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| [Type the company name] |
| Sensors and control: task 1 |
| 99143152 |
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| **James Walsh** |
| **8/6/2018** |

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Sensors and control task 1

# Image changing mathod

Given images were first converted using I = imread(‘image\_name’) then imwrite(I,’number’)

This was repeated with manual entry for all 35 images

# First MATLab calibration output

Calibration results after optimization (with uncertainties):

Focal Length: fc = [ 891.24361 889.37979 ] +/- [ 6.68081 6.34500 ]

Principal point: cc = [ 515.91541 422.93888 ] +/- [ 5.34718 4.55264 ]

Skew: alpha\_c = [ 0.00000 ] +/- [ 0.00000 ] => angle of pixel axes = 90.00000 +/- 0.00000 degrees

Distortion: kc = [ -0.19774 0.16522 0.00199 0.00334 0.00000 ] +/- [ 0.01037 0.02382 0.00110 0.00116 0.00000 ]

Pixel error: err = [ 1.01337 0.94415 ]

Note: The numerical errors are approximately three times the standard deviations (for reference).

# Second MATLab calibration output

Calibration results after optimization (with uncertainties):

Focal Length: fc = [ 882.70996 881.74741 ] +/- [ 2.01832 1.91982 ]

Principal point: cc = [ 513.92862 424.06439 ] +/- [ 1.65726 1.38827 ]

Skew: alpha\_c = [ 0.00000 ] +/- [ 0.00000 ] => angle of pixel axes = 90.00000 +/- 0.00000 degrees

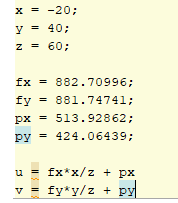
Distortion: kc = [ -0.20136 0.14091 0.00051 0.00113 0.00000 ] +/- [ 0.00304 0.00667 0.00032 0.00033 0.00000 ]

Pixel error: err = [ 0.33804 0.25282 ]

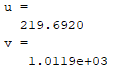
Note: The numerical errors are approximately three times the standard deviations (for reference).

Equations used

# Equations and data input to solve part 2



# Output for part 2



[u,v] = [219.6920 , 1011.9]