

Guidelines and Standards for Calibrated Millimeter Accurate Measurements in 3D Body Scans

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Abstract

By applying standard precision measurement techniques from the surveying industry, we demonstrate a process for calibrating the measurement accuracy in the millimeter range on a photogrammetry-based 3D model of humans. The two key elements behind a successful and truthful calibration baseline are:

- 1) Trust your measurement (which is we apply measurement standards from the surveying industry)
- 2) Control your space (the design aspects of the scanner space that optimize the calibration techniques)

This calibration method was applied to a commercial 3D body scanner and then verified using externally and independently calibrated scale bars. After calibrating the body scanner, a statistical comparison of measurements on mesh-based 3D models from humans pre- and post-calibration was performed.

Based on these results, a new calibration hardware optimized for photogrammetry-based body scans was developed to ease the open question of calibrated measurement accuracy on-site at the end customer's facilities.