ECEn 631 3D Structure From Motion – HW 6
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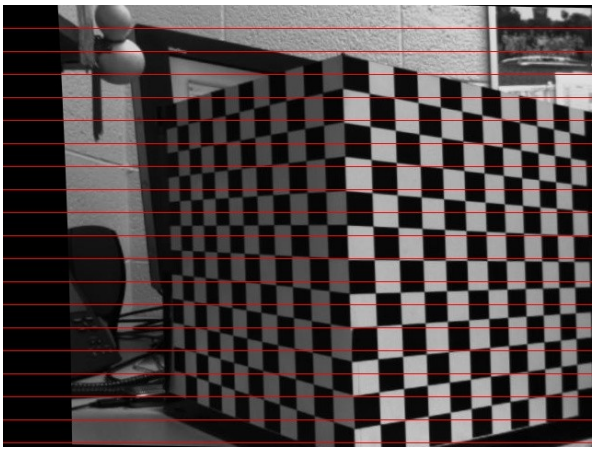
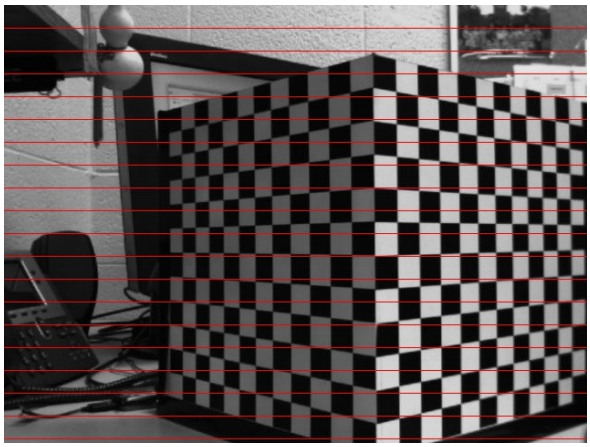
Task 1

Parallel sequences

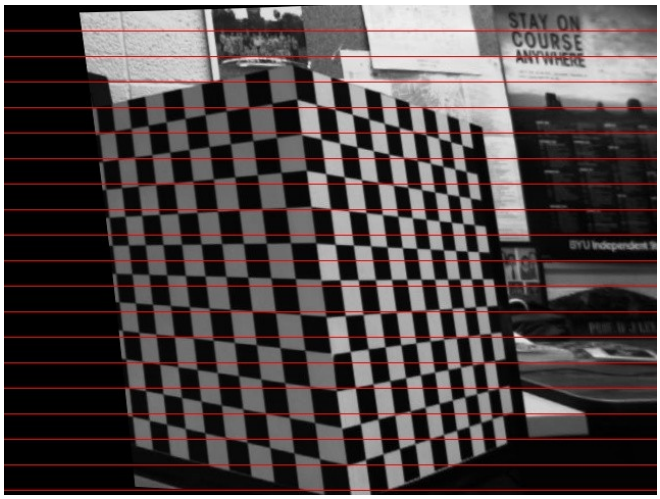
First

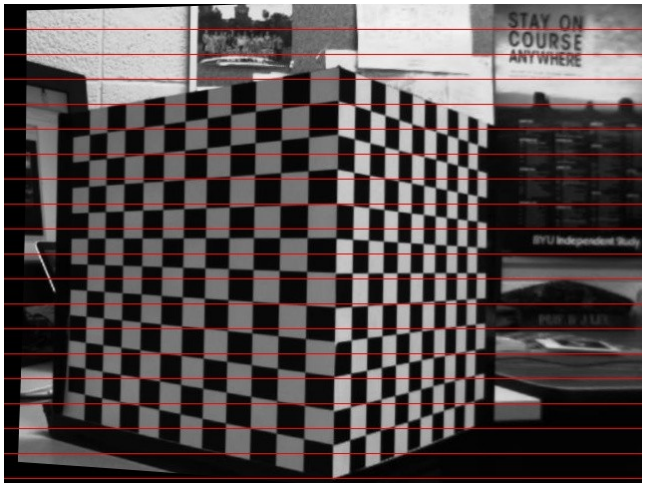


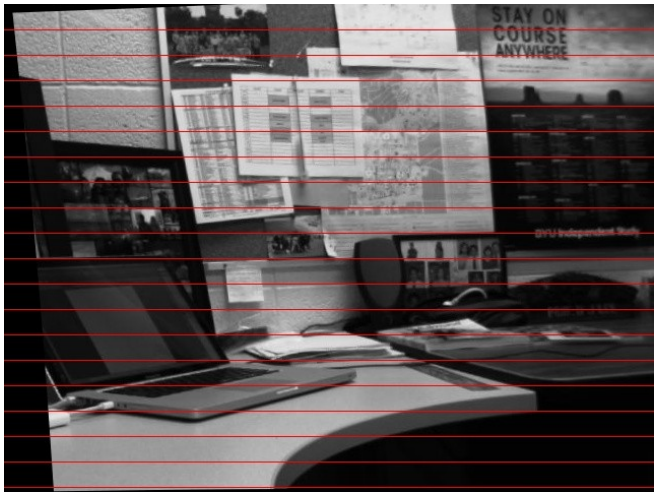
Last

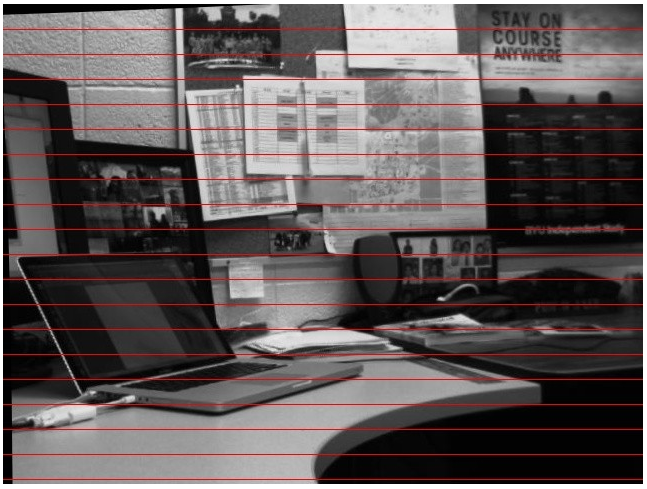


Real sequences









It appears that rectifying the images was somewhat successful in that sequences 1, 2, and 4 line up fairly well. However, sequence TurnCube was not successfully rectified. I believe this is due to error in the guess for the instrinsic parameters.

Task 2

Parallel Cube

```
RESULTS FOR SEQUENCE ParallelCube:
F:
[-2.339717448127474e-07, -6.138700081405107e-06, 0.0009164216571107831;
 8.224545152641055e-06, 1.073596590524802e-05, 0.004059536900314076;
 -0.001202233611728498, -0.01057674310766149, 1]
E:
[-0.1592817886993019, -4.174897302566347, -0.5889721643199355;
 5.593469450740268, 7.294191749313258, 7.832739025053733;
 0.6603938745317741, -8.1579666508116, 0.09286723719354484]
R == R1:
[0.9597944184261364, 0.1390619083225143, -0.2438369537451923;
 -0.2120543288690821, 0.9283656827325681, -0.3052378101290484;
 0.1839229076703541, 0.3446722280343956, 0.9205288801856722]
t:
[0.9128921420158784;
 0.07340453788736127;
 -0.4015466484273076]
```

Motion: very little rotation, high displacement in -x, some displacement in +z

Parallel Real

```
RESULTS FOR SEQUENCE ParallelReal:
F:
[1.295989051204618e-06, 5.361571577191192e-05, -0.01636406003416771;
 -4.995821688585011e-05, -1.942822600753427e-06, 0.008906063292400901;
 0.0142130313436966, -0.01118016046357873, 1]
E:
[0.8822751412816578, 36.46376336732248, -1.95818754431394;
 -33.97631781190063, -1.319985617490427, -6.721210677239016;
 1.655953895073306, 5.036520702064986, 0.03649098874917467]
R == R2:
[0.9980949641071706, 0.006957998782710315, 0.06130276402288096;
 -0.006106731046373742, 0.9998824669920559, -0.01406271800925351;
 -0.06139340729942003, 0.01366156853440807, 0.9980201456310124]
t == -t:
[0.135098764036228;
 -0.04473424612604643;
 -0.989821787585734]
```

Motion: zero rotation, high displacement in +z

Turn Cube

```
F:
[2.206433275731912e-06, 0.0003792788466278778, -0.1066451477673935;
 -0.0004246719752398808, -2.870983296771907e-05, 0.2686456301916531;
 0.1168454128957138, -0.2619630295369003, 1]
E:
[1.502081540168483, 257.945527996012, -8.236851819647399;
 -288.8171535330459, -19.50593254538288, 99.35718533505064;
 8.387510326671011, -118.2290051880836, 0.6714353979907628]
R == R1:
[-0.7238337716184726, -0.005535024406197853, 0.6899521973074654;
 0.04892387389406942, -0.9978625797325481, 0.04332120188430931;
 0.6882376955876319, 0.06511248324497138, 0.7225574294807984]
t:
[0.418279301669098;
 0.0285407501668191;
 0.9078699528980606]
```

Motion: +rotation about y-axis, high movement in -z, some movement in -x

Turn Real

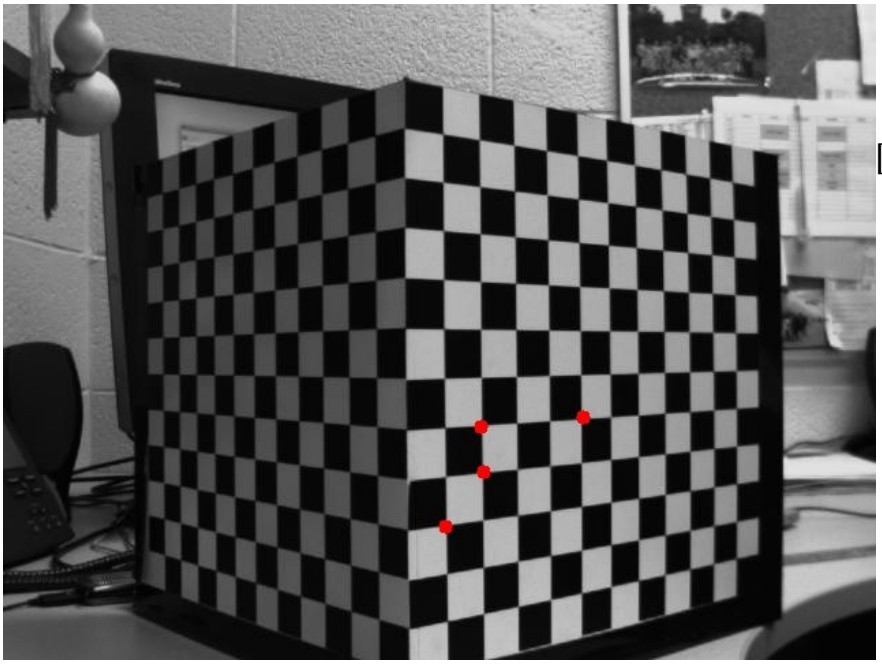
```
RESULTS FOR SEQUENCE TurnReal:
F:
[1.957298555799349e-06, 0.0002266573156002175, -0.0708715197512847;
 -0.0002465342402398921, 9.365225638657036e-06, 0.1295869443905616;
 0.0753301066809557, -0.1346495456123321, 1]
E:
[1.332477198200964, 154.1484358183015, -10.63895507382224;
 -167.6666266341163, 6.362888275432824, 41.37133653252687;
 11.24080766190563, -47.07311877619146, 0.3452733659612441]
R == R1:
[-0.8590283077852918, 0.05772067880812664, 0.5086636311566489;
 0.01150464258126025, -0.9911955931499276, 0.131905039021414;
 0.5117987979886389, 0.1191621557294613, 0.8508010172885855]
t:
[0.2889124839222871;
 0.06632543274920689;
 0.955055241127174]
```

Motion: +rotation about y-axis, high movement in -z, small movement in -x

Task 3

For the Parallel images, the scale factor was 2.7

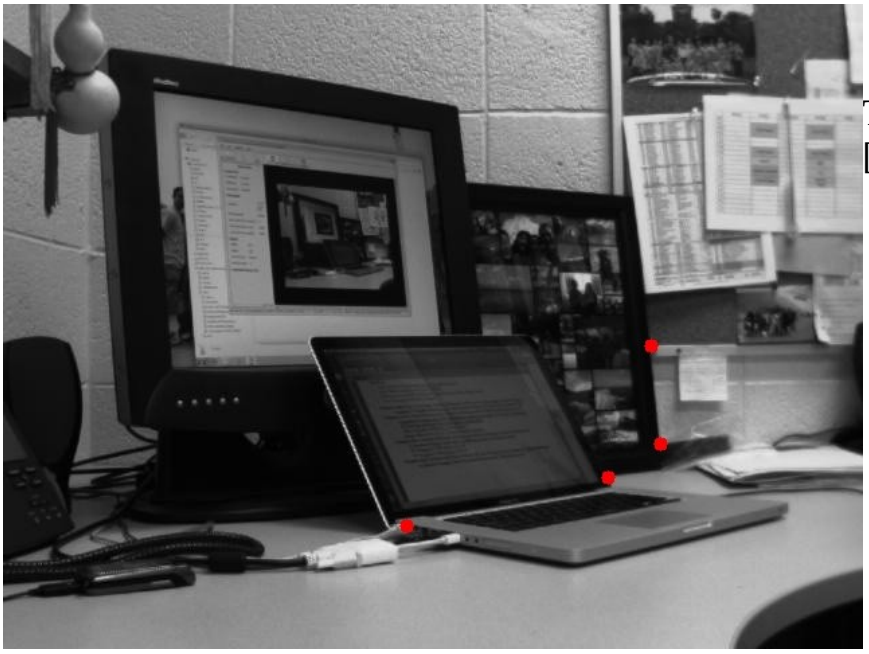
Parallel Cube



T =
[2.673458914606298;
-0.2094803564206801;
0.3142219155087391]

-2.67” in x
0.21” in y
-0.31” in z

Parallel Real

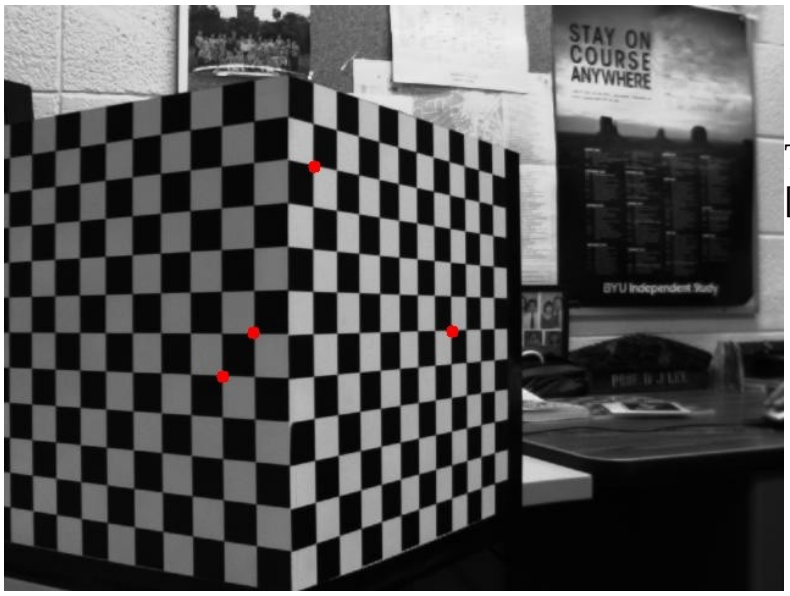


T =
[0.4740132860188657;
-0.2489938960104165;
-2.646377419119796]

-0.47” in x
0.25” in y
2.65” in z

For the Turn images, the scale factor was 2.3

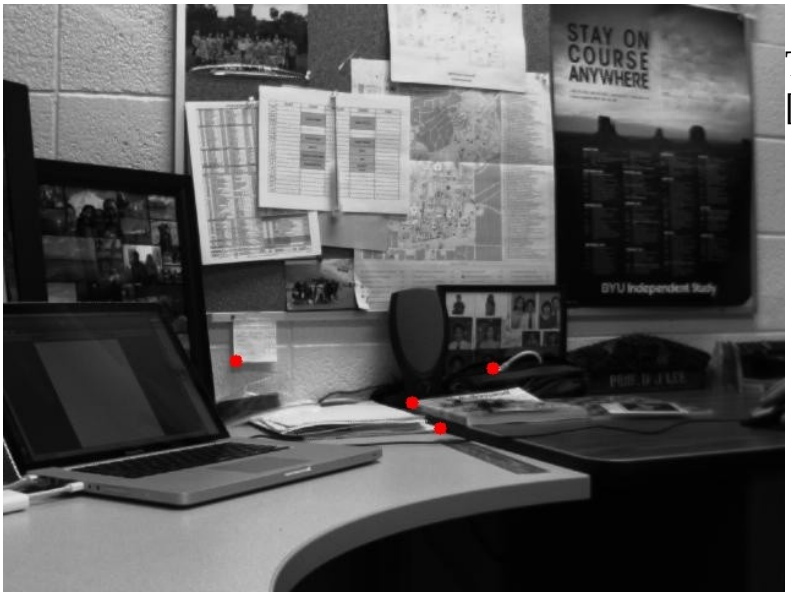
Turn Cube



T =
[1.554422843193451;
0.09549055537012778;
1.692528043606218]

-1.55” in x
-0.095” in y
-1.69” in z

Turn Real



T =
[0.3701657375194454;
-0.1100497790400233;
-2.267347872052263]

-0.37” in x
0.11” in y
2.27” in z