Collecting Human Motion Data in Large and Occlusion-Prone Environments using Ultra-Wideband Localization (UWB)

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Challenges in collecting human motion data with different modalities

Robot Sensors

- + Simple setup
- Sensitive to occlusion
- Measurements from a

Environment Sensors

- + Can cover large areas
- Requires multi-sensor calibration

Motion Capture

- + High accuracy
- Limited to small and inthe-lab environments



single vantage point

- Limited accuracy

Expensive setup

The alternative: UWB for occlusion-robust, scalable, and accurate recordings



Battery powered UWB anchor

UWB has several key advantages

- Works in occluded environments
- Resistance to multipath interference (environment signal reflections)
- Fast set-up and no calibration
- Unlimited number of tracked devices
- Low cost to cover large areas
- Power only required for UWB anchors

THÖR dataset family: Human and robot motion trajectories recorded in a controlled indoor environment



THÖR-UWB: Scalable human motion capture for occlusion-prone environments

- >130 min of recorded data
- ~140 m² experimental area
- Technological Modalities:
 - Motion Capture •
 - Ultra-Wideband (UWB) (1) •
 - Eye-tracking (2) •
 - Radar (3) LiDAR (4) Quadruped Robot
- Recorded in a museum-like environment



Technological Modalities

Comparison between UWB and Motion Capture trajectories











3 minutes of motion data, 4 participants

ZENCE Dataset

Paper

Top-down view of the indoor environment

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