Calibration results
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Normalized Residuals

Reprojection error (cam0): mean 0.138451947569, median 0.132994420064, std: 0.0666269280684
Reprojection error (cam1): mean 0.135220240478, median 0.129237259972, std: 0.0672921608529
Gyroscope error (imu0): mean 0.152872822239, median 0.136082545866, std: 0.101036362498
Accelerometer error (imu0): mean 0.163089406417, median 0.143523903532, std: 0.0963154098877

Residuals

Reprojection error (cam0) [px]: mean 0.138451947569, median 0.132994420064, std: 0.0666269280684
Reprojection error (cam1) [px]: mean 0.135220240478, median 0.129237259972, std: 0.0672921608529
Gyroscope error (imu0) [rad/s]: mean 0.00564007172042, median 0.00502061326101, std: 0.00372762354033
Accelerometer error (imu0) [m/s^2]: mean 0.0739058240566, median 0.065039493339, std: 0.0436464261748

Transformation (cam0):

T_ci: (imu0 to cam0):
[[-0.99992242 -0.0123085   0.00190935 0.04759018]
[0.0122961 -0.99990406 -0.00637754 0.00706917]
[0.00198766 -0.00635356 0.99997784 -0.00358185]
[0.   0.   0.   1.   ]]

T_ic: (cam0 to imu0):
[[-0.99992242 0.0122961   0.00198766 0.04750669]
[-0.0123085 -0.99990406 -0.00635356 0.0076315]
[0.00190935 -0.00637754 0.99997784 0.00353599]
[0.   0.   0.   1.   ]]

timeshift cam0 to imu0: [s] (t_imu = t_cam + shift)
0.00130628061392

Transformation (cam1):

T_ci: (imu0 to cam1):
[[-0.99993866 0.003253   0.01058758 -0.03320155]
[-0.00326093 -0.99999441 -0.00073236 0.00795934]
[0.01058514 -0.00076684 0.99994368 -0.00344443]
[0.   0.   0.   1.   ]]

T_ic: (cam1 to imu0):
[[-0.99993866 -0.00326093 0.01058514 -0.0331371]
[0.003253   -0.99999441 -0.00076684 0.00806465]
[0.01058758 -0.00073236 0.99994368 0.00380159]
[0.   0.   0.   1.   ]]

timeshift cam1 to imu0: [s] (t_imu = t_cam + shift)
0.00132591750653

Baselines:

Baseline (cam0 to cam1):
[[0.99984126 -0.01561555 0.00857914 -0.08064306]
[0.01556771 0.99986305 0.00561471 0.00017037]
[-0.00866564 -0.00548026 0.99994744 0.00058837]
[0.   0.   0.   1.   ]]
baseline norm: 0.0806453865426 [m]

Gravity vector in target coords: [m/s^2]
[-9.80568063 -0.11422313 0.0632722]

Calibration configuration
=========================

cam0

Camera model: pinhole
Focal length: [282.8699438858687, 283.34214135495967]
Principal point: [314.587867686885, 199.07847816725808]
Distortion model: equidistant
Distortion coefficients: [0.011018291766795633, -0.03111262566381329, 0.03866392281969869, -0.013246432186465809]
Type: aprilgrid
Tags:
Rows: 6
Cols: 6
Size: 0.0312 [m]
Spacing 0.00959999976 [m]

cam1

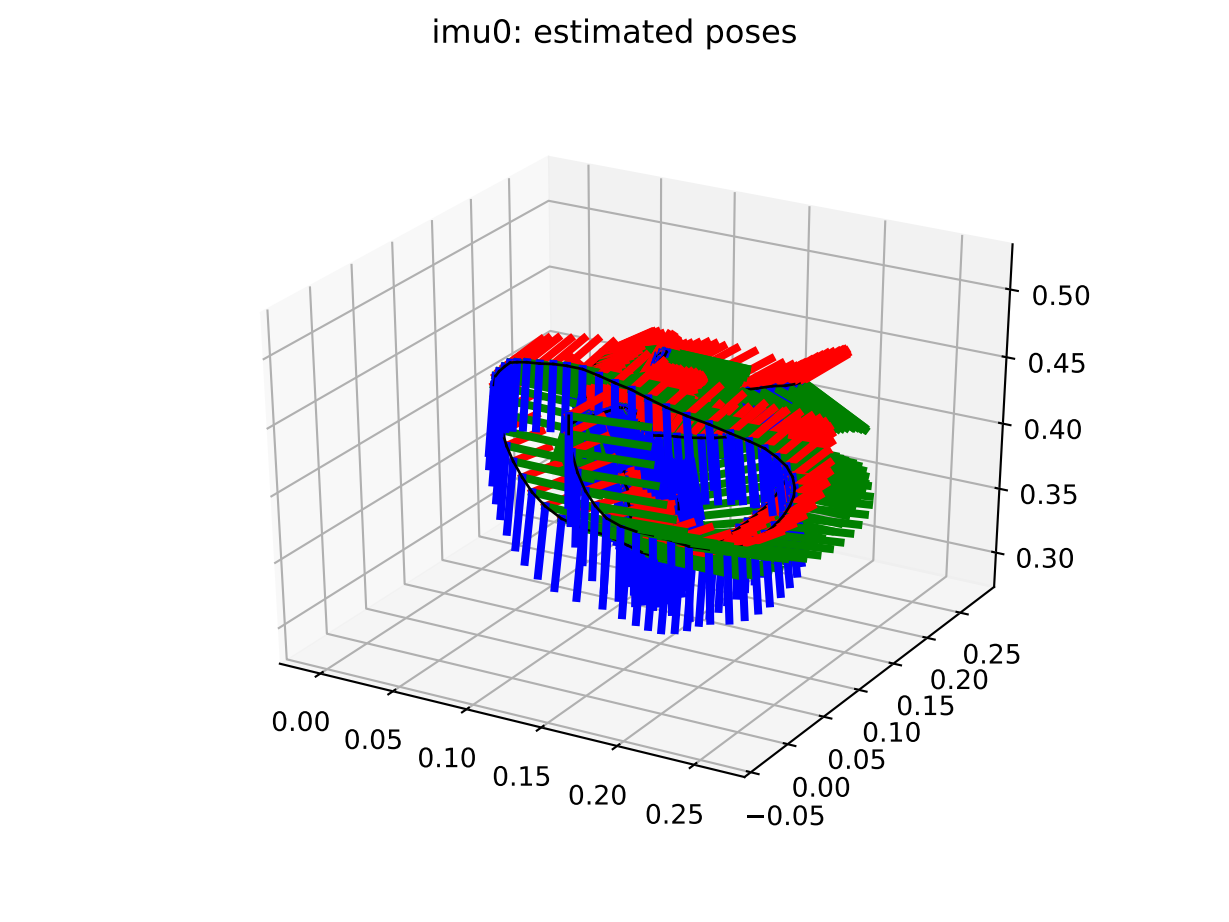
Camera model: pinhole
Focal length: [283.8785355000905, 284.41236915323645]
Principal point: [316.046410057771, 200.21113821016962]
Distortion model: equidistant
Distortion coefficients: [0.006317721376277158, -0.021592486423281095, 0.03159442506624234, -0.011611071662988966]
Type: aprilgrid
Tags:
Rows: 6
Cols: 6
Size: 0.0312 [m]
Spacing 0.00959999976 [m]

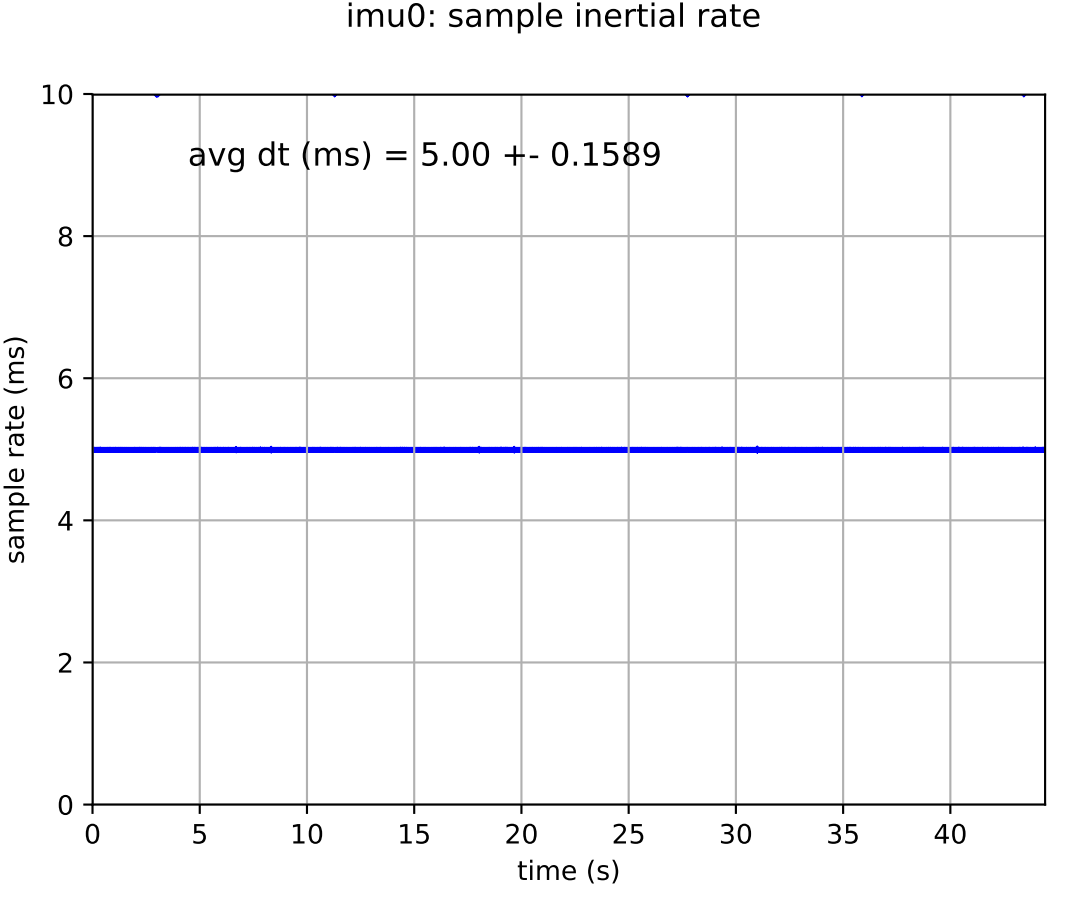
IMU configuration
==========

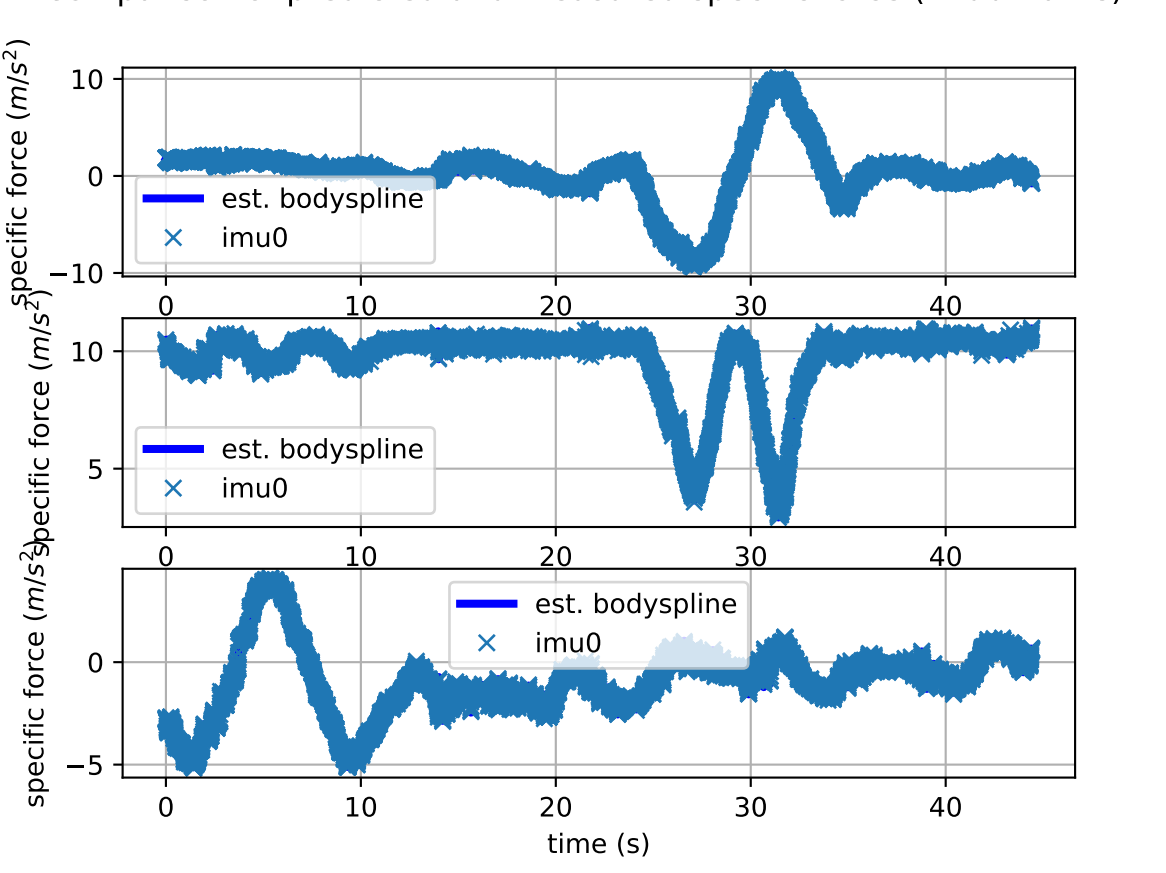
IMU0:

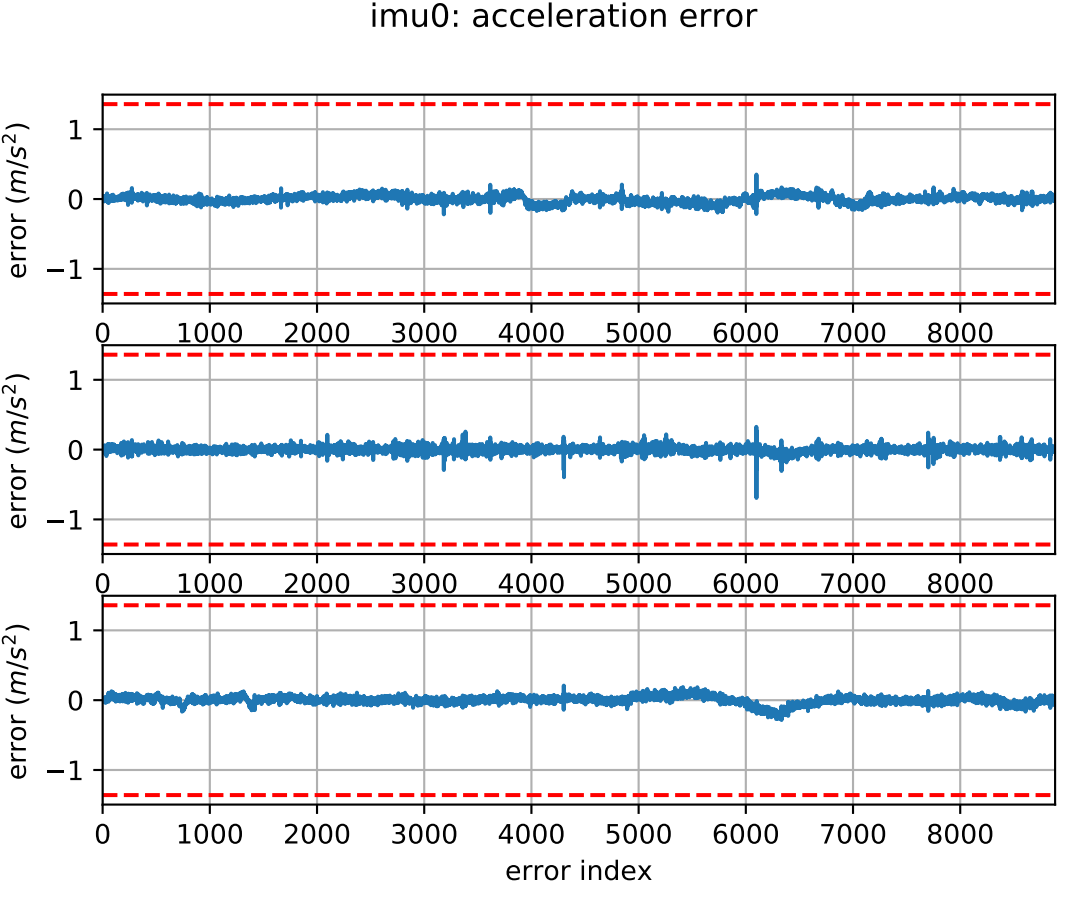
Model: calibrated
Update rate: 200.0

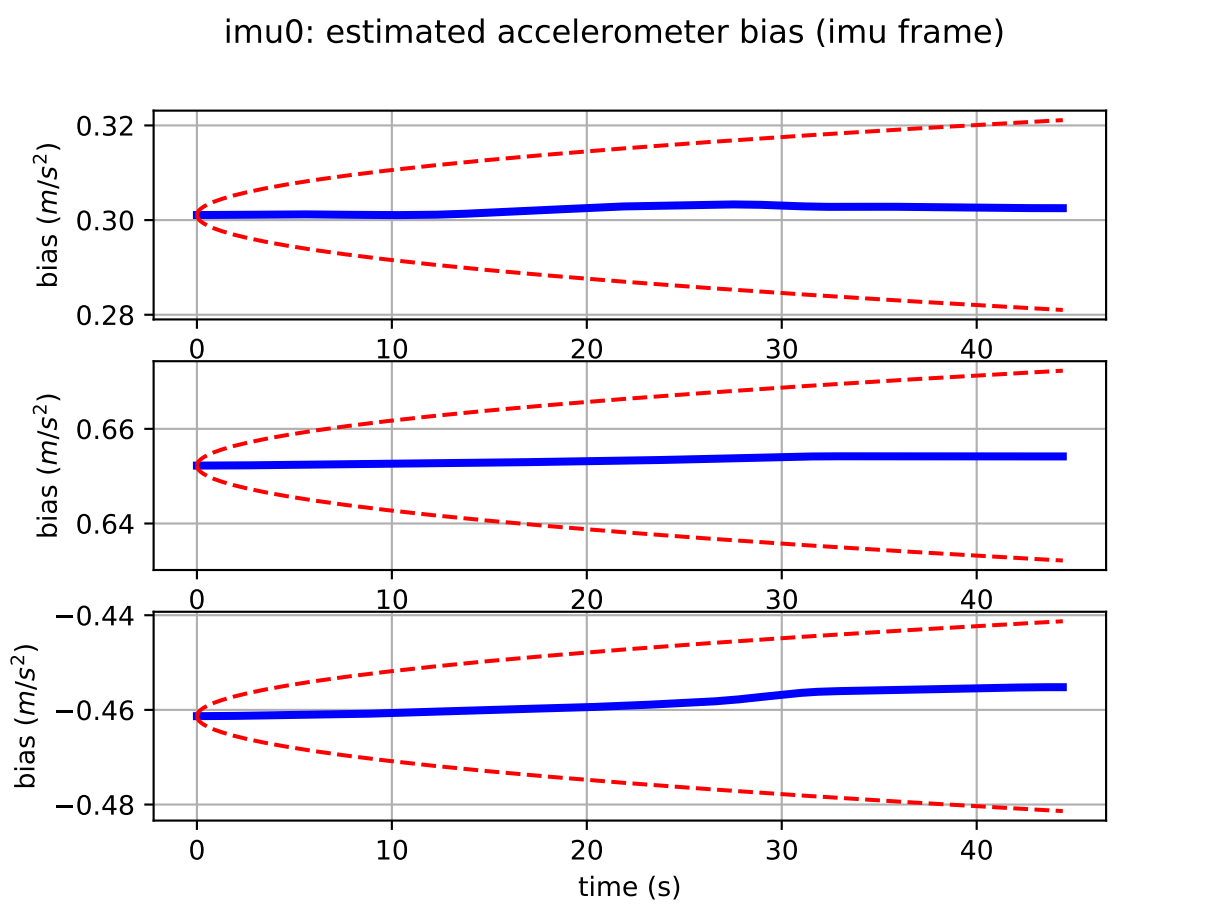
Accelerometer:
Noise density: 0.0320433500296
Noise density (discrete): 0.453161401958
Random walk: 0.00100298832408
Gyroscope:
Noise density: 0.00260879134791
Noise density (discrete): 0.0368938810561
Random walk: 2.74490384354e-05
T_ib (imu0 to imu0)
[[1. 0. 0. 0.]
[0. 1. 0. 0.]
[0. 0. 1. 0.]
[0. 0. 0. 1.]]
time offset with respect to IMU0: 0.0 [s]

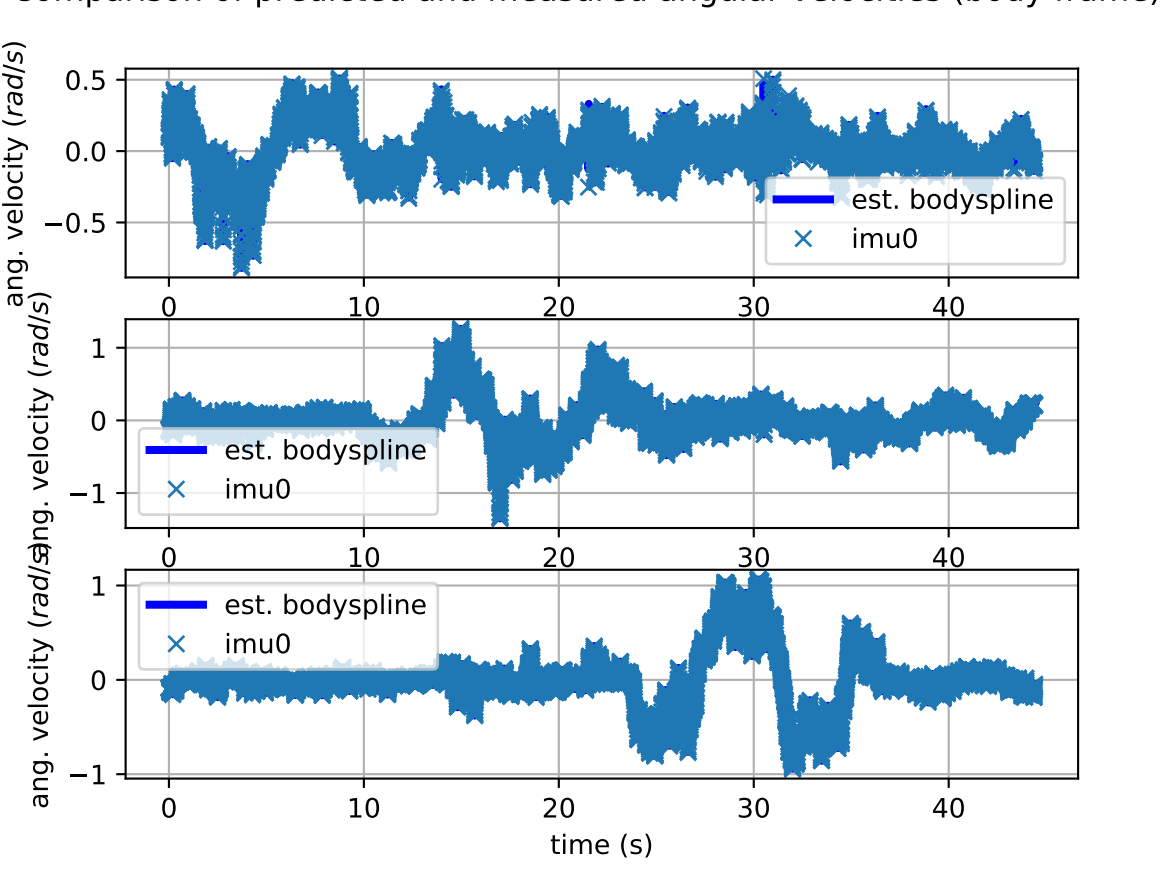

imu0: estimated poses
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
−0.05
0.00
0.05
0.10
0.15
0.20
0.25

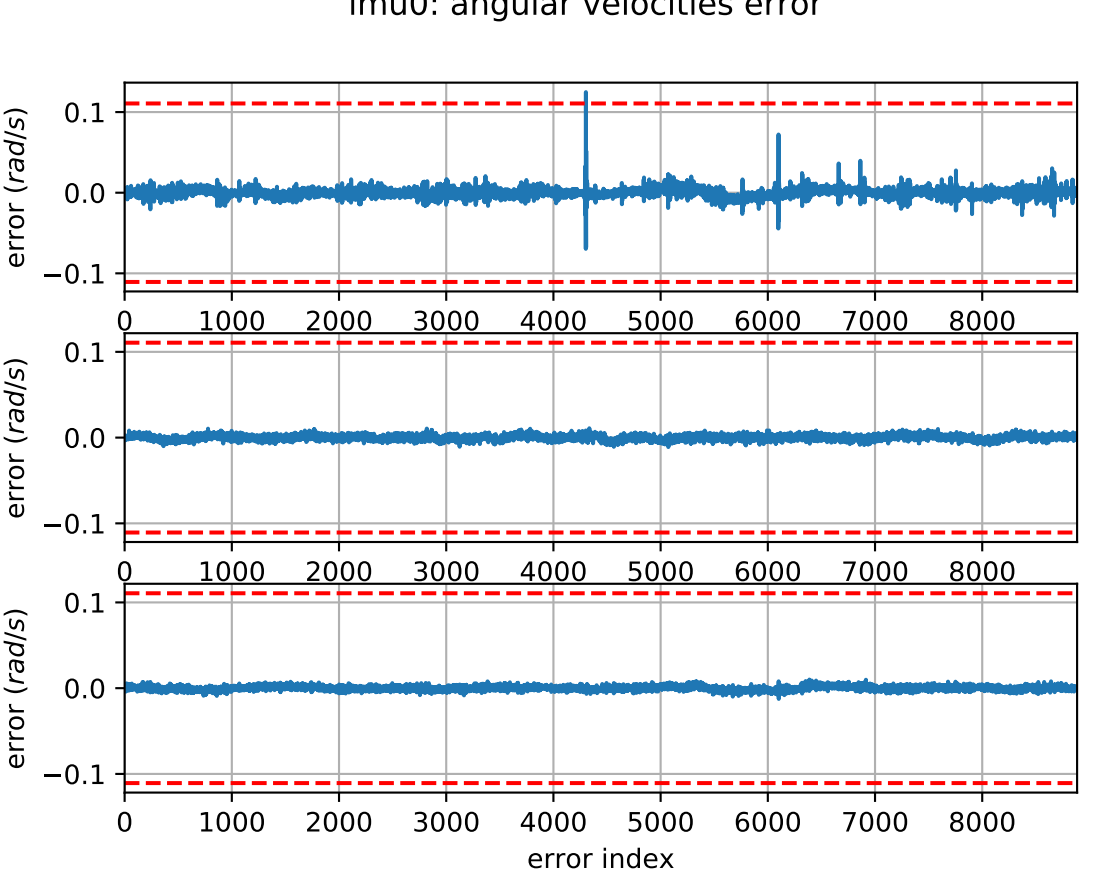

imu0: sample inertial rate
avg dt (ms) = 5.00 +- 0.1589
sample rate (ms)
time (s)
0
2
4
6
8
10
0
5
10
15
20
25
30
35
40

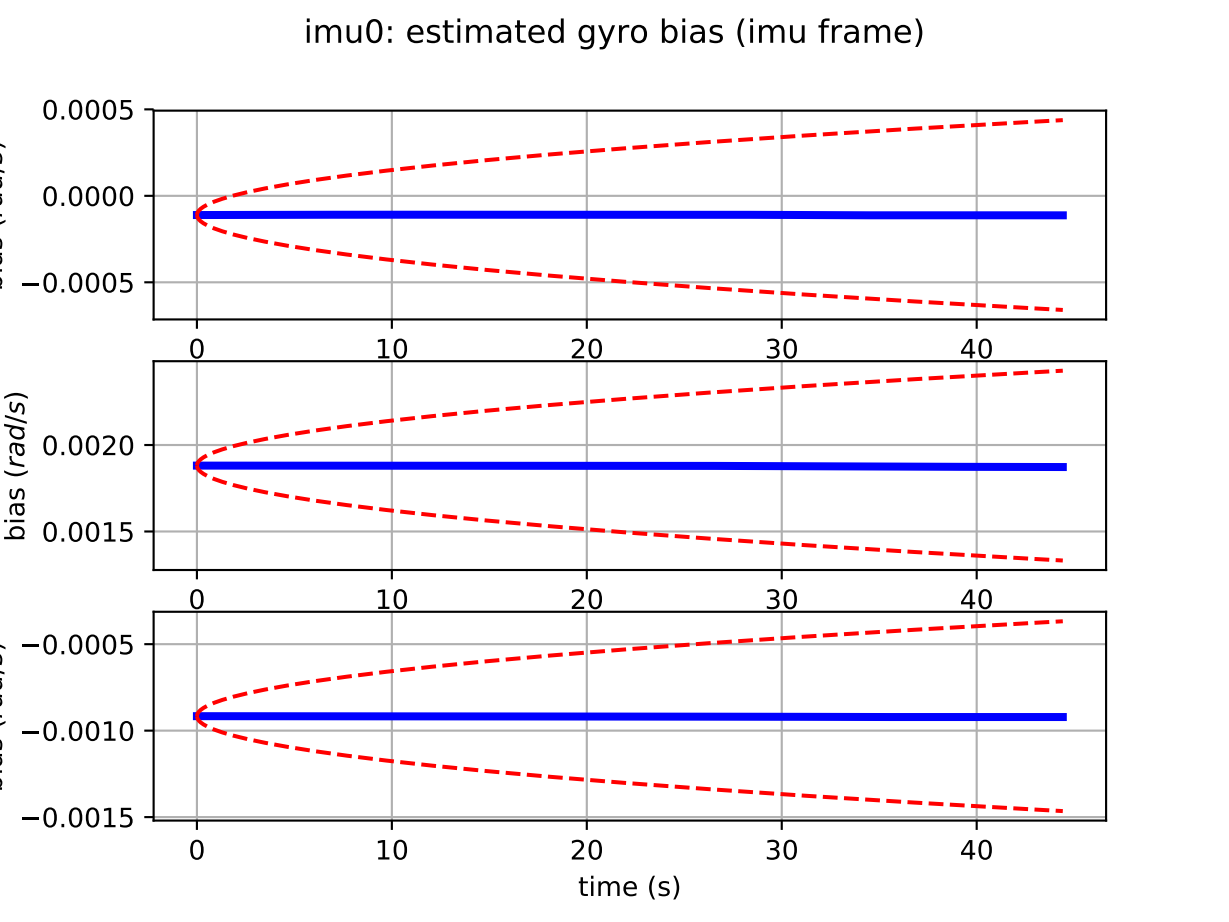

Comparison of predicted and measured specific force (imu0 frame)
specific force (m/s^2)
specific force (m/s^2)
specific force (m/s^2)
est. bodyspline
imu0
est. bodyspline
imu0
est. bodyspline
imu0
10
0
−10
10
5
0
−5
0
10
20
30
40
time (s)

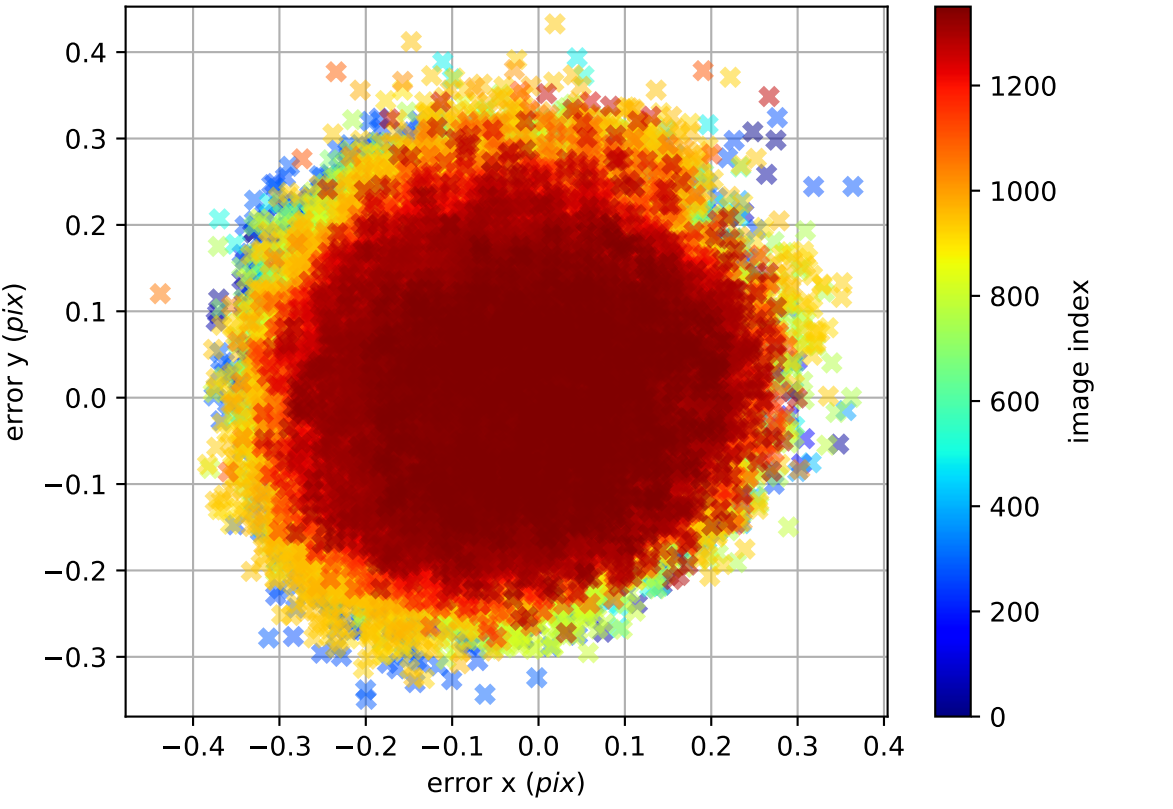

imu0: acceleration error
error (m/s^2)
1
0
−1
0
1000
2000
3000
4000
5000
6000
7000
8000
error index

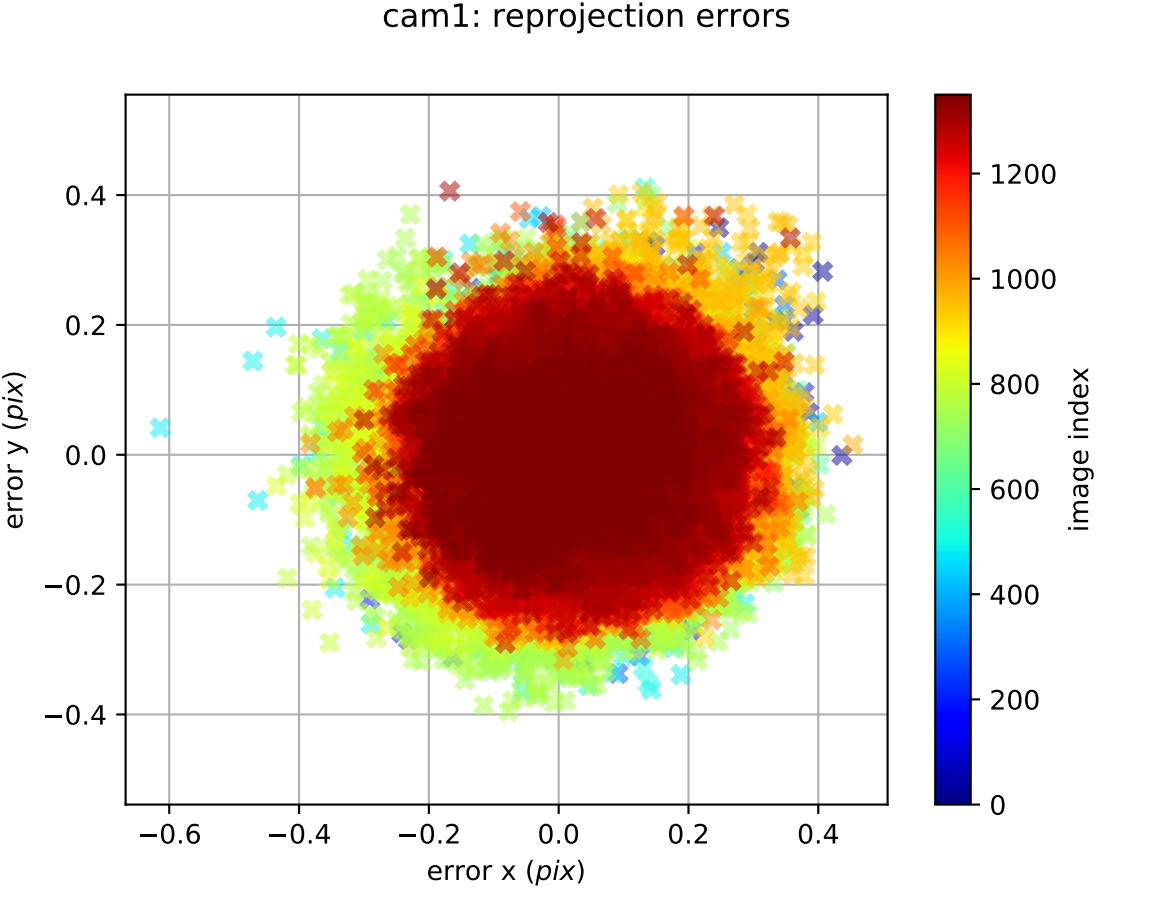

imu0: estimated accelerometer bias (imu frame)
bias (m/s^2)
0.32
0.30
0.28
0
10
20
30
40
bias (m/s^2)
0.66
0.64
0
10
20
30
40
bias (m/s^2)
−0.44
−0.46
−0.48
0
10
20
30
40
time (s)


Comparison of predicted and measured angular velocities (body frame)
ang. velocity (rad/s)
ang. velocity (rad/s)
ang. velocity (rad/s)
est. bodyspline
imu0
est. bodyspline
imu0
est. bodyspline
imu0
0.5
0.0
−0.5
1
0
−1
0
10
20
30
40
time (s)


imu0: angular velocities error
error (rad/s)
0.1
0.0
−0.1
0
1000
2000
3000
4000
5000
6000
7000
8000
error index


imu0: estimated gyro bias (imu frame)
0.0005
0.0000
−0.0005
0
10
20
30
40
bias (rad/s)
0.0020
0.0015
−0.0005
−0.0010
−0.0015
time (s)


cam0: reprojection errors
error x (pix)
error y (pix)
image index
0.4
0.3
0.2
0.1
0.0
−0.1
−0.2
−0.3
−0.4
1200
1000
800
600
400
200
0


cam1: reprojection errors
error y (pix)
error x (pix)
image index
0.4
0.2
0.0
−0.2
−0.4
−0.6
−0.4
−0.2
0.0
0.2
0.4
1200
1000
800
600
400
200
0