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

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| --- | --- |
| 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.

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# 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 |

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| A large machine in a room  Description automatically generated |
| 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 |

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| **A graph of a number of numbers and a number of red and blue dots  Description automatically generated with medium confidence** |
| Figure 1.1: 1.Mean\_Motion resp motion trace |

# 1.Mean\_Motion\_gradual\_start

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1\_Mean\_Motion | | | | |
|  | (mm) | (mm) | (mm) | (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 |

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| A graph of a diagram  Description automatically generated with medium confidence |
| A white background with black text  Description automatically generatedA close-up of a white background  Description automatically generated |
| 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 |

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| **A graph of a graph  Description automatically generated with medium confidence** |
| Figure 2.1: 2.Mean\_Motion2 resp motion trace |

# 2.Mean\_Motion\_gradual\_start

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 2\_Mean\_Motion2 | | | | |
|  | (mm) | (mm) | (mm) | (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 |

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| --- | --- |
| A graph of a diagram  Description automatically generated with medium confidence | |
| A white background with black text  Description automatically generated | A close-up of a white background  Description automatically generated |
| 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 |

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| **A graph of a graph  Description automatically generated with medium confidence** |
| Figure 3.1: 3.Mean\_Motion3 resp motion trace |

# 3.Mean\_Motion\_gradual\_start

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 3.Mean\_Motion | | | | |
|  | (mm) | (mm) | (mm) | (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 |

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| A graph of a diagram  Description automatically generated with medium confidence | |
| A white background with black text  Description automatically generated | A close-up of a white background  Description automatically generated |
| 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 |

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|  |
| Figure 4.1: 4.Mean\_Motion4 resp motion trace |

# 4.Mean\_Motion\_gradual\_start

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4.Mean\_Motion | | | | |
|  | mm) | (mm) | (mm) | (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 |

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| A white background with black text  Description automatically generated | A close-up of a white background  Description automatically generated |
| 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 |

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| **A graph of a number of numbers  Description automatically generated with medium confidence** |
| Figure 5.1: Simulated 1D rotation motion trace (AP) |

# Simulated\_6D\_trace\_for\_rotation (AP)

|  |  |
| --- | --- |
| A graph of a motion line  Description automatically generated with low confidence | |
| A white background with black text  Description automatically generated | A close-up of a white background  Description automatically generated |
| 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 |

|  |
| --- |
| **A graph of a number of numbers  Description automatically generated with medium confidence** |
| Figure 6.1: Simulated 1D rotation motion trace (SI) |

# Simulated\_6D\_trace\_for\_rotation (SI)

|  |  |
| --- | --- |
| A graph of a motion trace  Description automatically generated with medium confidence | |
| A white background with black text  Description automatically generated | A close-up of a white background  Description automatically generated |
| 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 |

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| **A graph of a number of numbers  Description automatically generated with medium confidence** |
| Figure 7: Simulated 1D rotation motion trace (LR) |

# Simulated\_6D\_trace\_for\_rotation (LR)

|  |  |
| --- | --- |
| A graph of a motion trace  Description automatically generated with medium confidence | |
| A white background with black text  Description automatically generated | A close-up of a white background  Description automatically generated |
| Figure 6.2: Simulated 6D rotation motion trace (SI) | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Rotational 6DoF Motions | | | | |
|  | ) | (°) | (°) | (°) |
| 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 |