

ROTATION RANGE OF MOTION BENCHMARK

Reference No / Version	B-RRM-0.01
Authors	Gal Gorjup
Institution	University of Auckland
Contact Information	ggor290@aucklanduni.ac.nz
Adopted Protocol	In-Hand Rotation Protocol (P-IHR-0.01)
Scoring	<p>Assessment is based on the range of motion metric m, obtained through the following steps:</p> <ol style="list-style-type: none"> 1) Align the recorded object rotation point clouds with respect to their maximum and minimum angle offsets around the x, y and z axis. 2) Merge the point clouds. 3) Compute the volume of a convex hull V_{ch} around the merged point clouds. 4) Scale the convex hull volume to the cube of 2π. 5) Obtain the metric m by computing the base-10 logarithm of the above fraction: $m = \log_{10} \frac{V_{ch}}{(2\pi)^3}$ <p>As the reachable workspace volume will be smaller or equal to $2\pi^3$, the metric m will be negative or 0 (if full rotation in all axes is achievable). The assessed hands are therefore compared based on this value, where a less negative score corresponds to a larger rotation workspace and better performance. The metric is computed for each sensorized object.</p>
Details of Setup	To assist with data processing and metric computation, code samples are provided.
Results to Submit	<p>For each sensorized object:</p> <ul style="list-style-type: none"> • Assessed hand model and control details. • Computed metrics m. • Plots of recorded point cloud with overlaid convex hull. • Comments on obtained results with respect to the hand model and control.