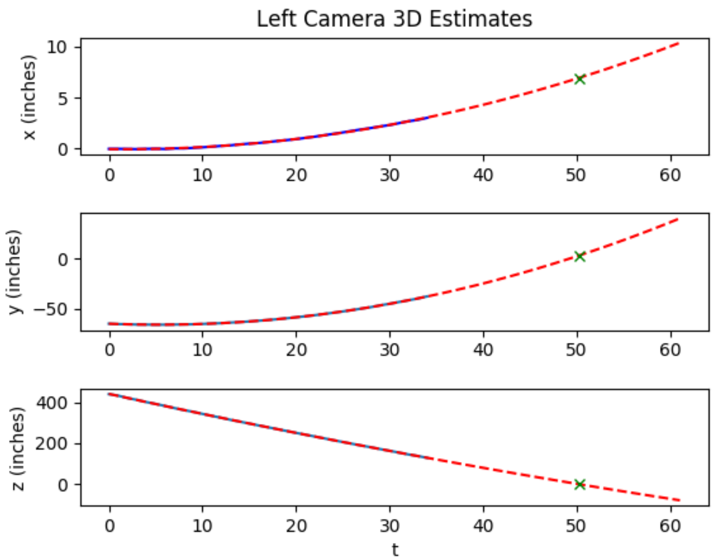
**For the plots, the blue is actual data and the red dotted line is estimated trajectory. The green x is the estimated position of the catcher at Z=0.

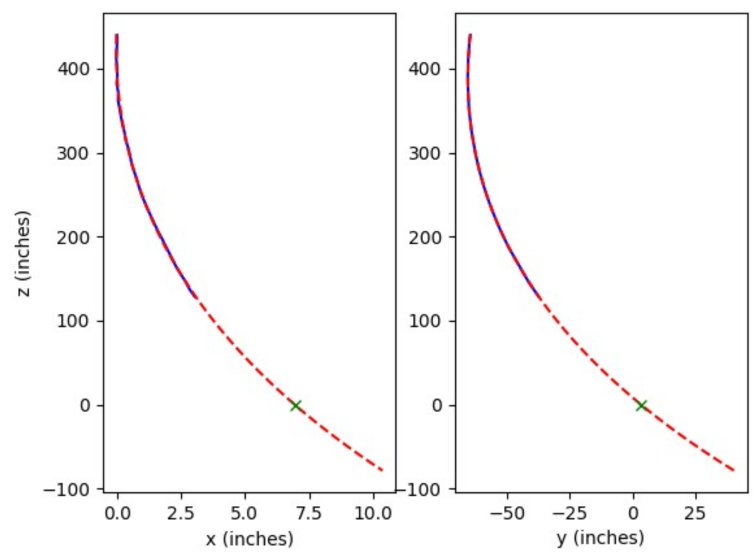
20 frames at Z=0:
X estimate: 7.58 inches
Y estimate: 2.77 inches





35 frames at Z=0:
X estimate: 6.94 inches
Y estimate: 3.4 inches





42 frames at Z=0:
X estimate: 6.63 inches
Y estimate: 2.45 inches