Testing 1D Motion Platform for 6D-IEC framework experiment

Royal North Shore Hospital

03/07/2024

This report shows the data acquired by D415 RealSense camera and by the 6DoF robot feedback during the experiment conducted by Alicja Kaczynska at Royal North Shore Hospital (03/07/2024). The motion traces that have been tested in the clinic are in the AP direction for 1D platform, in all directions for 6DoF platform and can be found on ShareDrive: 2_ProjectData\6DoF Robotic Motion Phantom\Chris_tests\LARK - LIGHT SABR

1DoF	\2_ProjectData\6DoF Robotic Motion Phantom\Chris_tests\LARK - LIGHT SABR\1.Mean_Motion_resp_shifted_rescaled_gradual_start.txt"
6DoF	\2_ProjectData\6DoF Robotic Motion Phantom\Chris_tests\LARK - LIGHT SABR\1.Mean_Motion_gradual_start.txt"
1DoF	\2_ProjectData\6DoF Robotic Motion Phantom\Chris_tests\LARK - LIGHT SABR\1.Mean_Motion2_resp_shifted_rescaled_gradual_start.txt"
6DoF	\2_ProjectData\6DoF Robotic Motion Phantom\Chris_tests\LARK - LIGHT SABR\1.Mean_Motion2_gradual_start.txt"
1DoF	\2_ProjectData\6DoF Robotic Motion Phantom\Chris_tests\LARK - LIGHT SABR\3.Mean_Motion_1_092_resp_shifted_rescaled_gradual_start.txt"
6DoF	\2_ProjectData\6DoF Robotic Motion Phantom\Chris_tests\LARK - LIGHT SABR\3.Mean_Motion_1_092_gradual_start.txt"
1DoF	\2_ProjectData\6DoF Robotic Motion Phantom\Chris_tests\LARK - LIGHT SABR\4.Mean_Motion_2_111__resp_shifted_rescaled_gradual_start.txt"
6DoF	\2_ProjectData\6DoF Robotic Motion Phantom\Chris_tests\LARK - LIGHT SABR\4.Mean_Motion_2_111__gradual_start.txt"

The three Simulated 1D traces for rotation (AP, SI, LR) are the same input file.

The two motions have not been recorded by the same device so the two measurements are independent.

Contents

1 DoF Platform overall accuracy

Trace	1DoF Motion traces
Mean (mm)	-0.2
Std (mm)	0.7
1st percentile (mm)	-1.7
99th percentile (mm)	1.4

Figure 0: Experimental setup

1.Mean_Motion_resp_shifted_gradual_start

Trace	1.Mean_Motion_resp_shifted_gradual_start
Mean (mm)	-0.2
Std (mm)	0.6
1st percentile (mm)	-1.2
99th percentile (mm)	1.8

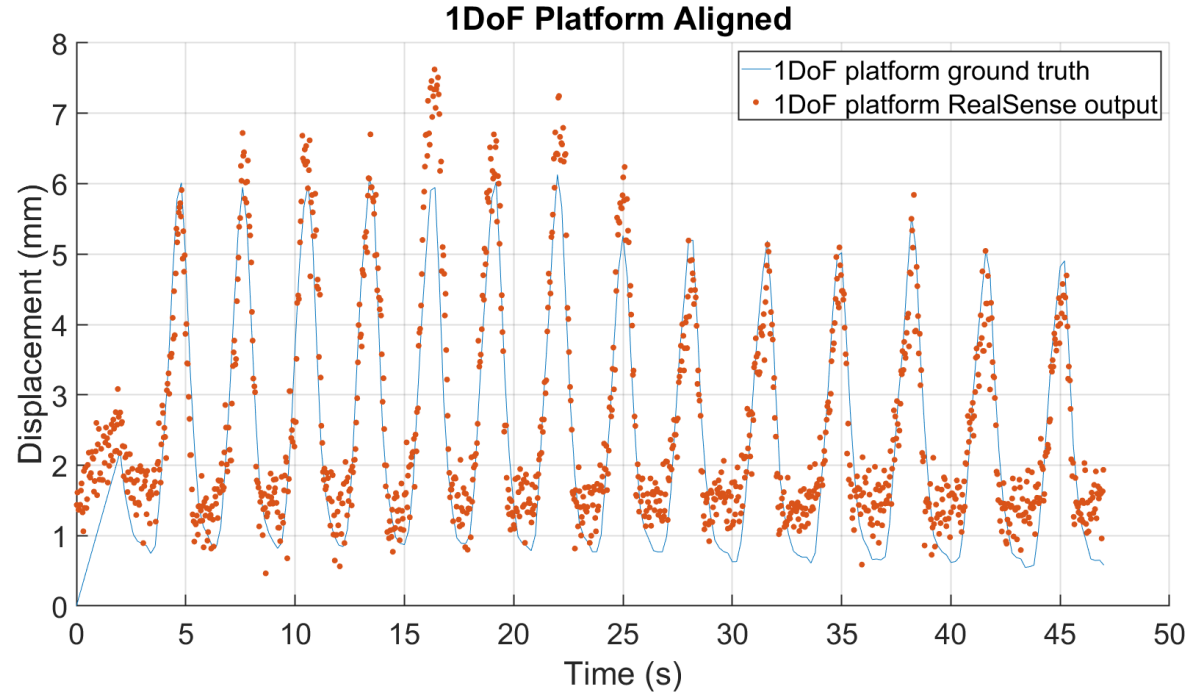

Figure 1.1: 1.Mean_Motion resp motion trace

1.Mean_Motion_gradual_start

1_Mean_Motion

	$\bar{X}$(mm)	σ (mm)	$Perc_1$ (mm)	$Perc_{99}$ (mm)
LR (mm)	-0.0	0.1	-0.2	0.2
SI (mm)	-0.0	0.1	-0.2	0.2
AP (mm)	0.0	0.1	-0.2	0.3
rLR (°)	-0.0	0.0	-0.1	0.1
rSI (°)	0.0	0.0	-0.1	0.1
rAP (°)	0.0	0.0	-0.1	0.1

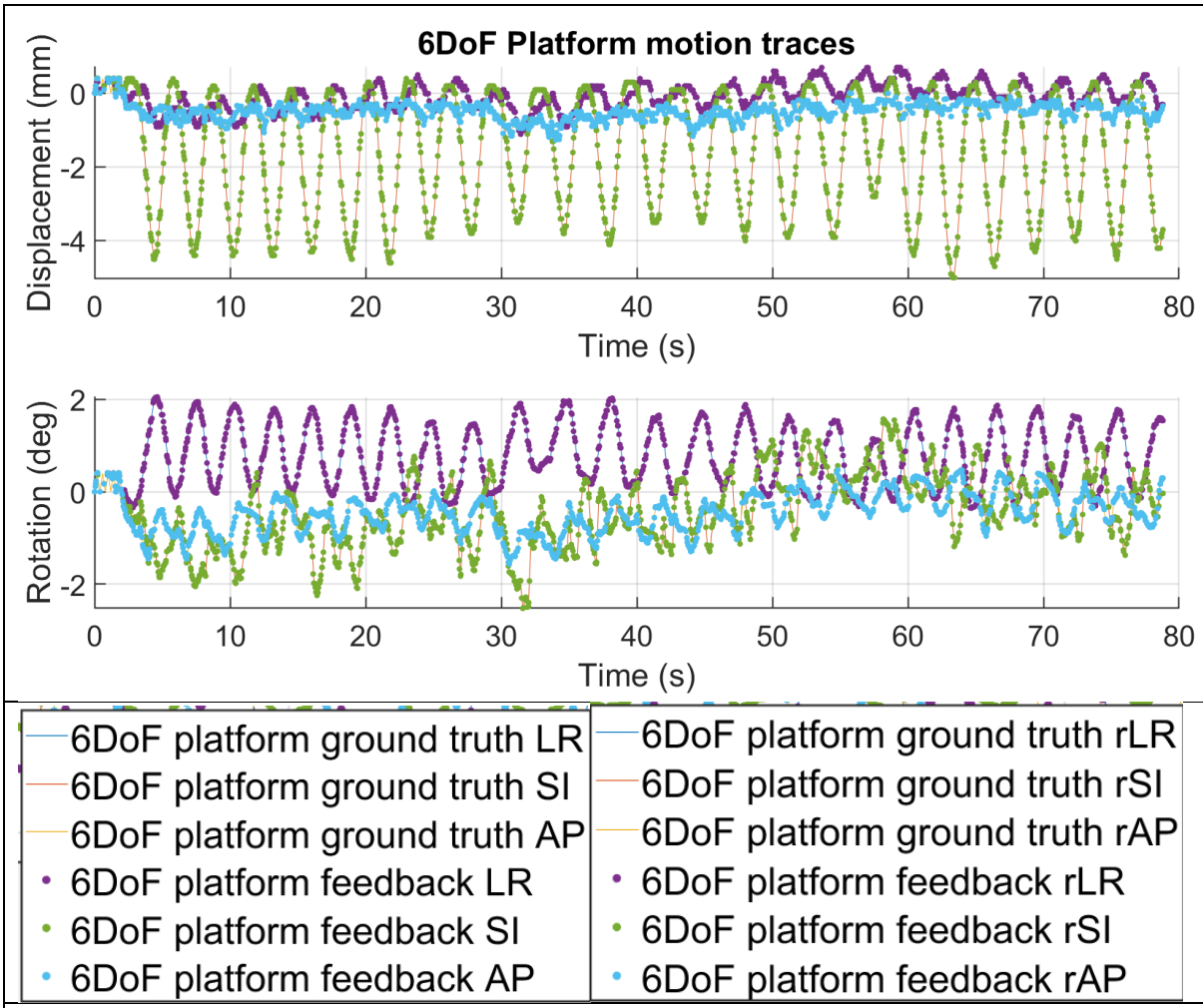

Figure 1.2: 1.Mean_Motion motion trace

2.Mean_Motion2_resp_shifted_gradual_start

Trace	2.Mean_Motion2_resp_shifted_gradual_start
Mean (mm)	-0.3
Std (mm)	0.8
1st percentile (mm)	-2.2
99th percentile (mm)	1.7

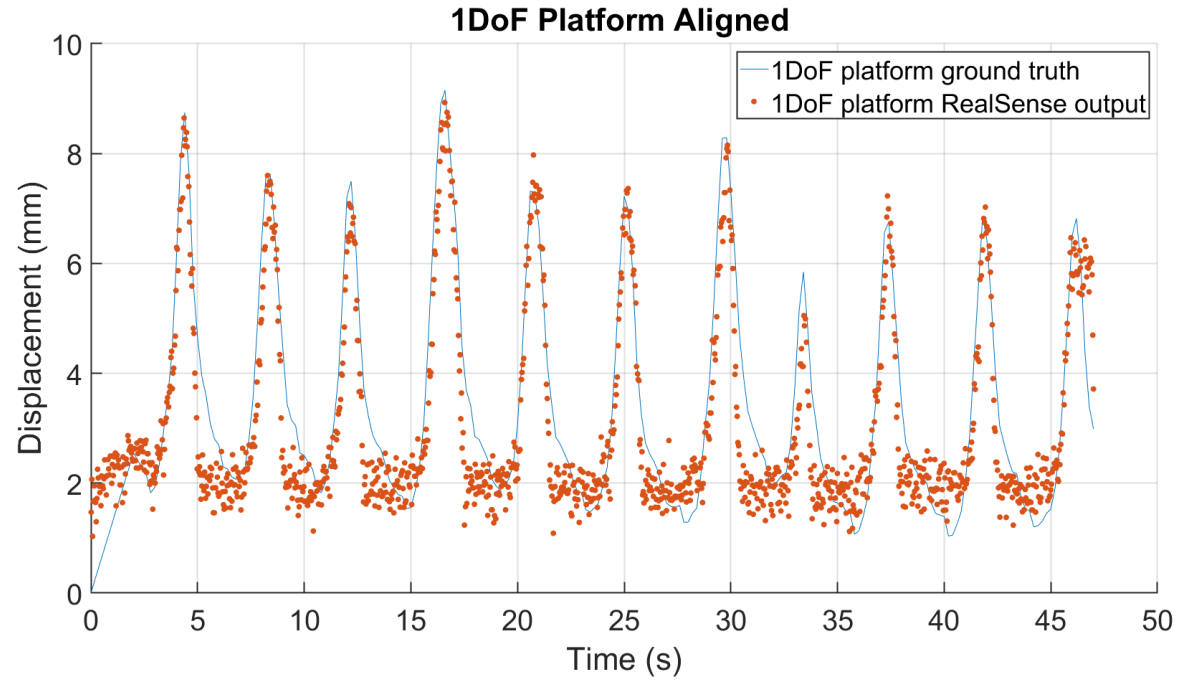

Figure 2.1: 2.Mean_Motion2 resp motion trace

2.Mean_Motion_gradual_start

2_Mean_Motion2

	$\bar{X}$(mm)	σ (mm)	$Perc_1$ (mm)	$Perc_{99}$ (mm)
LR (mm)	-0.0	0.1	-0.4	0.2
SI(mm)	-0.0	0.1	-0.2	0.2
AP(mm)	0.0	0.1	-0.3	0.3
rLR(°)	0.0	0.1	-0.2	0.3
rSI(°)	0.0	0.1	-0.2	0.2
rAP(°)	0.0	0.1	-0.2	0.2

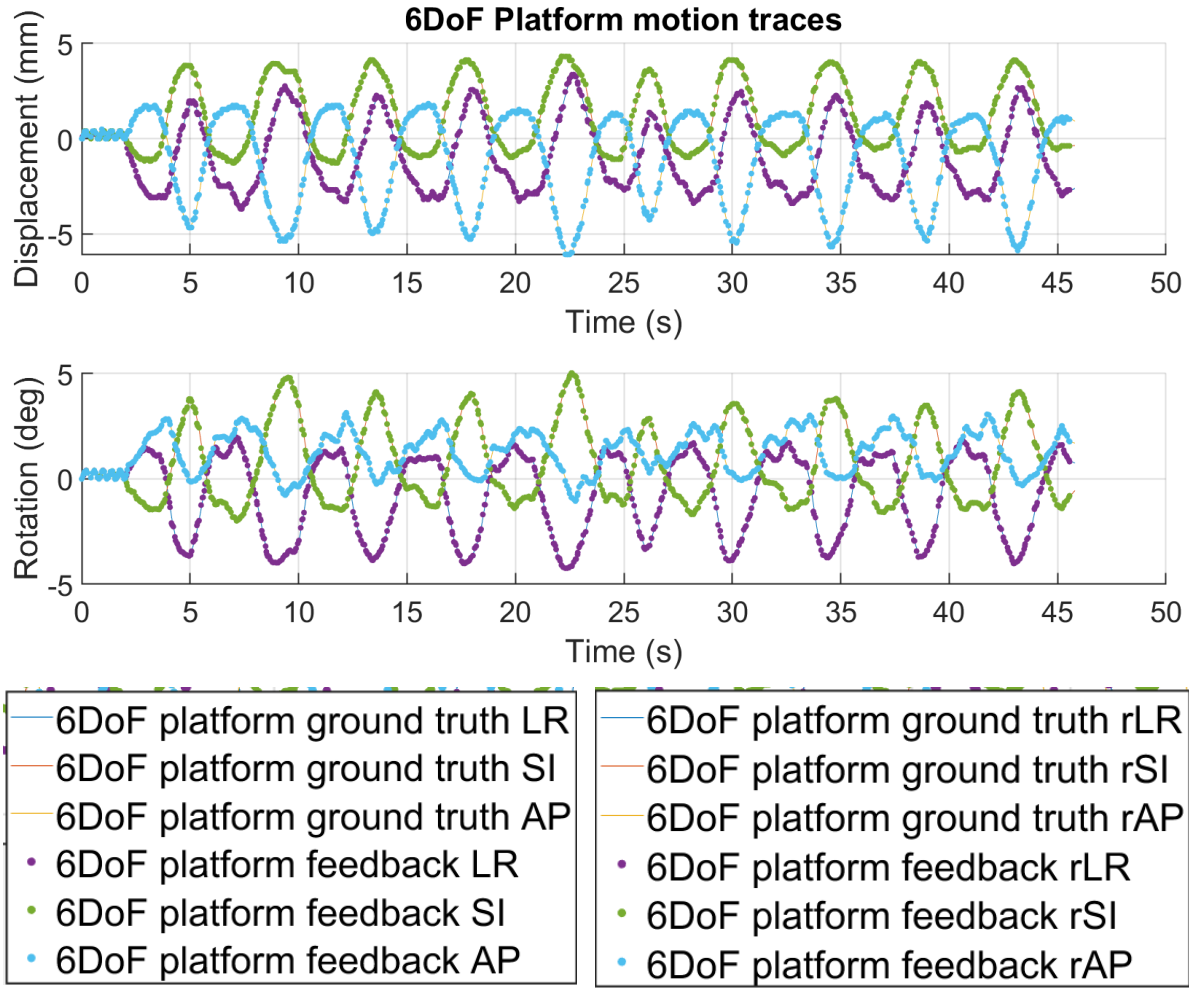

Figure 2.2: 2.Mean_Motion motion trace

3.Mean_Motion3_resp_shifted_gradual_start

Trace	3.Mean_Motion3_resp_shifted_gradual_start
Mean (mm)	-0.1
Std (mm)	0.7
1st percentile (mm)	-1.7
99th percentile (mm)	1.2

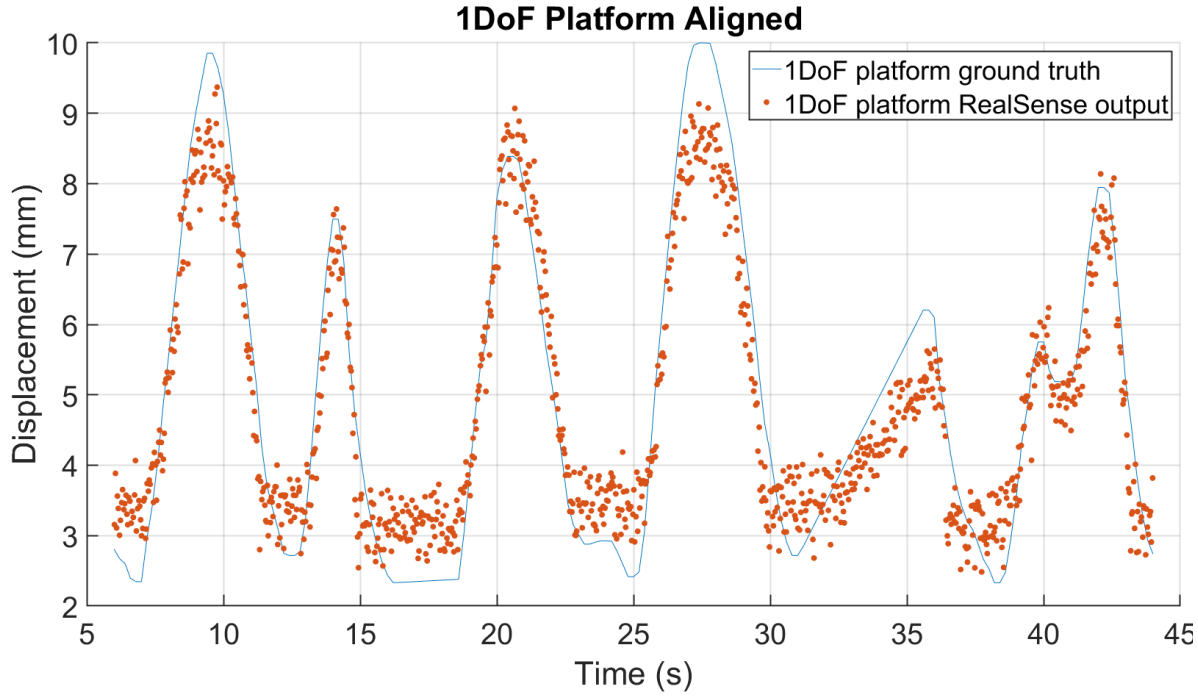

Figure 3.1: 3.Mean_Motion3 resp motion trace

3.Mean_Motion_gradual_start

3.Mean_Motion

	$\bar{X}$(mm)	σ (mm)	$Perc_1$ (mm)	$Perc_{99}$ (mm)
LR (mm)	0.0	0.2	-0.5	0.6
SI(mm)	-0.0	0.6	-1.5	1.4
AP(mm)	0.0	0.2	-0.7	0.6
rLR(°)	0.0	0.1	-0.2	0.3
rSI(°)	0.0	0.2	-0.6	0.5
rAP(°)	-0.0	0.1	-0.2	0.2

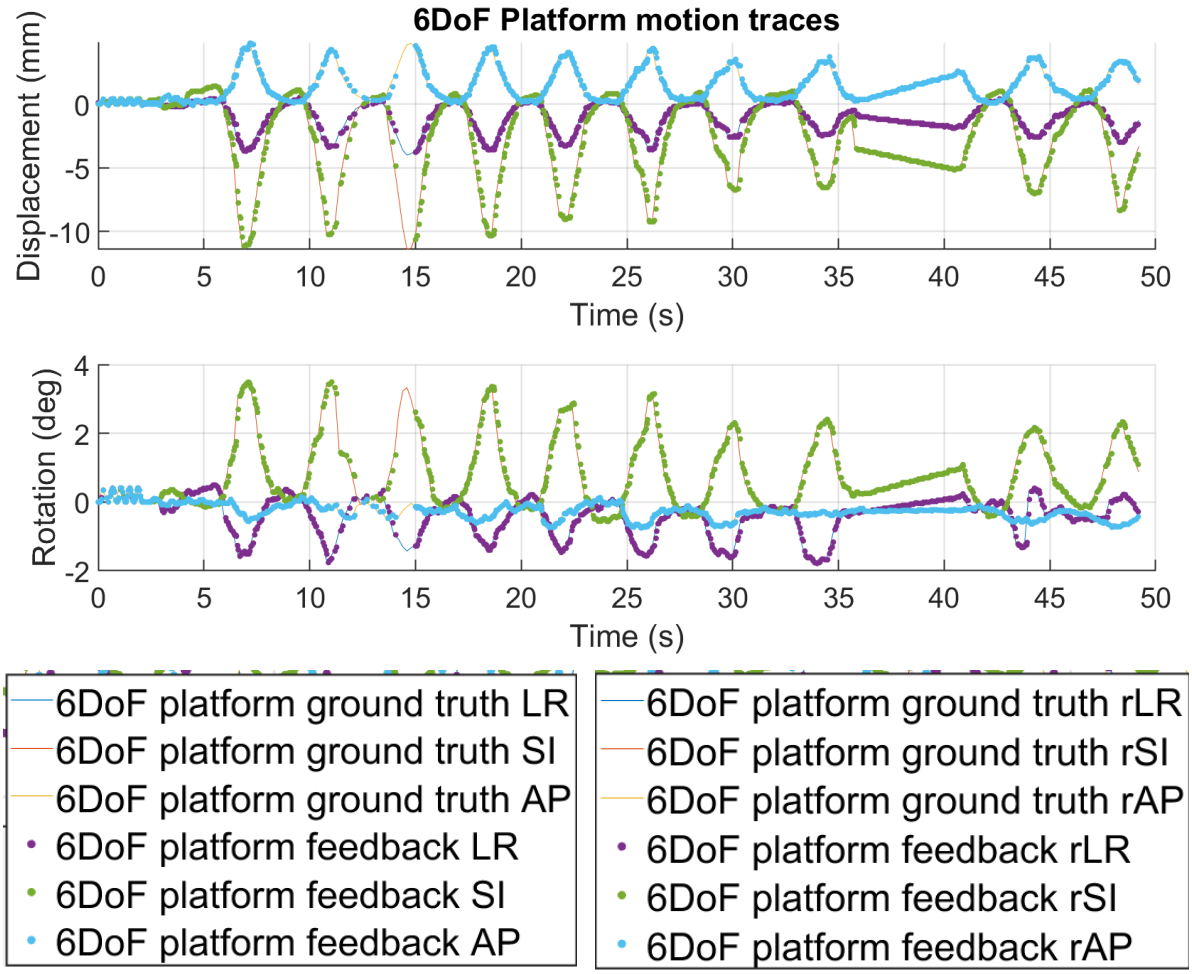

Figure 3.2: 3.Mean_Motion motion trace

4.Mean_Motion4_resp_shifted_gradual_start

Trace	4.Mean_Motion4_resp_shifted_gradual_start
Mean (mm)	-0.0
Std (mm)	0.7
1st percentile (mm)	-1.7
99th percentile (mm)	1.4

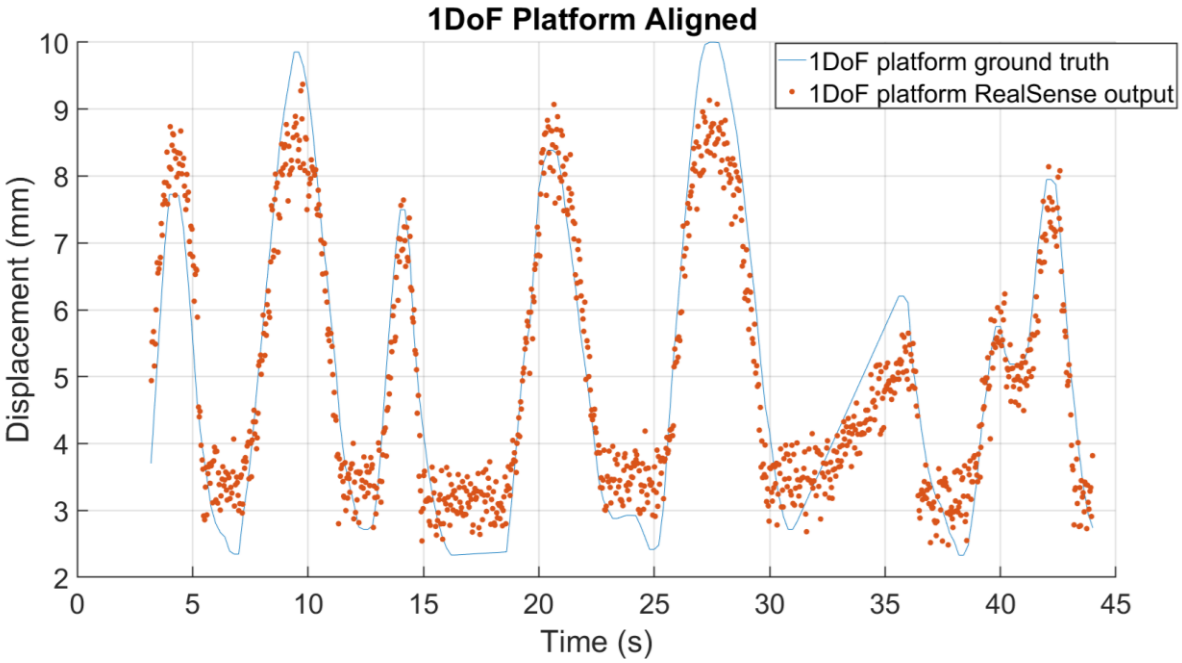

Figure 4.1: 4.Mean_Motion4 resp motion trace

4.Mean_Motion_gradual_start

4.Mean_Motion

	$\bar{X}$ (mm)	σ (mm)	$Perc_1$ (mm)	$Perc_{99}$ (mm)
LR (mm)	-0.0	0.1	-0.2	0.2
SI(mm)	-0.0	0.1	-0.4	0.3
AP(mm)	0.0	0.1	-0.2	0.2
rLR(°)	0.0	0.0	-0.1	0.1
rSI(°)	0.0	0.0	-0.1	0.1
rAP(°)	0.0	0.0	-0.1	0.1

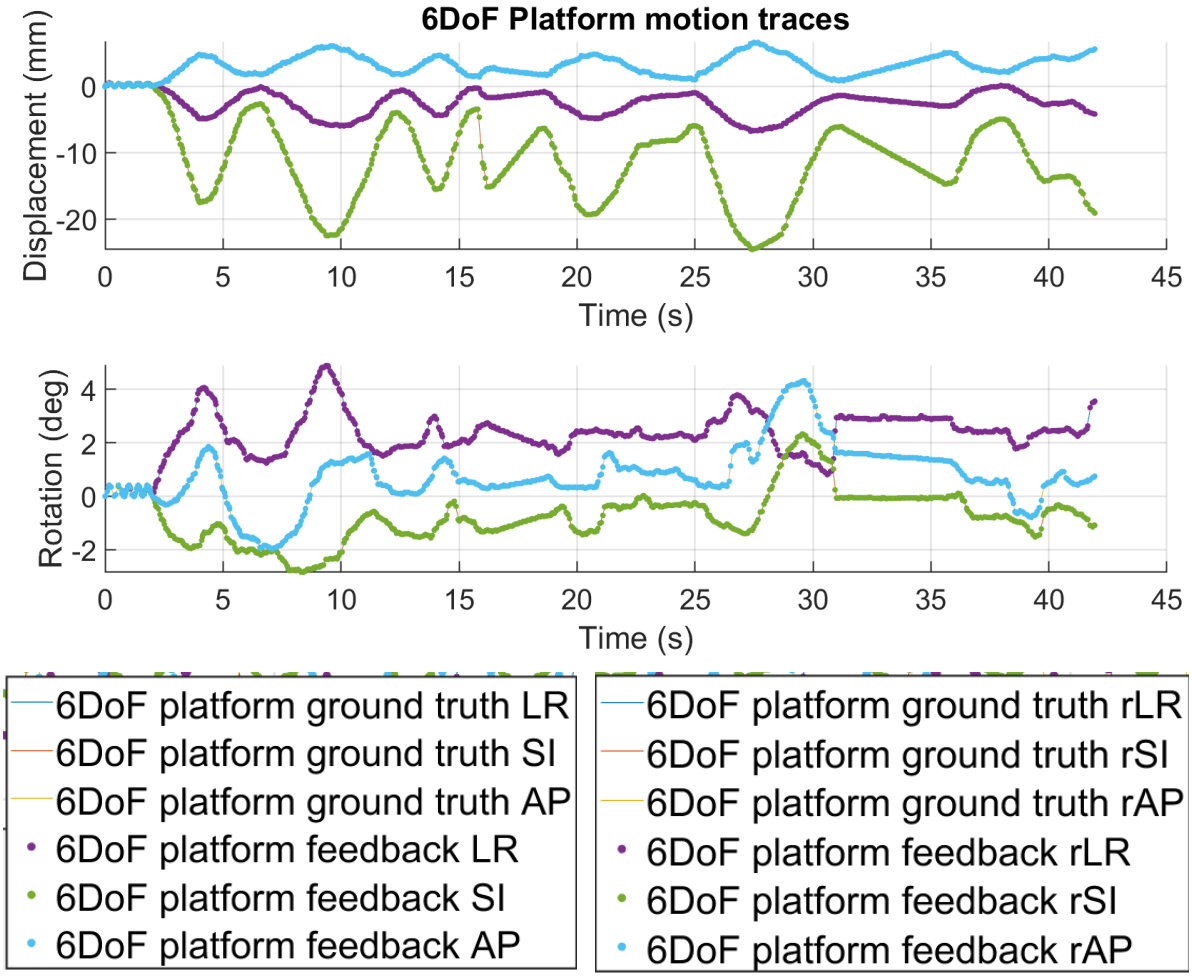

Figure 4.2: 4.Mean_Motion motion trace

Simulated_1D_trace_for_rotation (AP)

Trace	Simulated 1D trace for rotation (AP)
Mean (mm)	-0.6
Std (mm)	0.6
1st percentile (mm)	-1.8
99th percentile (mm)	0.8

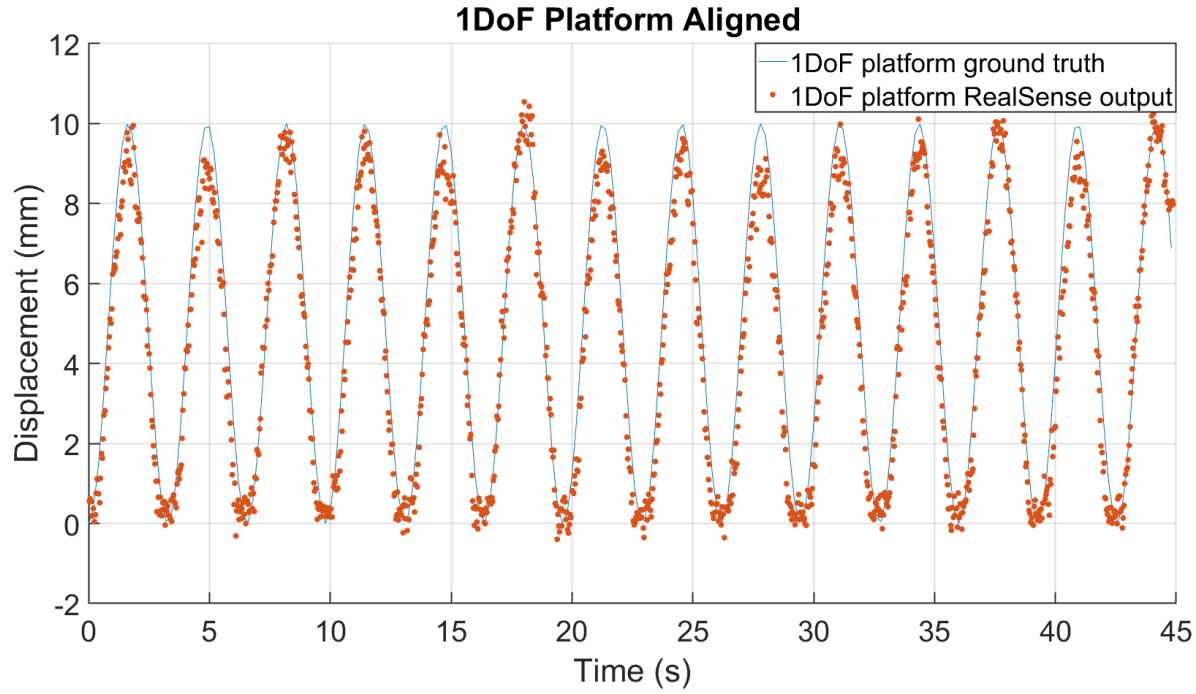

Figure 5.1: Simulated 1D rotation motion trace (AP)

Simulated_6D_trace_for_rotation (AP)

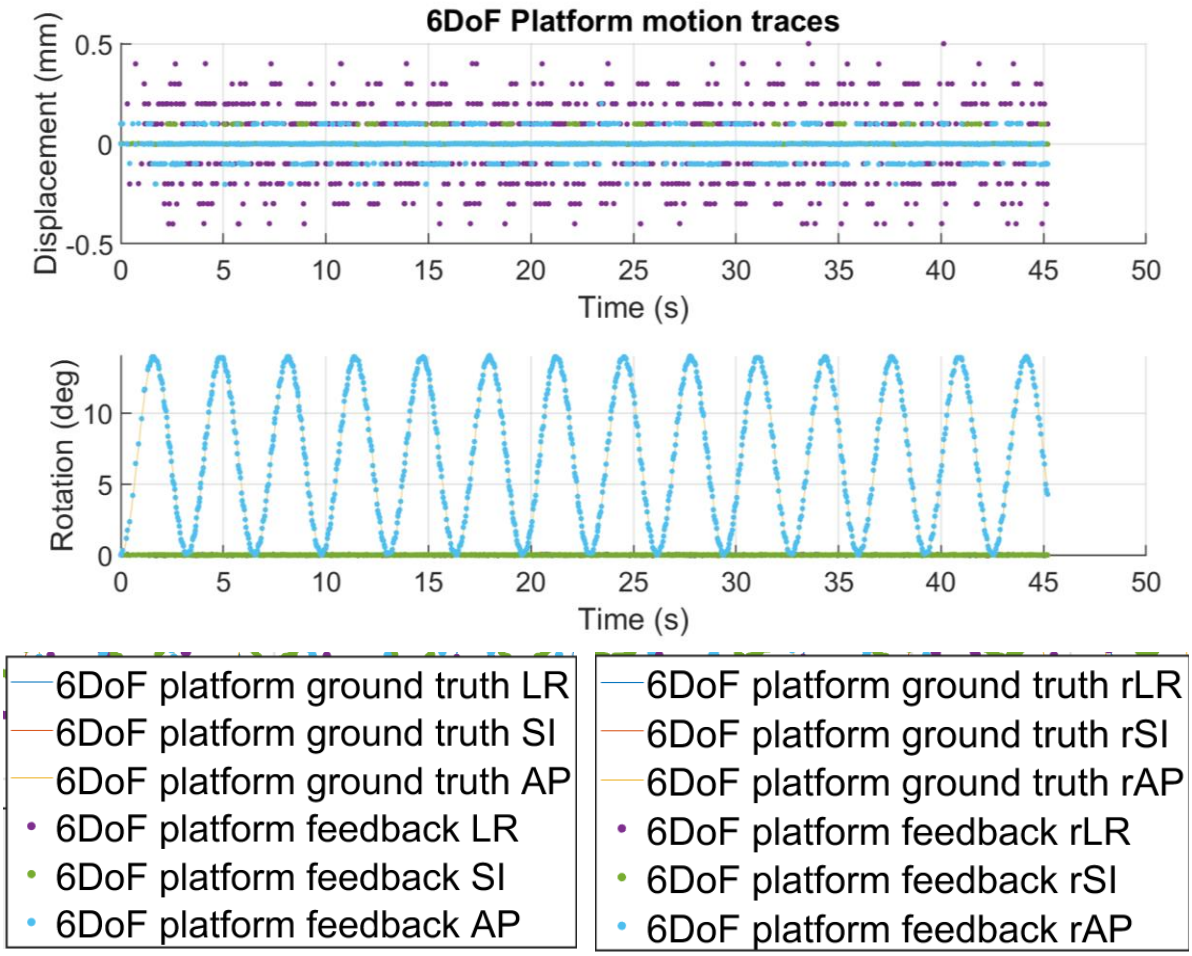

Figure 5.2: Simulated 6D rotation motion trace (AP)

Simulated_1D_trace_for_rotation (SI)

Trace	Simulated 1D trace for rotation (SI)
Mean (mm)	-0.1
Std (mm)	0.7
1st percentile (mm)	-1.5
99th percentile (mm)	1.5

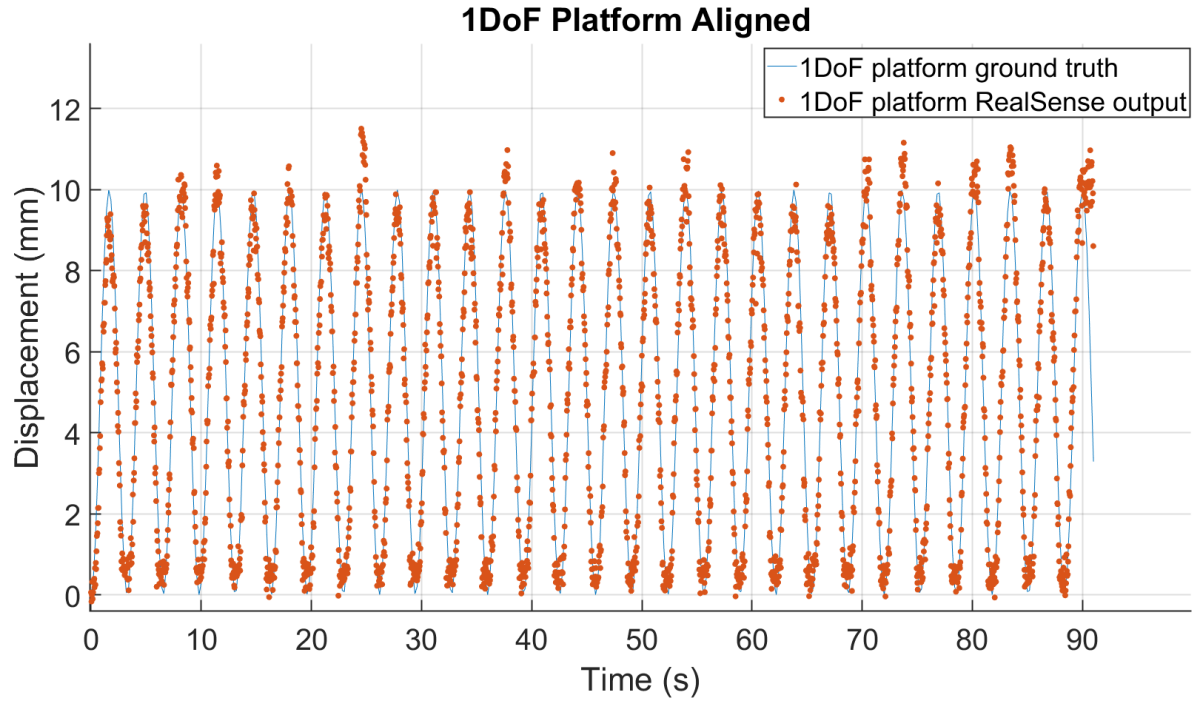

Figure 6.1: Simulated 1D rotation motion trace (SI)

Simulated_6D_trace_for_rotation (SI)

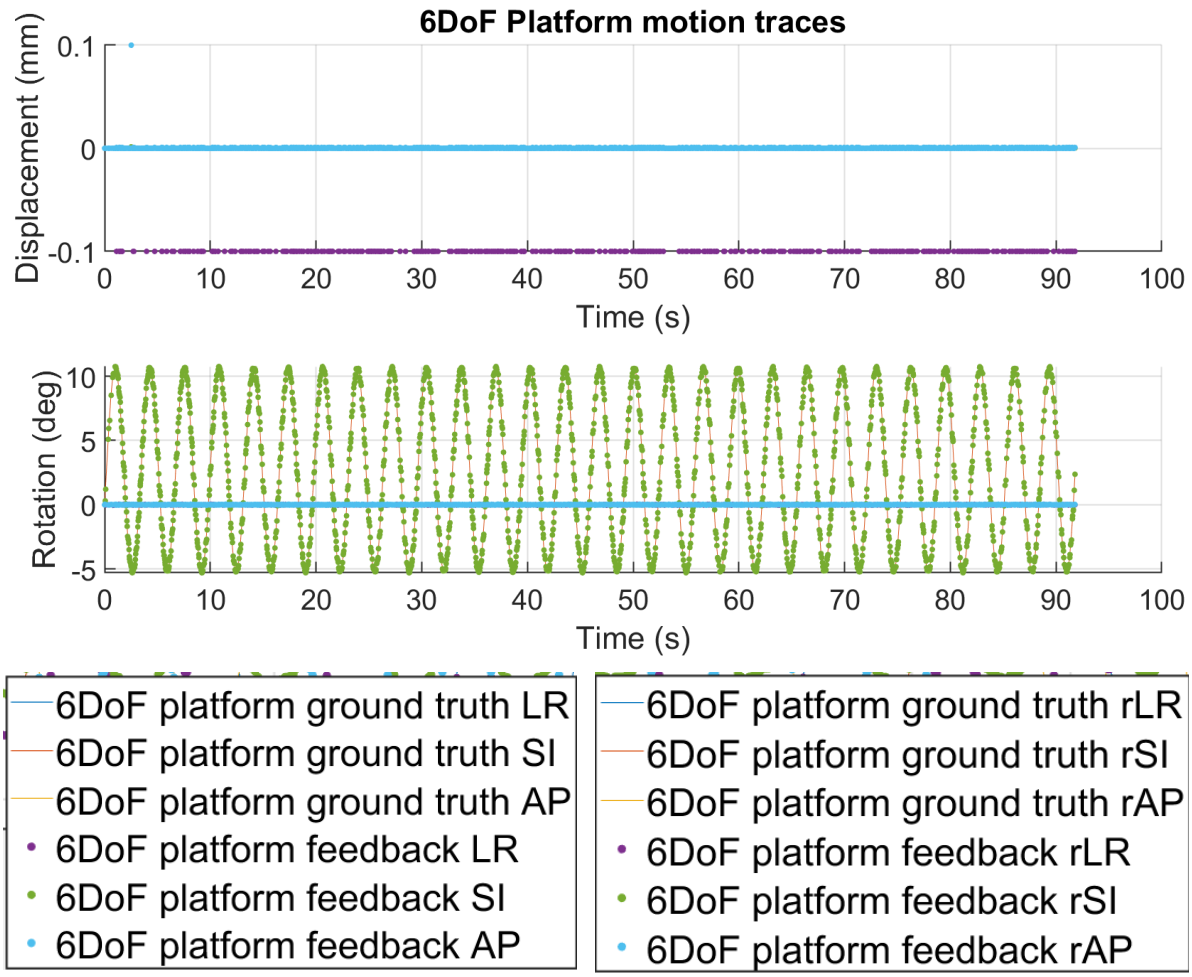

Figure 6.2: Simulated 6D rotation motion trace (SI)

Simulated_1D_trace_for_rotation (LR)

Trace	Simulated 1D trace for rotation (LR)
Mean (mm)	-0.1
Std (mm)	0.7
1st percentile (mm)	-1.7
99th percentile (mm)	1.5

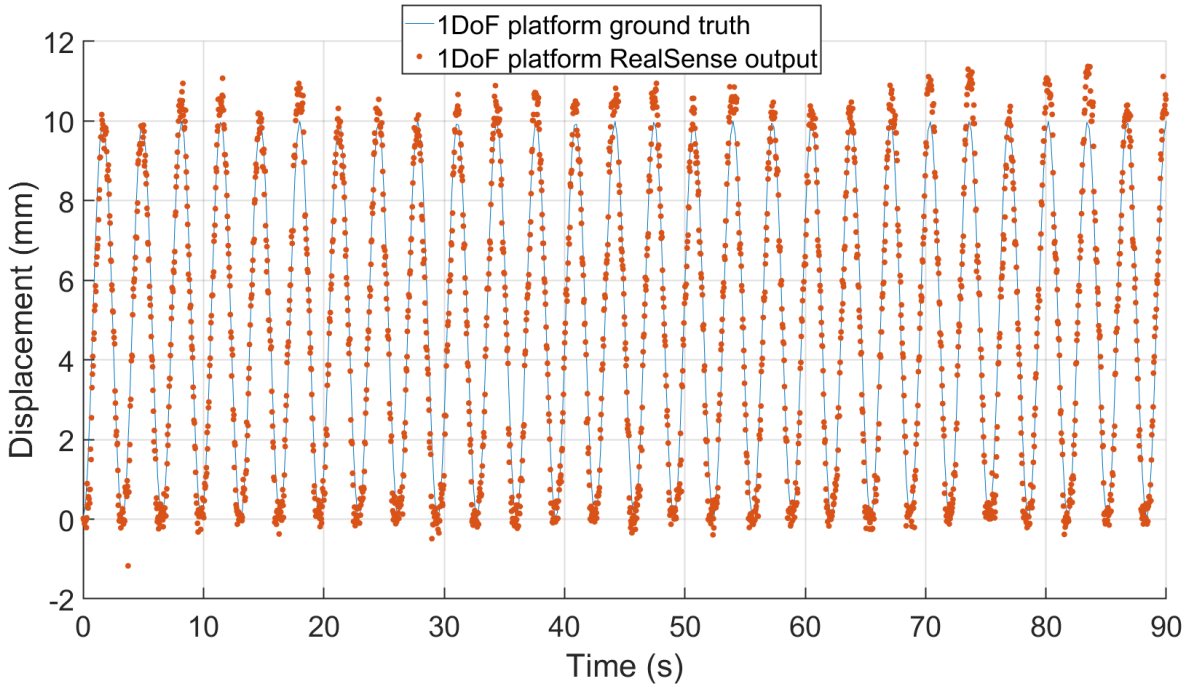

Figure 7: Simulated 1D rotation motion trace (LR)

Simulated_6D_trace_for_rotation (LR)

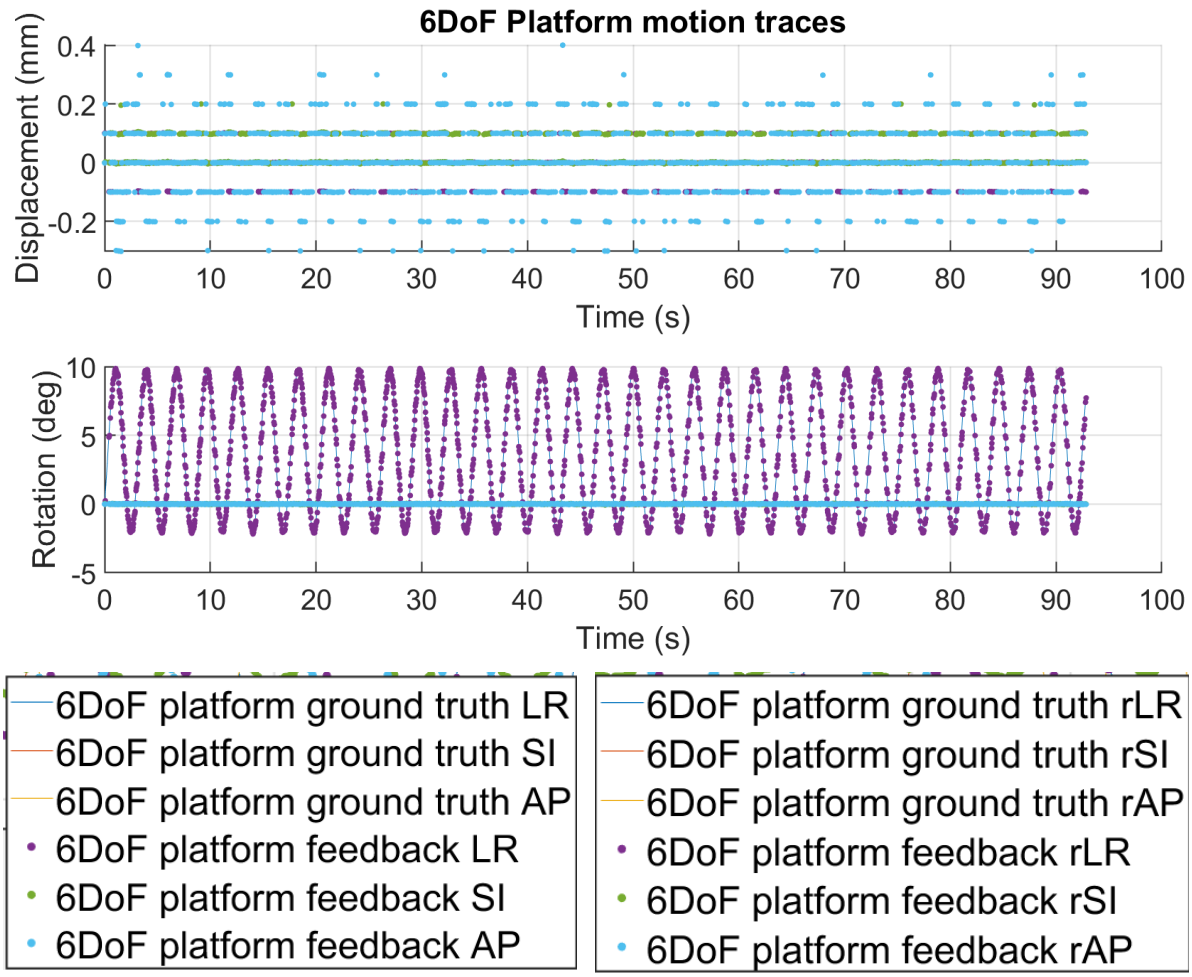

Figure 6.2: Simulated 6D rotation motion trace (SI)

Rotational 6DoF Motions

	$\bar{X}$ (°)	σ (°)	$Perc_1$ (°)	$Perc_{99}$ (°)
rLR(°)	0.0	0.4	-0.8	0.8
rSI(°)	0.0	0.3	-0.7	0.7
rAP(°)	0.0	0.3	-0.7	0.7