ELECTRICAL & COMPUTER ENGINEERING
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Digital Twin–Generated Radar Data for Scalable Pose Estimation

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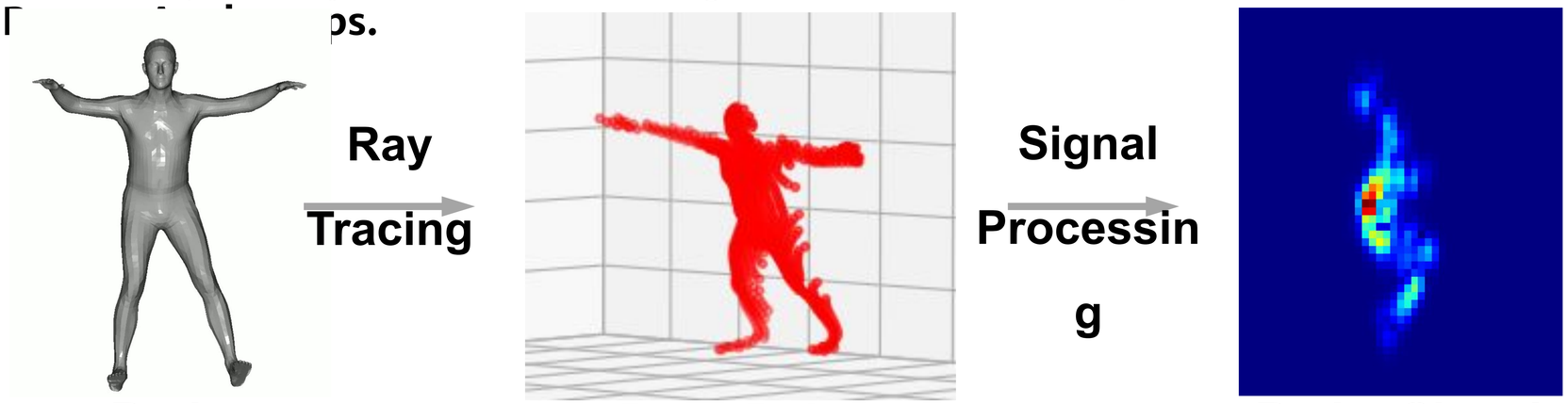
BACKGROUND

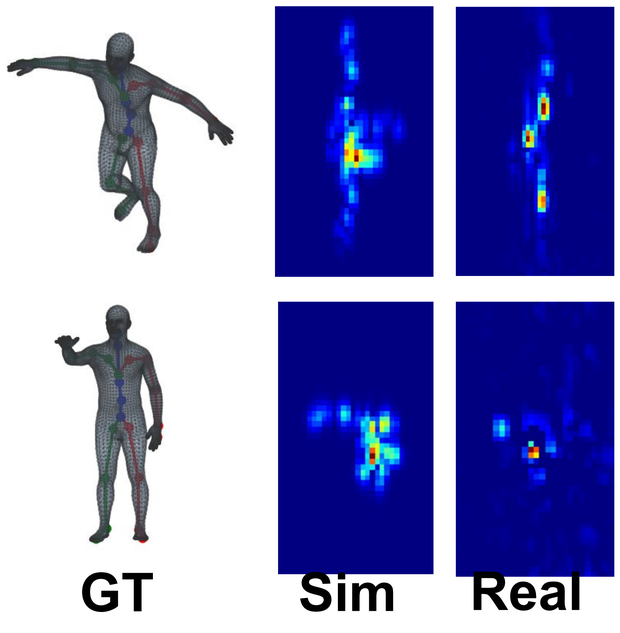
- Collecting large amounts of ground-truth annotations for radar pose estimation is intrusive and expensive.
- Radar measurements are hard to reproduce across various frequencies, devices, and environments, limiting dataset diversity and scalability.
- Digital twins can generate synthetic radar signals to be served as scalable training data and potential references for

METHODS

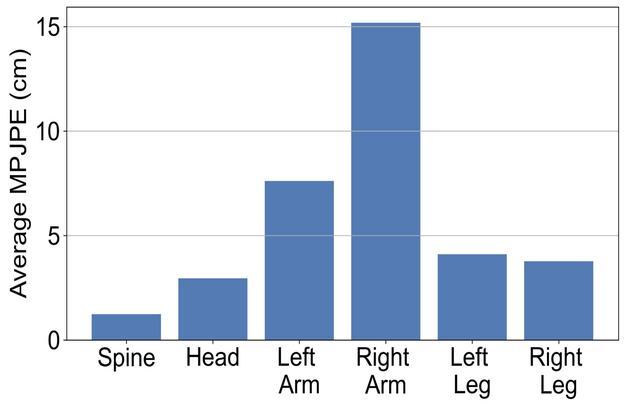
We generate human meshes for given poses using pre-trained LLM tools. Ray tracing is applied to the meshes to obtain corresponding point clouds, where each point acts as a reflector. By computing the amplitude and phase contributions from these reflectors, we synthesize radar signals and derive representations such as [illegible]ps.



RESULTS



The ML model trained on synthetic radar Range–Angle maps achieves an MPJPE of 7.36 [illegible]



DISCUSSION

By reducing the gap between simulated and real radar signals, a model can be tuned in a self-supervised manner.