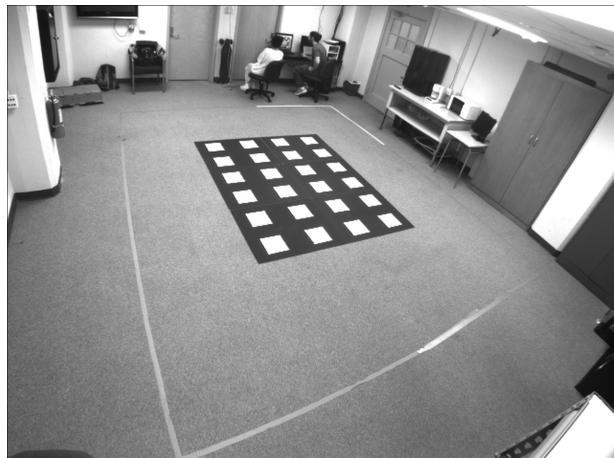


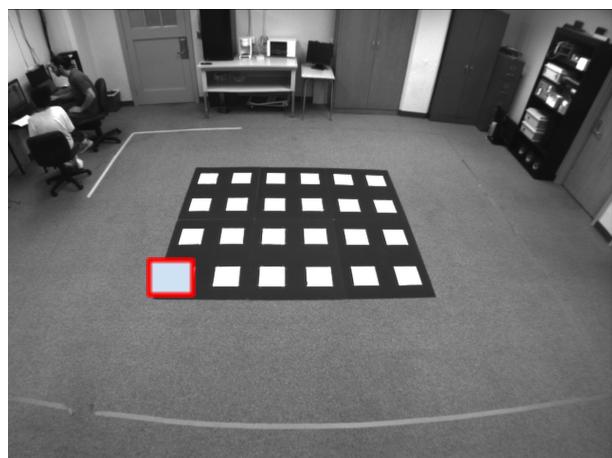
Lab Report 7: Camera Calibration
Deeb Armaly and Mariah Tam
ECE 4310
Fall 2022

Calibration Images

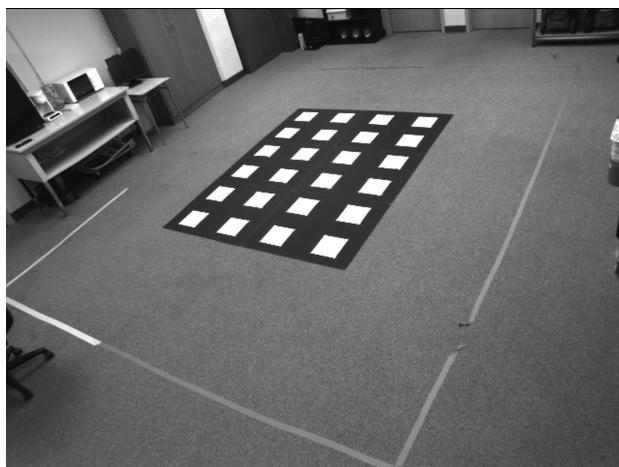
The Box highlighting the calibration point in red was our reference for (0,0) and the Y axis was chosen to be the reference points emanating upward from that location and the X axis was chosen to be the horizontal points emanating from the origin



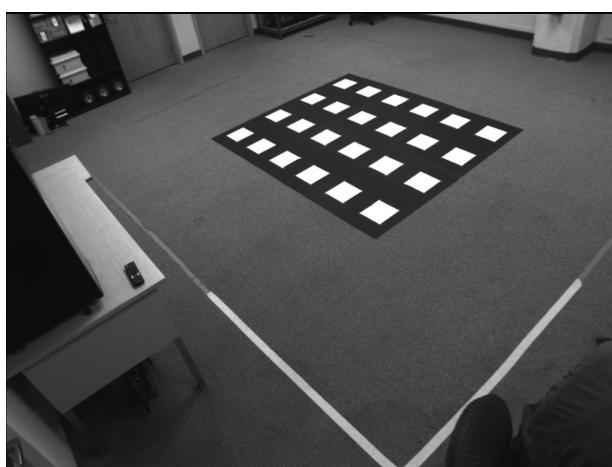
CalImage_0.ppm



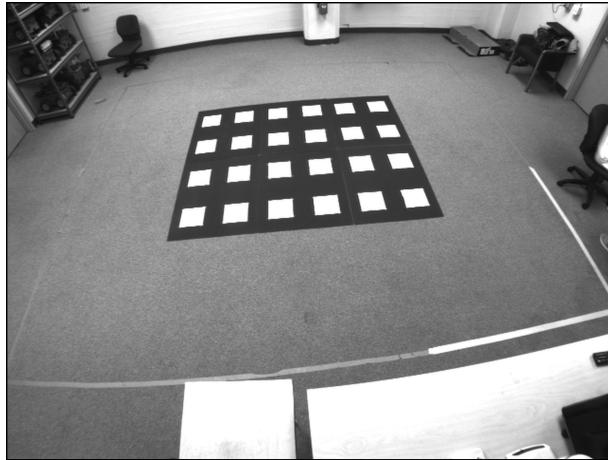
CalImage_1.ppm



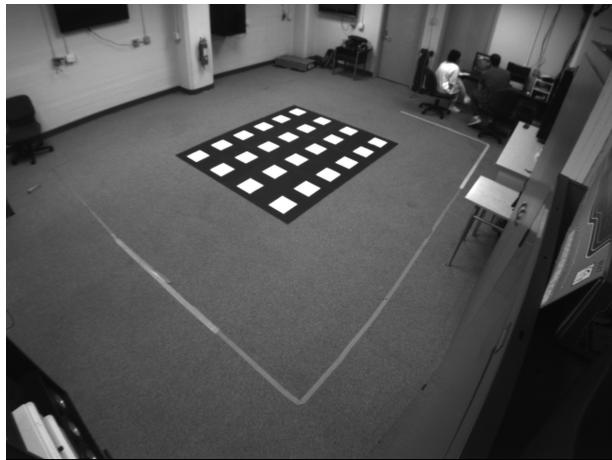
CalImage_2.ppm



CalImage_3.ppm



CalImage_4.ppm



CalImage_5.ppm

Locations of X, Y, and Z axes

World Coordinate System			Computer Coordinate System	
X_world	Y_world	Z_world	X	Y
0	0	0	215.896	148.04
0	508	0	251.477477	145.243243
0	1016	0	284.357143	143
0	1524	0	314.233333	141.188889
406	0	0	225.335484	163.135484
406	508	0	262.855072	159.384058
406	1016	0	296.386555	156.546218
406	1524	0	327.867347	154.214286
812	0	0	235.571429	179.904762
812	508	0	274.964072	175.772455
812	1016	0	310.727273	172.265734
812	1524	0	343.055556	169.031746
1218	0	0	247.432203	199.932203
1218	508	0	289.420792	194.376238
1218	1016	0	326.4	189.5
1218	1524	0	359.308219	185.205479
1624	0	0	261.893103	223.141379
1624	508	0	305.402439	215.808943
1624	1016	0	343.946078	209.362745
1624	1524	0	378.274854	203.783626
2030	0	0	278.155738	250.071038
2030	508	0	324.066667	240.316667
2030	1016	0	363.829268	232.195122
2030	1524	0	398.565	224.63

Table is created from CalPoints_0.txt

The purple bolded row is (0,0). The red bolded rows are the X-axis and the blue bolded rows are the Y-axis. Tables for the X and Y axes are shown below.

X-Axis						
World Coordinates	(0,0)	(406,0)	(812,0)	(1218,0)	(1624,0)	(2030,0)
Computer Coordinates	(215.87,148.04)	(225.34, 163.14)	(235.57,179.90)	(247.43,199.92)	(261.89,223.14)	(278.156,250.07)

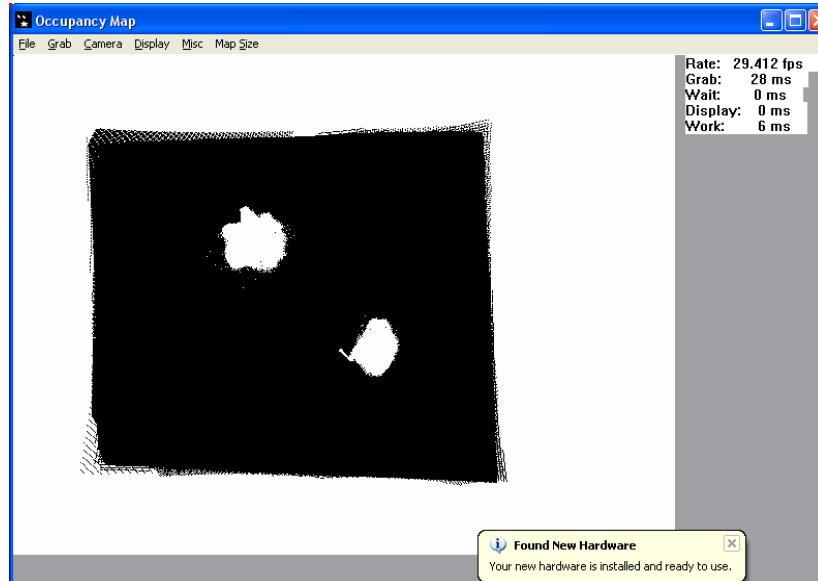
X-Axis Coordinates

Y-Axis				
World Coordinates	(0,0)	(0,508)	(0,1016)	(0,1524)
Computer Coordinates	(215.87,148.04)	(251.48,145.24))	(284.36,143)	(314.23,141.19)

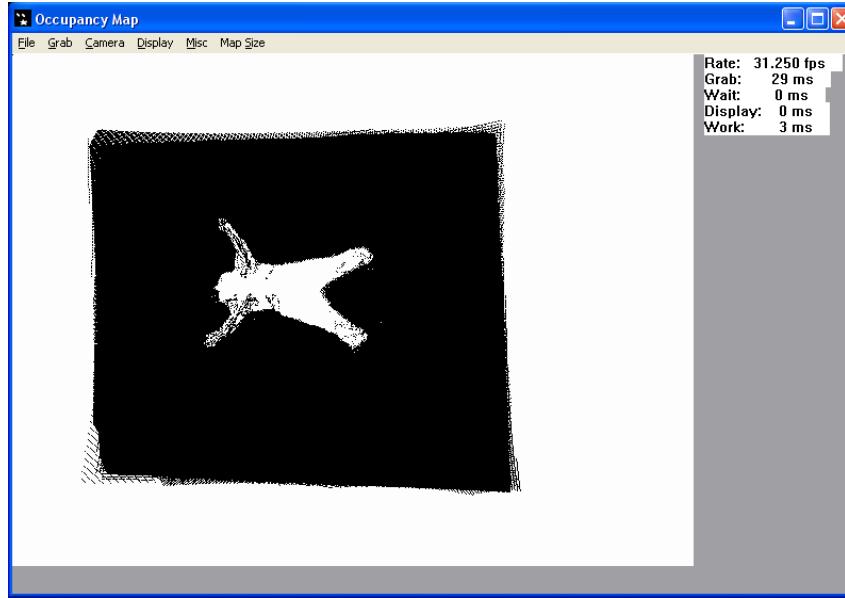
Y-Axis Coordinates

The Z axis is not accounted for in the CalPoints_0.txt, but the X and Y coordinates should remain around (215.87,148.04) while the Z coordinates will increase from 0 to ~2010.

Tracking Test Images



Book-bag and Chair Detection



Person Detection

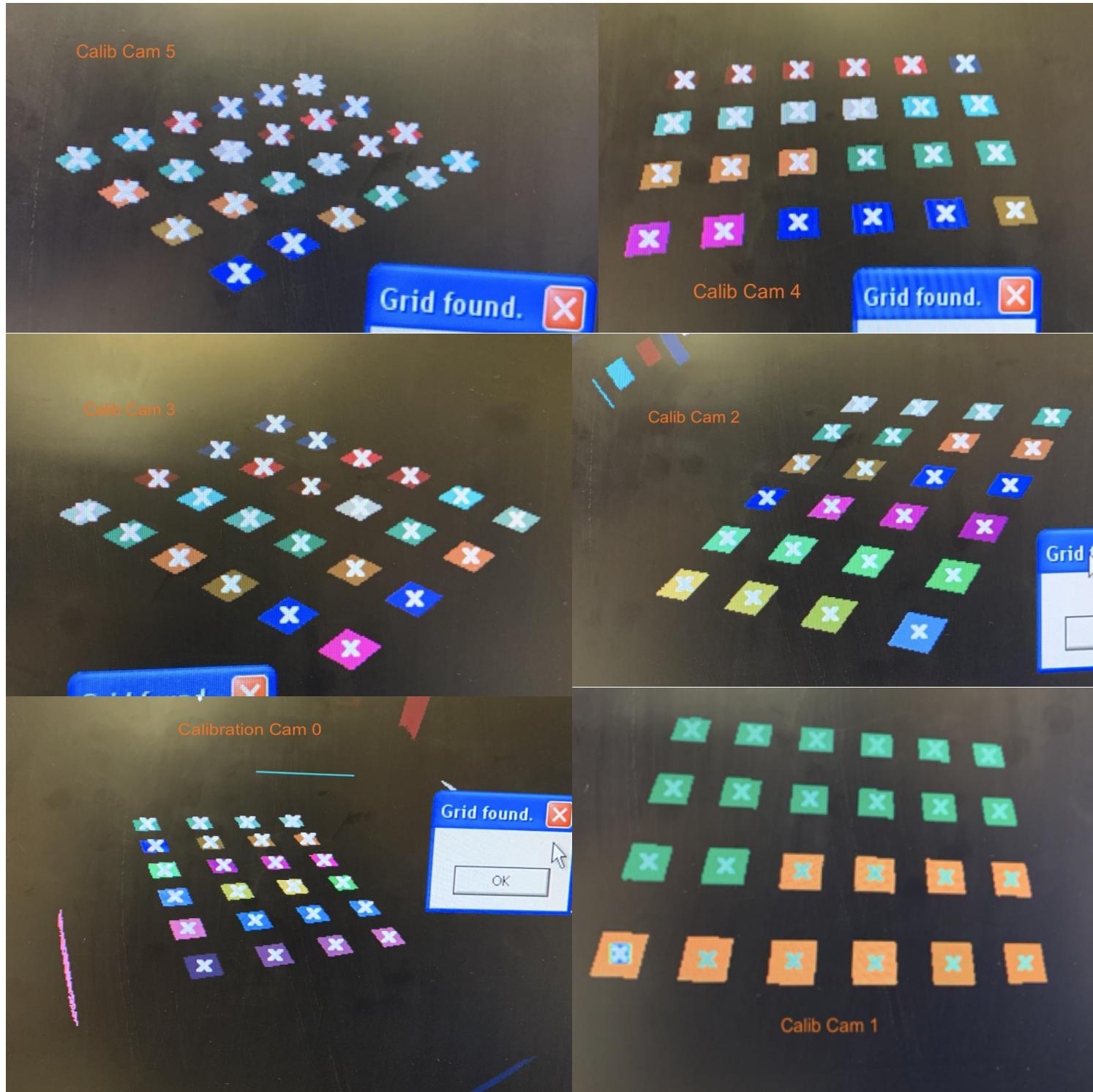
Camera Position

Below is the calibration results showing the camera position in the real world with respect to the (0,0) location.

Camera	X [mm]	Y [mm]	Z [mm]
0	4180	-806	2242
1	1007	-1501	2318
2	-2110	-1576	2316
3	-1853	3709	2054
4	1030	3934	2227
5	4201	3983	2267

Floor Images

Below are the calibration images with the grid locations identified



floor#.txt files

Floor 0:

337 105 400 151 480 215 555 282 477 333 405 376 318 420 225 460 182 475 164 423
144 323 127 227 121 160 118 128 117 112 186 108 259 105 301 105 337 105

Floor 1:

135 131 198 127 248 125 297 126 353 127 408 129 459 131 483 159 512 203 546 250
590 321 636 399 639 406 574 417 484 430 396 439 278 442 215 439 139 431 89 426
35 415 5 409 1 336 31 284 72 218 103 172 135 130

Floor 2:

0 287 85 218 152 164 200 126 250 88 284 62 324 63 375 62 437 59 524 60 594 60 568
120 533 206 492 300 451 381 413 459 363 461 297 435 228 408 166 377 106 348 30
313 0 299 0 286

Floor 3:

349 20 295 41 226 72 132 117 70 148 106 185 162 240 219 299 296 374 370 444 450
448 543 347 594 287 638 233 636 93 540 68 457 45 395 31 349 20

Floor 4:

121 88 166 80 221 73 269 66 347 62 421 60 463 60 501 99 533 144 569 193 595 233
616 267 639 307 639 324 578 338 528 350 471 362 416 372 352 380 287 388 214 397
146 401 75 402 21 399 2 399 1 376 24 310 49 254 62 223 77 185 94 148 107 117 115
102 120 88

Floor 5:

311 419 349 378 373 349 397 319 415 292 443 251 464 217 491 179 510 150 471 134
433 119 393 104 351 91 311 76 264 92 217 107 162 127 106 148 77 158 49 173 73
201 104 233 136 266 169 296 223 344 265 383 309 419