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Problem Set #4 - ECE1390

1a.

M = 0.4583 -0.2947 -0.01340 0.0040

-0.0509 -0.0546 -0.5411 -0.0524

0.1090 0.1783 -0.0443 0.5968

<u1, v1> = <1.0468, -0.3626>

<u2, v2> = <0.1419, -0.4518>

Residual - Point 1 = 0.0026

Residual - Point 2 = 0.0016

1b.

Average Residuals: M (8 pts), M (12 pts), M (16 pts)

avgResiduals

10x3 double

	1	2	3
1	1.3425	3.0704	1.3845
2	2.2731	1.3610	1.3509
3	1.5281	1.1278	2.2600
4	1.3083	6.2670	1.1686
5	1.6143	1.3093	1.6271
6	7.7062	1.3438	0.8918
7	1.1881	0.9644	1.5699
8	4.7128	4.5078	1.2091
9	4.1645	2.4939	1.7498
10	3.3213	1.8060	1.0060

The difference between the results for varying k is that as k increases, the average residual decreases. This is because with more points used, the less error will be introduced into the

calculation. Error could come from slight inaccuracies in the physical measurement of the point locations or clicks to identify the points in the 2d image.

Best M Matrix (16 pts):

M16

3x4 double

	1	2	3	4
1	0.0069	-0.0040	-0.0014	-0.8269
2	0.0015	0.0010	-0.0073	-0.5622
3	7.5514e-06	3.7184e-06	-1.9953e-06	-0.0034

1c.

Location of the camera center in the world: <303.0953, 307.1844, 30.4219>

C

3x1 double

	1
1	303.0953
2	307.1844
3	30.4219

2a.

F generated by least squares function:

F

3x3 double

	1	2	3
1	-6.6070e-07	8.8240e-06	-9.0738e-04
2	7.9103e-06	1.2138e-06	-0.0264
3	-0.0019	0.0172	0.9995

2b.

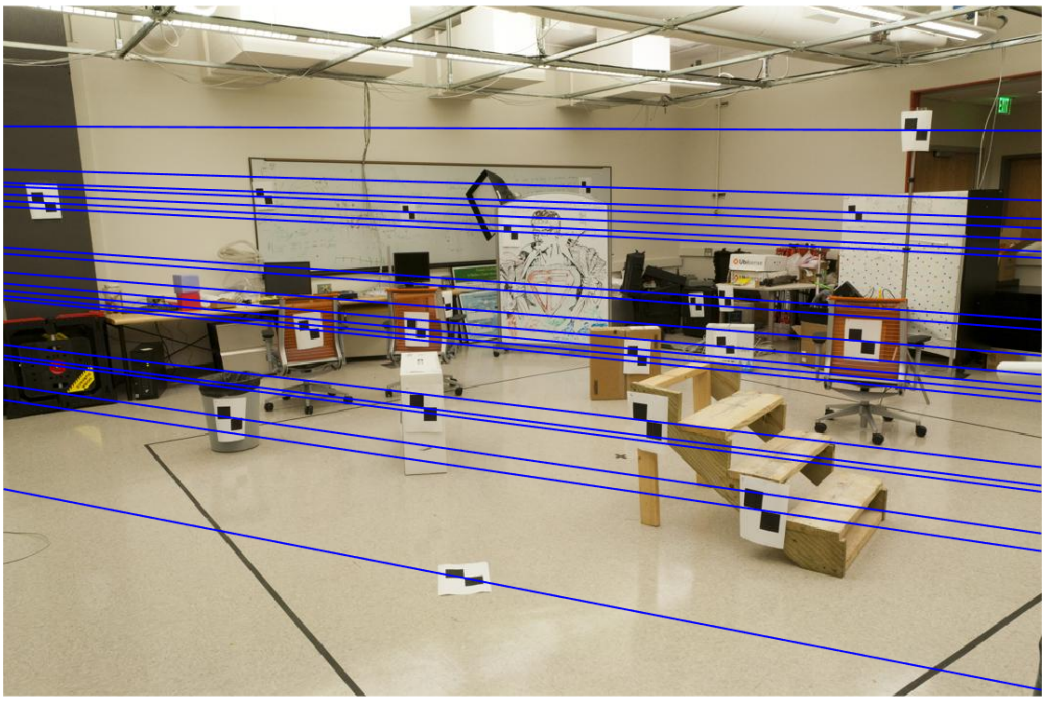
F forced to rank 2:

F_rank2

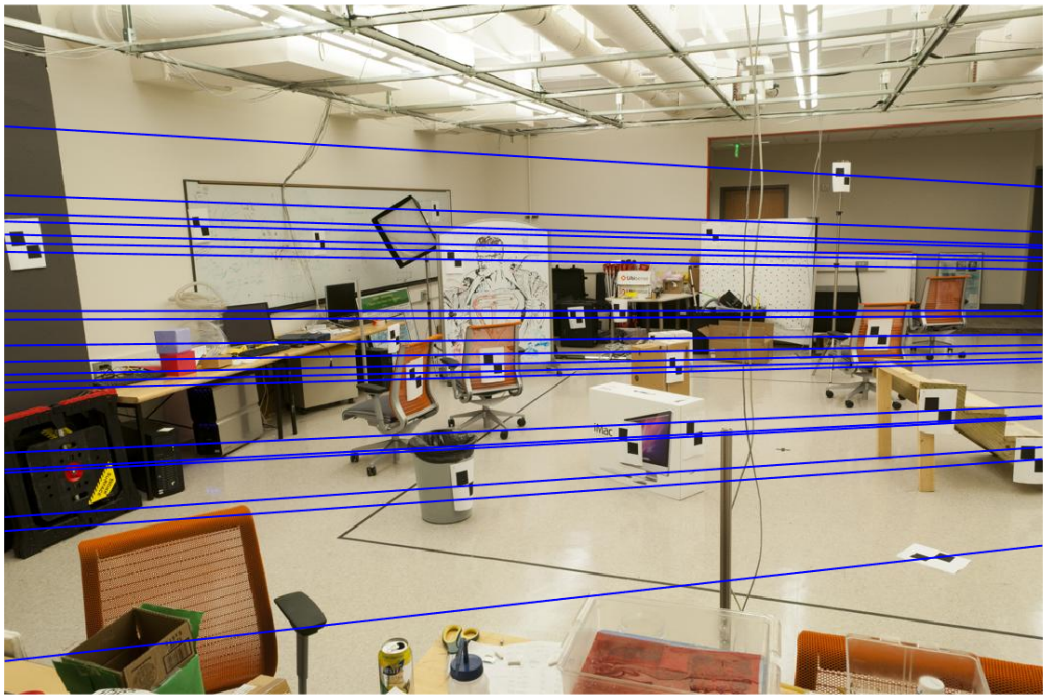
3x3 double

	1	2	3
1	2.1336e-06	1.0741e-04	9.0104e-04
2	5.7711e-05	0.0029	0.0263
3	-0.0019	-0.0914	-0.9955

2c.



ps4-4-c-1.png



ps4-4-c-2.png