Combined system 1D-UR16

The aim of this report is to caracterize the accuracy of the 1DoF and UR16 6DoF platforms and identify the time synchronization of the combined system.The motion traces that have been tested in the Image X Institute are in the AP direction 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" |

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# Combined time synchronization

|  |  |
| --- | --- |
| (s) | Combined system latency |
| Mean | 0.14 |
| Std | 0.06 |
| 1st percentile | 0.02 |
| 99th percentile | 0.28 |

# UR16 performance

|  |  |
| --- | --- |
| (mm) | UR 16 |
| Mean | -0.0 |
| Std | 0.6 |
| 1st percentile | -1.4 |
| 99th percentile | 1.4 |

# 1.Mean\_Motion1 (test1)

|  |  |
| --- | --- |
| Trace | 1.Mean\_Motion\_1D |
| Mean (mm) | 0.0 |
| Std (mm) | 0.7 |
| 1st percentile (mm) | -1.7 |
| 99th percentile (mm) | 2.0 |
| Trace | 1.Mean\_Motion\_6D |
| Mean (mm) | -0.0 |
| Std (mm) | 0.6 |
| 1st percentile (mm) | -1.4 |
| 99th percentile (mm) | 1.4 |
| Latency (s) | 0.02 |

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| **A screenshot of a graph  Description automatically generated** |
| Figure 1.1: 1.Mean\_Motion motion trace test 1 |

# 1.Mean\_Motion1 (test2)

|  |  |
| --- | --- |
| Trace | 1.Mean\_Motion\_1D |
| Mean (mm) | 0.0 |
| Std (mm) | 0.8 |
| 1st percentile (mm) | -1.9 |
| 99th percentile (mm) | 1.8 |
| Trace | 1.Mean\_Motion\_6D |
| Mean (mm) | 0.0 |
| Std (mm) | 0.7 |
| 1st percentile (mm) | -1.5 |
| 99th percentile (mm) | 1.5 |
| Latency (s) | 0.13 |

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| **A screen shot of a graph  Description automatically generated** |
| Figure 1.2: 1.Mean\_Motion motion trace test 2 |

# 1.Mean\_Motion1 (test3)

|  |  |
| --- | --- |
| Trace | 1.Mean\_Motion\_1D |
| Mean (mm) | -0.0 |
| Std (mm) | 0.8 |
| 1st percentile (mm) | -1.8 |
| 99th percentile (mm) | 2.2 |
| Trace | 1.Mean\_Motion\_6D |
| Mean (mm) | 0.0 |
| Std (mm) | 0.6 |
| 1st percentile (mm) | -1.4 |
| 99th percentile (mm) | 1.4 |
| Latency (s) | 0.14 |

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| **A screenshot of a graph  Description automatically generated** |
| Figure 1.3: 1.Mean\_Motion1 motion trace test 3 |

# 2.Mean\_Motion (test1)

|  |  |
| --- | --- |
| Trace | 2.Mean\_Motion\_1D |
| Mean (mm) | 0.0 |
| Std (mm) | 1.0 |
| 1st percentile (mm) | -2.4 |
| 99th percentile (mm) | 2.4 |
| Trace | 2.Mean\_Motion\_6D |
| Mean (mm) | 0.0 |
| Std (mm) | 0.6 |
| 1st percentile (mm) | -1.3 |
| 99th percentile (mm) | 1.3 |
| Latency (s) | 0.10 |

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| Figure 2.1: 2.Mean\_Motion2 motion trace test 1 |

# 2.Mean\_Motion (test2)

|  |  |
| --- | --- |
| Trace | 2.Mean\_Motion\_1D |
| Mean (mm) | -0.0 |
| Std (mm) | 1.0 |
| 1st percentile (mm) | -2.5 |
| 99th percentile (mm) | 2.4 |
| Trace | 2.Mean\_Motion\_6D |
| Mean (mm) | 0.0 |
| Std (mm) | 0.6 |
| 1st percentile (mm) | -1.4 |
| 99th percentile (mm) | 1.4 |
| Latency (s) | 0.02 |

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| Figure 2.2: 2.Mean\_Motion2 motion trace test 2 |

# 2.Mean\_Motion2 (test3)

|  |  |
| --- | --- |
| Trace | 2.Mean\_Motion\_1D |
| Mean (mm) | 0.0 |
| Std (mm) | 0.9 |
| 1st percentile (mm) | -2.3 |
| 99th percentile (mm) | 2.2 |
| Trace | 2.Mean\_Motion\_6D |
| Mean (mm) | 0.0 |
| Std (mm) | 0.6 |
| 1st percentile (mm) | -1.5 |
| 99th percentile (mm) | 1.5 |
| Latency (s) | 0.09 |

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| Figure 2.3: 2.Mean\_Motion2 motion trace test 3 |

# 3.Mean\_Motion\_1 (test1)

|  |  |
| --- | --- |
| Trace | 3.Mean\_Motion\_1D |
| Mean (mm) | -0.0 |
| Std (mm) | 1.1 |
| 1st percentile (mm) | -2.6 |
| 99th percentile (mm) | 2.8 |
| Trace | 3.Mean\_Motion\_6D |
| Mean (mm) | -0.0 |
| Std (mm) | 0.6 |
| 1st percentile (mm) | -1.4 |
| 99th percentile (mm) | 1.4 |
| Latency (s) | 0.07 |

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| **A graph of a graph  Description automatically generated with medium confidence** |
| Figure 3.1: 3.Mean\_Motion\_1 motion trace test 1 |

# 3.Mean\_Motion\_1 (test2)

|  |  |
| --- | --- |
| Trace | 3.Mean\_Motion\_1D |
| Mean (mm) | 0.0 |
| Std (mm) | 1.1 |
| 1st percentile (mm) | -2.4 |
| 99th percentile (mm) | 2.9 |
| Trace | 3.Mean\_Motion\_6D |
| Mean (mm) | 0.0 |
| Std (mm) | 0.6 |
| 1st percentile (mm) | -1.4 |
| 99th percentile (mm) | 1.4 |
| Latency (s) | 0.13 |

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| Figure 3.2: 3.Mean\_Motion\_1 motion trace test 2 |

# 3.Mean\_Motion\_1 (test3)

|  |  |
| --- | --- |
| Trace | 3.Mean\_Motion\_1D |
| Mean (mm) | 0.0 |
| Std (mm) | 1.1 |
| 1st percentile (mm) | -2.4 |
| 99th percentile (mm) | 2.8 |
| Trace | 3.Mean\_Motion\_6D |
| Mean (mm) | -0.0 |
| Std (mm) | 0.6 |
| 1st percentile (mm) | -1.4 |
| 99th percentile (mm) | 1.4 |
| Latency (s) | 0.12 |

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| Figure 3.3: 3.Mean\_Motion\_1 motion trace test 3 |

# 4.Mean\_Motion\_2 (test1)

|  |  |
| --- | --- |
| Trace | 4.Mean\_Motion\_1D |
| Mean (mm) | -0.0 |
| Std (mm) | 1.0 |
| 1st percentile (mm) | -2.2 |
| 99th percentile (mm) | 2.7 |
| Trace | 4.Mean\_Motion\_6D |
| Mean (mm) | 0.0 |
| Std (mm) | 0.6 |
| 1st percentile (mm) | -1.4 |
| 99th percentile (mm) | 1.4 |
| Latency (s) | 0.09 |

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| Figure 4.1: 4.Mean\_Motion\_2 motion trace test 1 |

# 4.Mean\_Motion\_2 (test2)

|  |  |
| --- | --- |
| Trace | 4.Mean\_Motion\_1D |
| Mean (mm) | -0.0 |
| Std (mm) | 1.0 |
| 1st percentile (mm) | -2.3 |
| 99th percentile (mm) | 2.5 |
| Trace | 4.Mean\_Motion\_6D |
| Mean (mm) | 0.0 |
| Std (mm) | 0.6 |
| 1st percentile (mm) | -1.4 |
| 99th percentile (mm) | 1.4 |
| Latency (s) | 0.07 |

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|  |
| Figure 4.2: 4.Mean\_Motion\_2 motion trace test 2 |

# 4.Mean\_Motion\_2 (test3)

|  |  |
| --- | --- |
| Trace | 4.Mean\_Motion\_1D |
| Mean (mm) | 0.0 |
| Std (mm) | 1.2 |
| 1st percentile (mm) | -2.6 |
| 99th percentile (mm) | 2.6 |
| Trace | 4.Mean\_Motion\_6D |
| Mean (mm) | 0.0 |
| Std (mm) | 0.6 |
| 1st percentile (mm) | -1.5 |
| 99th percentile (mm) | 1.4 |
| Latency (s) | 0.09 |

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|  |
| Figure 4.3: 4.Mean\_Motion\_2 motion trace test 3 |

# 1.Mean\_Motion1 (test 1100s)

|  |  |
| --- | --- |
| Trace | 1.Mean\_Motion\_1D |
| Mean (mm) | -0.0 |
| Std (mm) | 0.7 |
| 1st percentile (mm) | -1.7 |
| 99th percentile (mm) | 1.6 |
| Trace | 1.Mean\_Motion\_6D |
| Mean (mm) | -0.0 |
| Std (mm) | 0.6 |
| 1st percentile (mm) | -1.4 |
| 99th percentile (mm) | 1.5 |
| Latency (s) | 0.28 |

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| **A screenshot of a graph  Description automatically generated** |
| Figure 5: 1.Mean\_Motion1 motion trace test 1100s |