

LiveHPS++



EUROPEAN CONFERENCE ON COMPUTER VISION

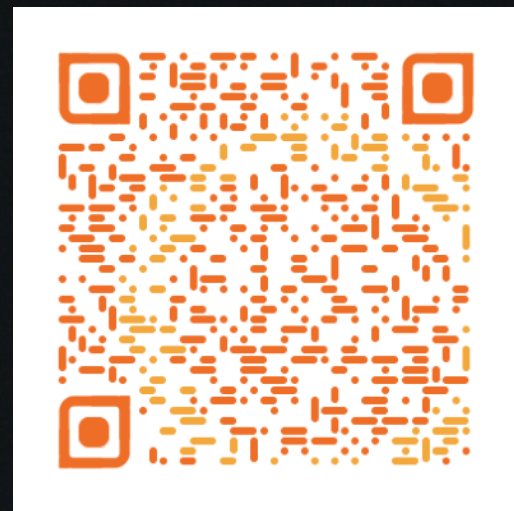
MILANO
2024

Robust and Coherent Motion Capture in Dynamic Free Environment

YimingRen¹, XiaoHan¹, YichenYao¹, XiaoxiaoLong², YujingSun^{2,†}, YuexinMa^{1,†}

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Motivation

Motivation

Variety Objects



Left-view



Front-view

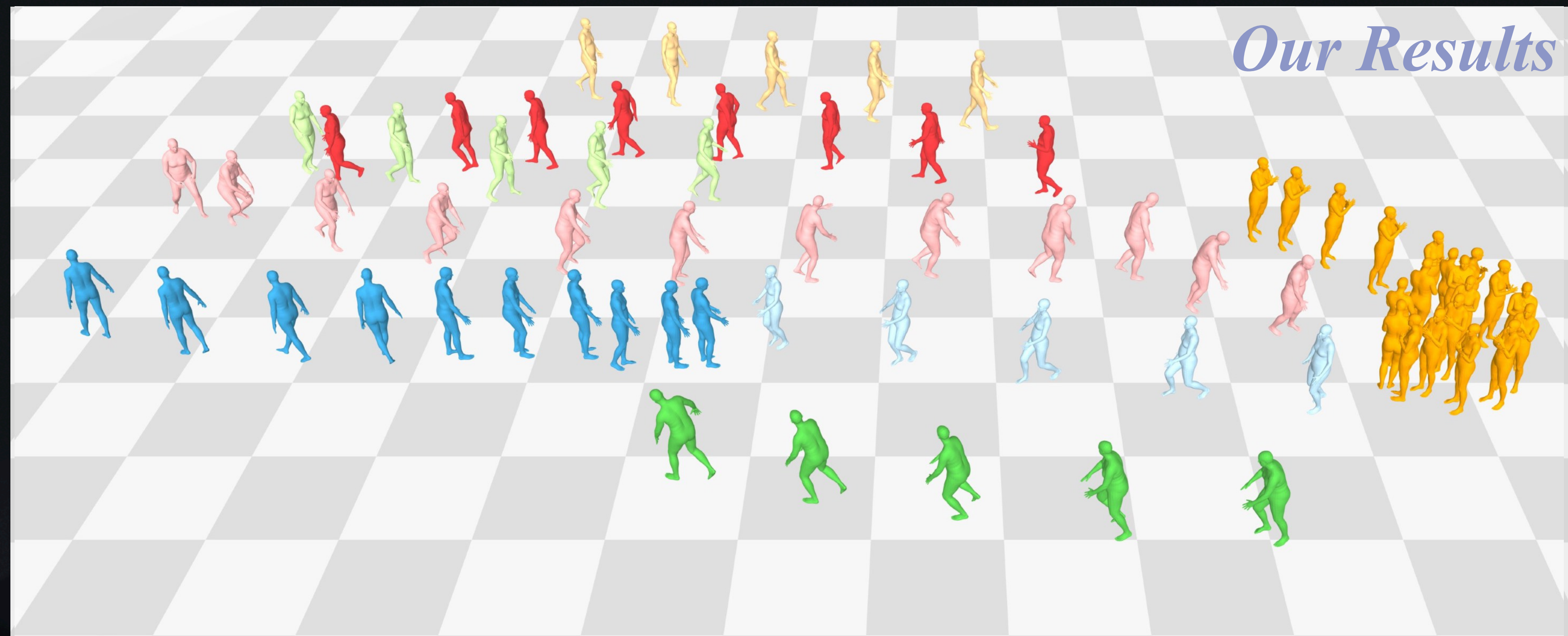
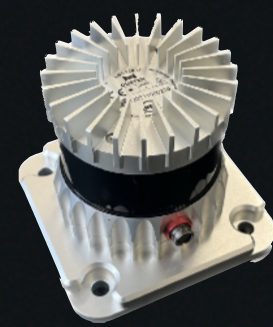


Right-view

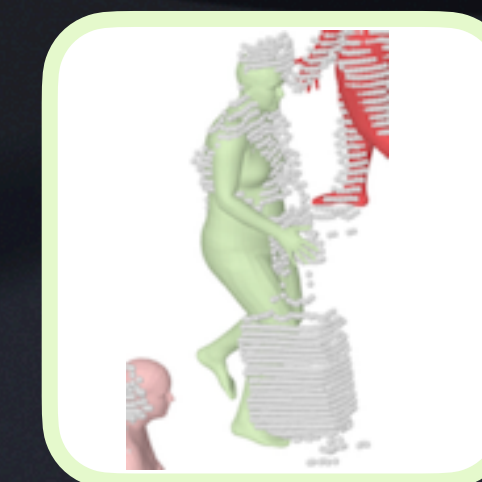
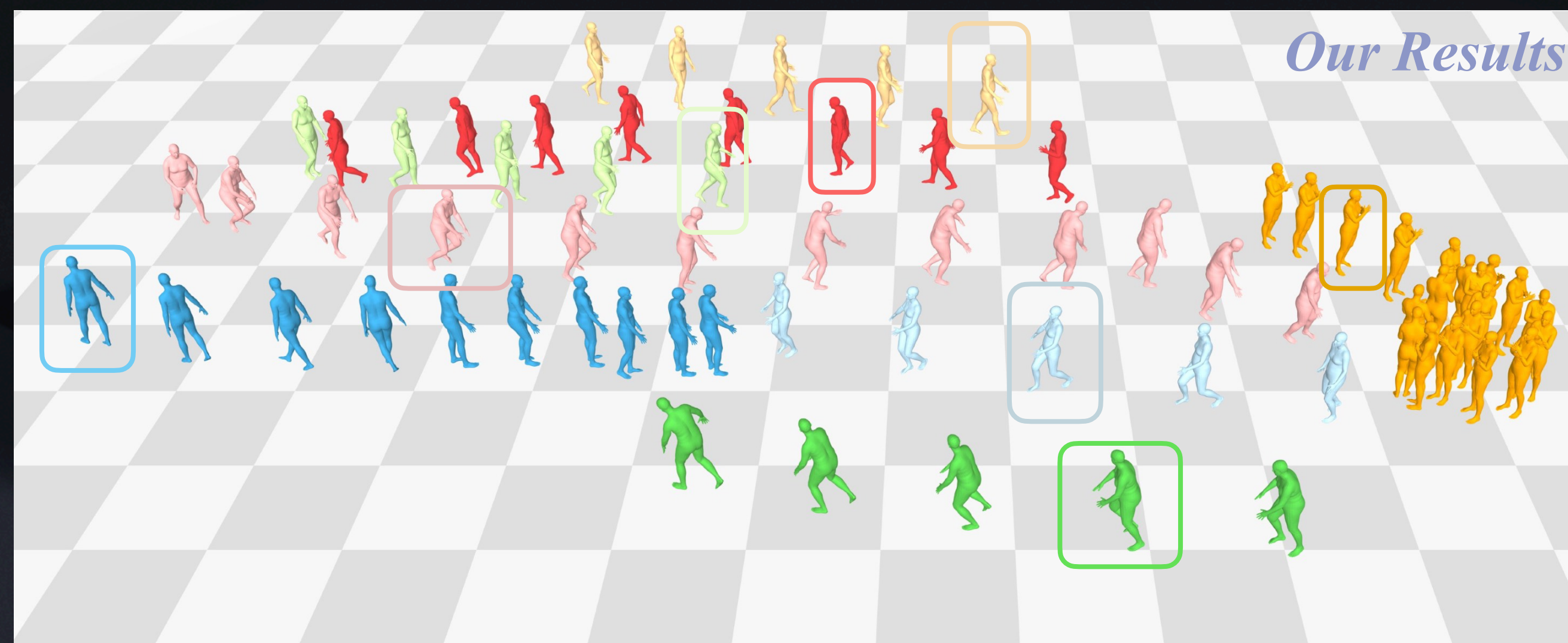
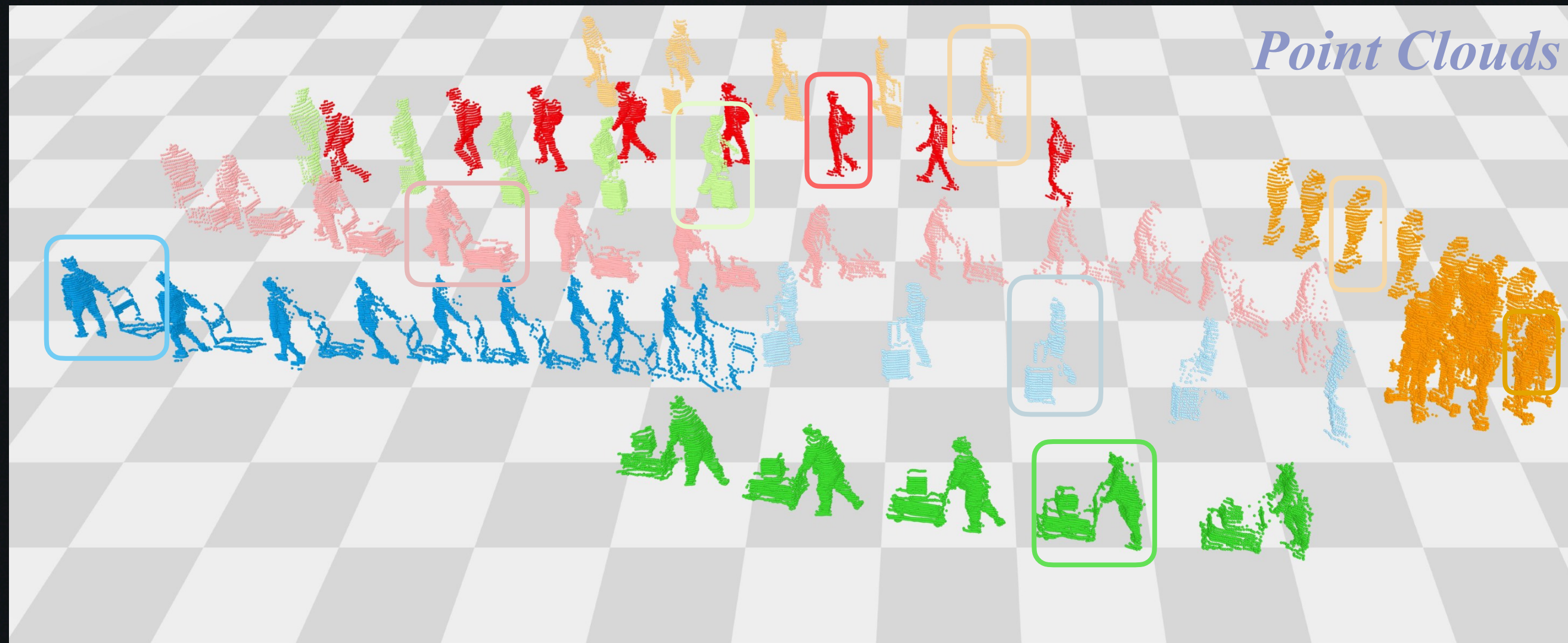
Large-scale Environment

Motivation

LiveHPS++

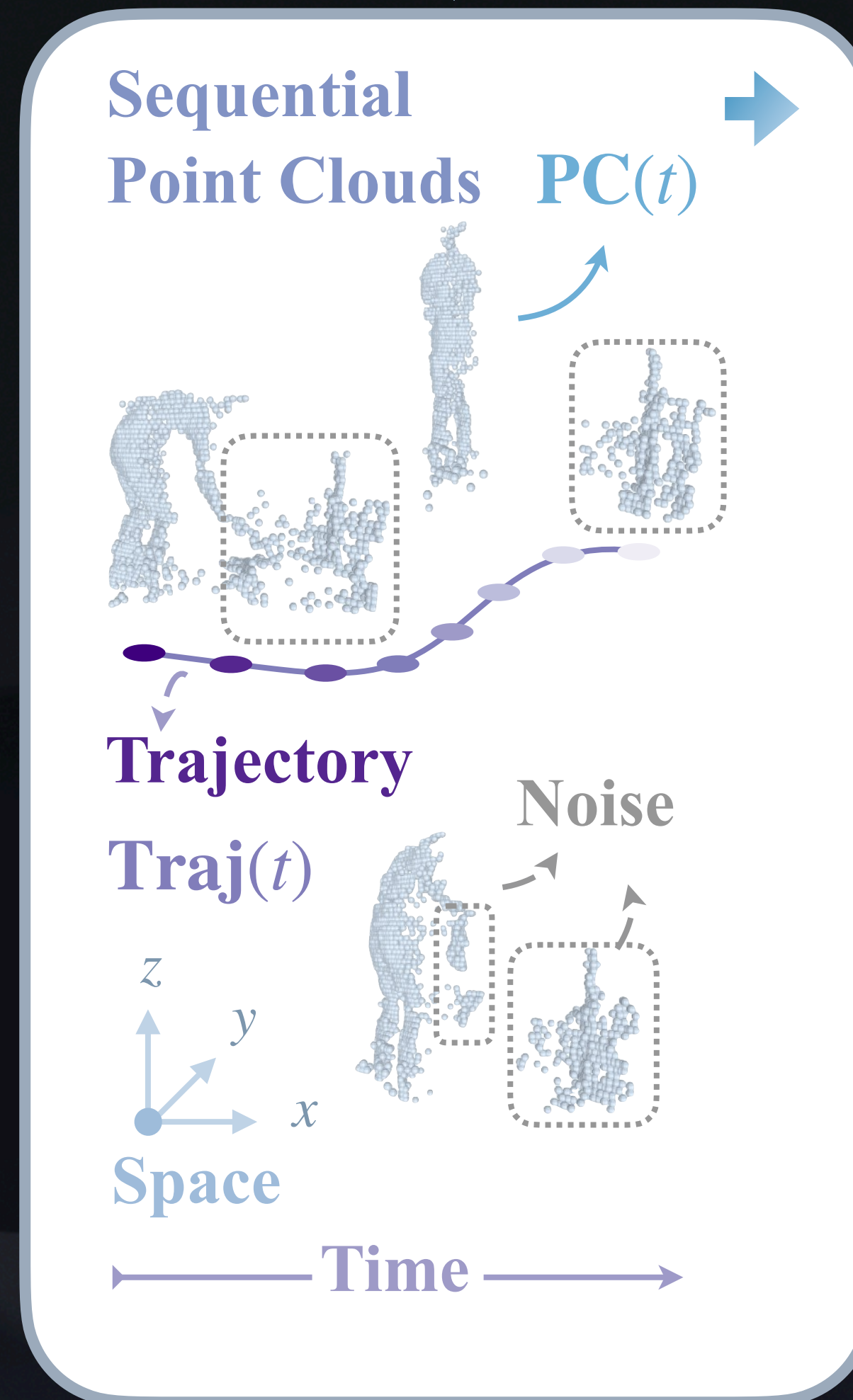
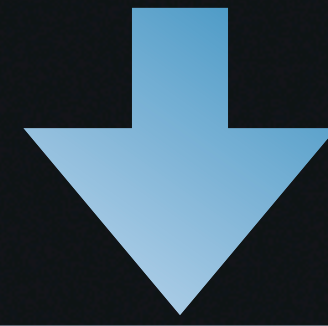


Motivation

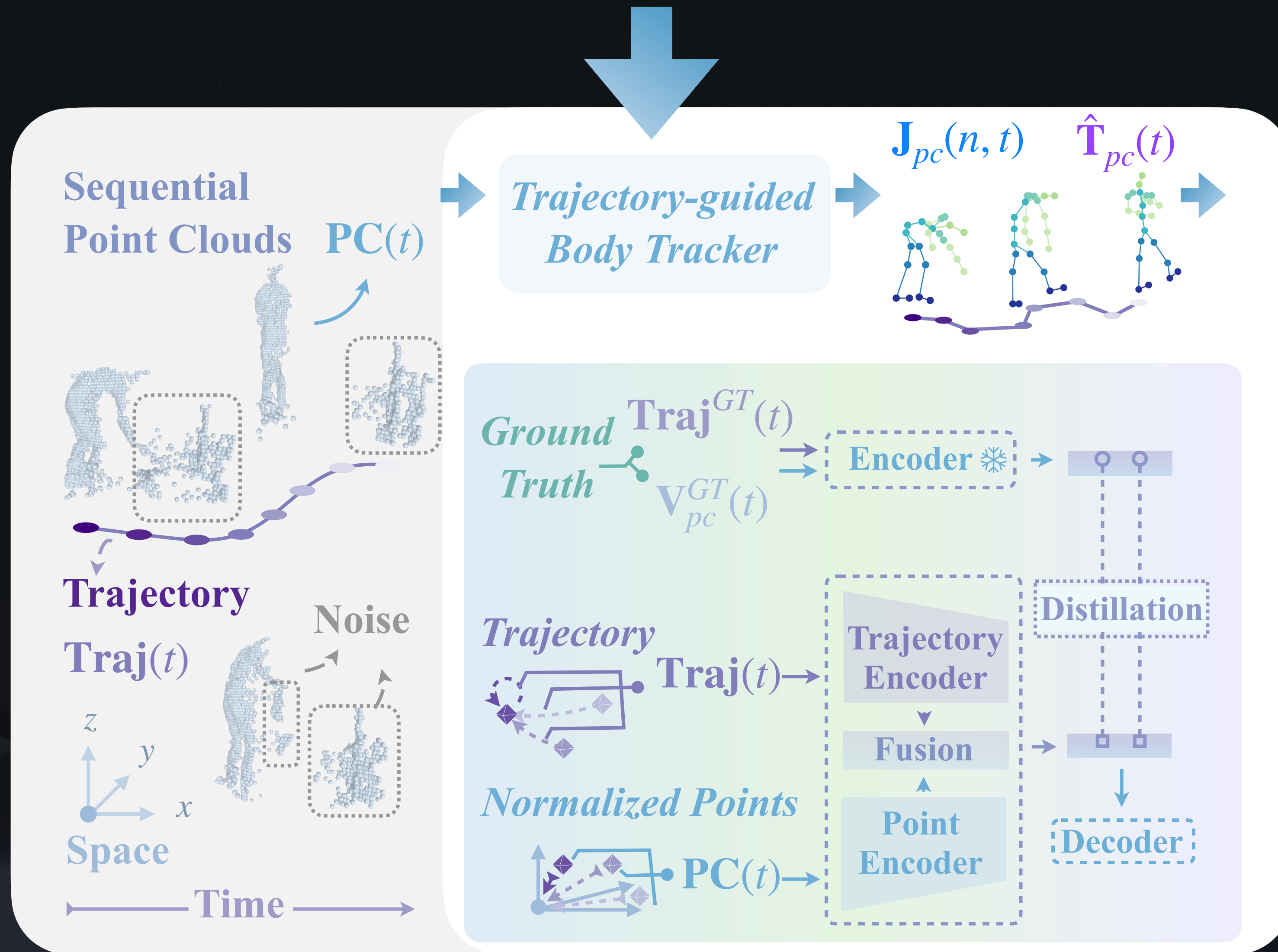


Method

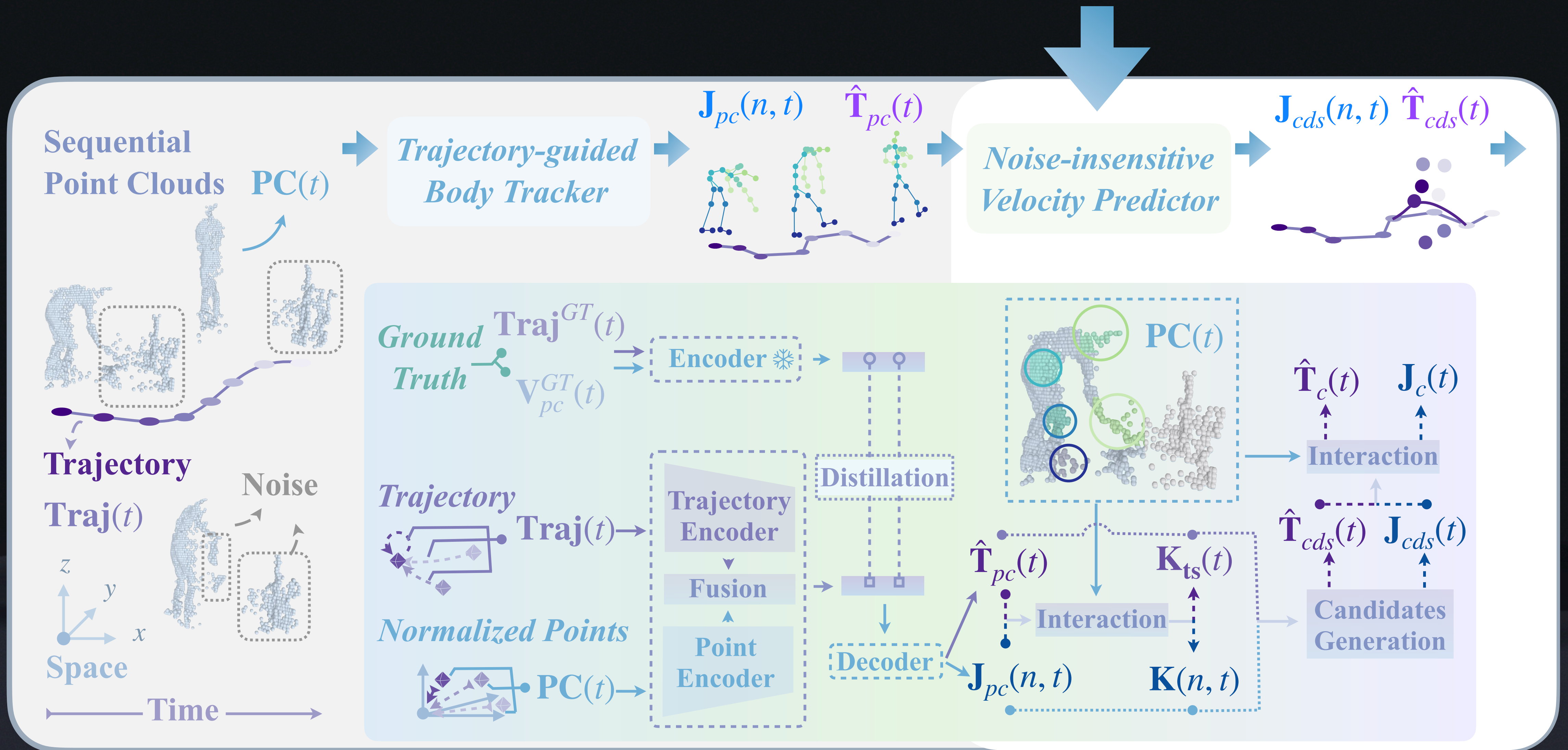
INPUT: Sequential Point Clouds



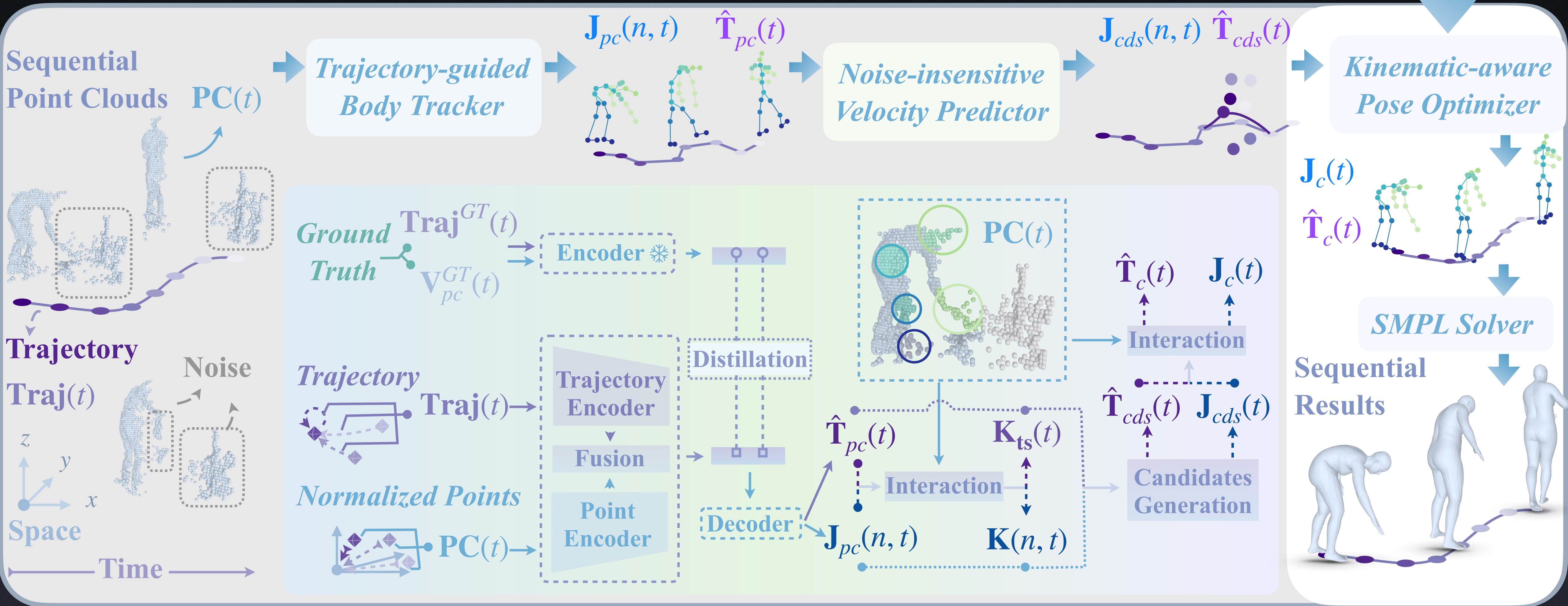
Trajectory-guided Body Tracker



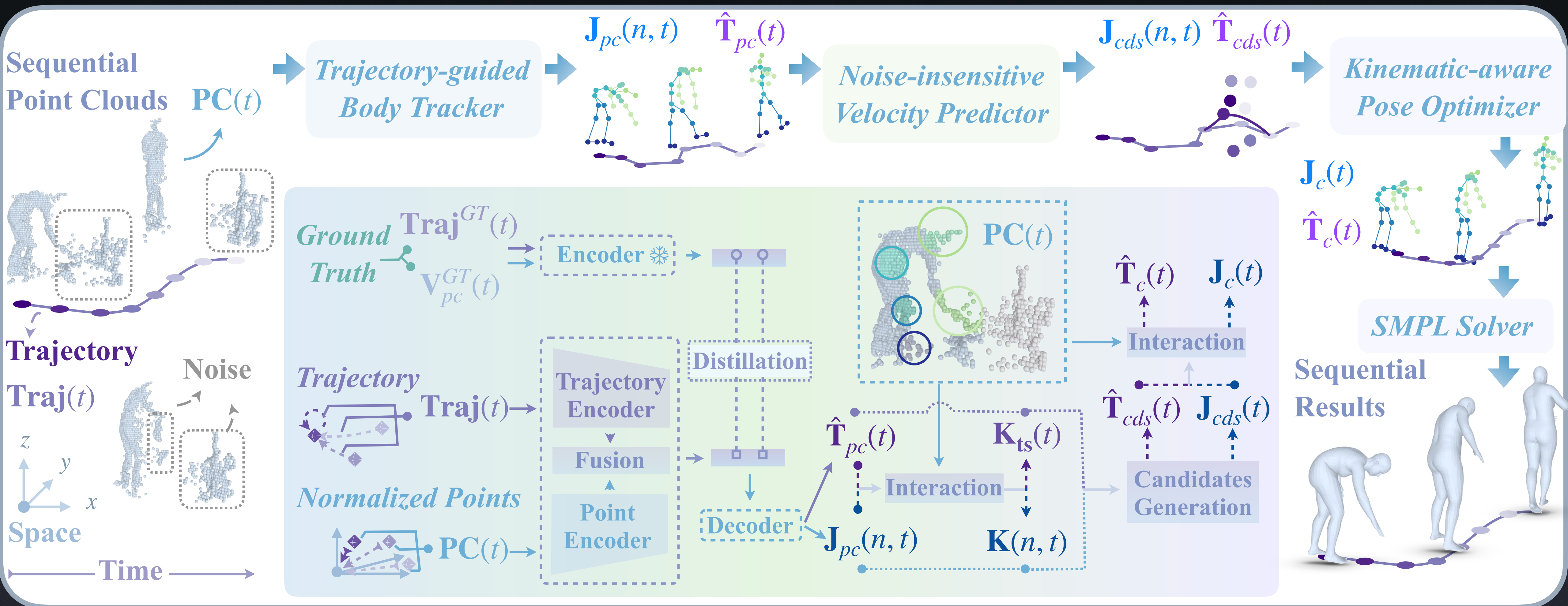
Noise-insensitive Velocity Predictor

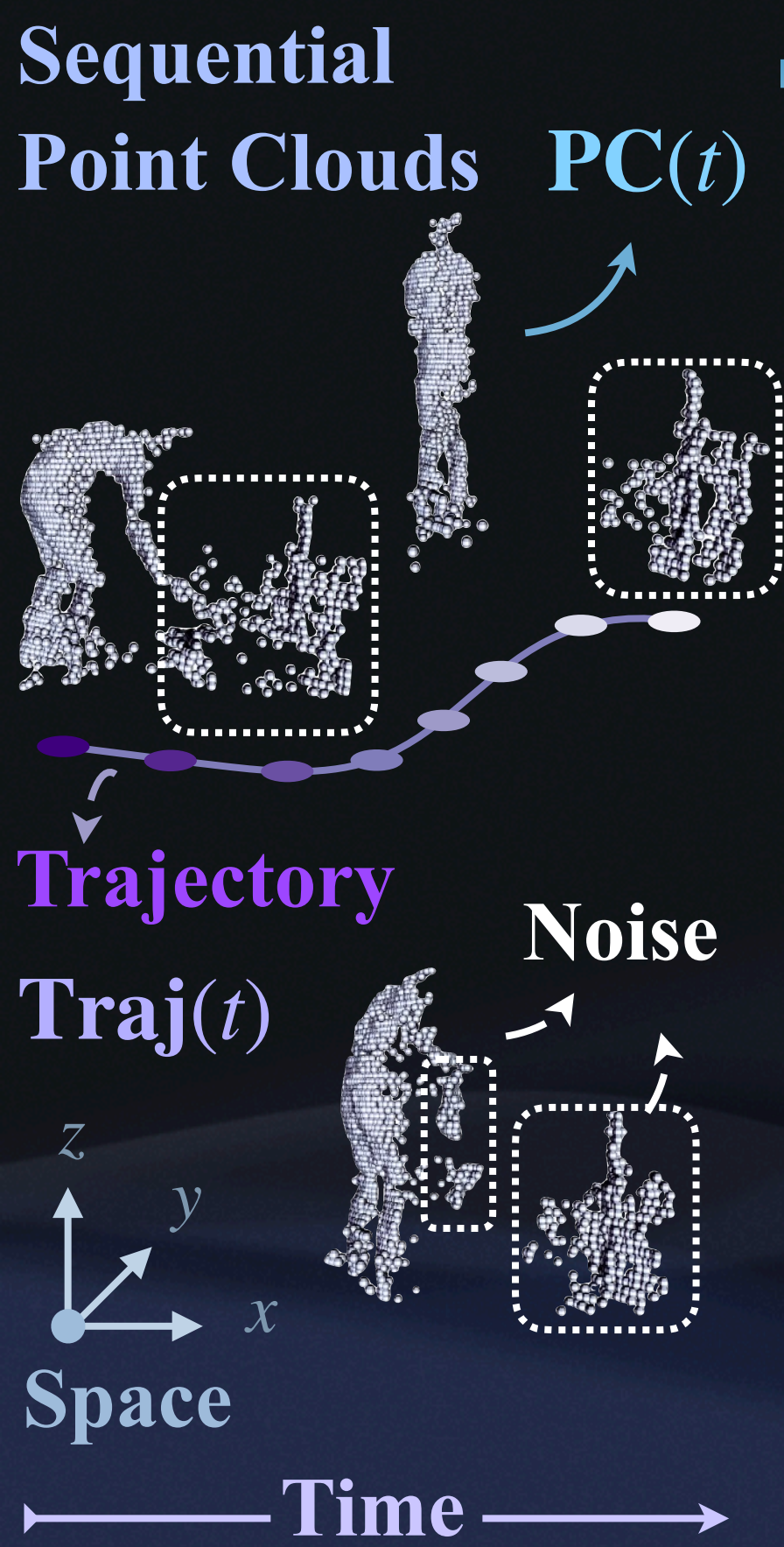


Kinematic-aware Pose Optimizer

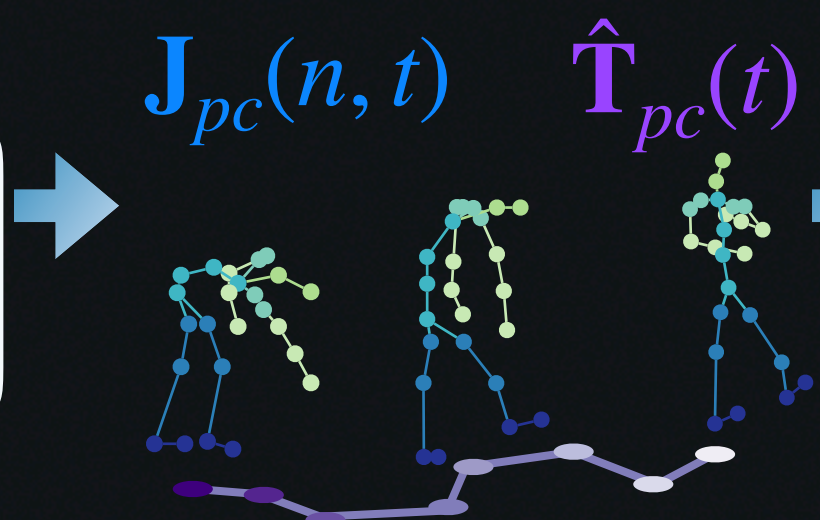


RESULT: Sequential SMPLs

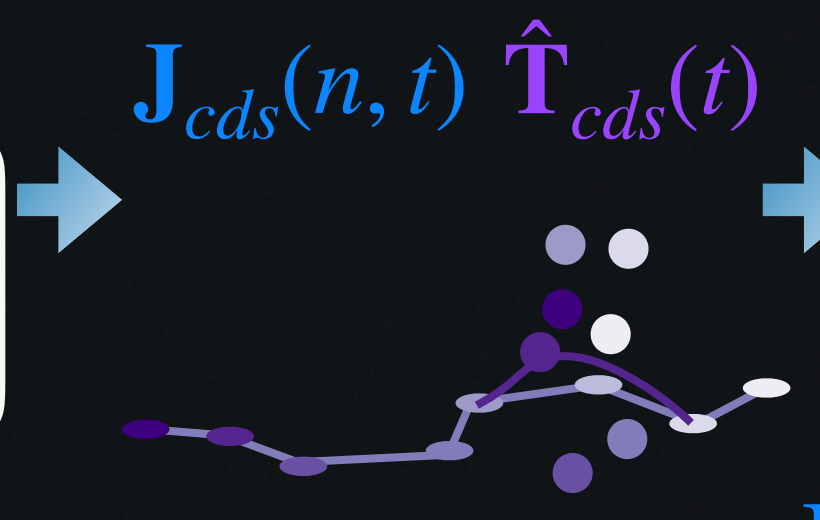




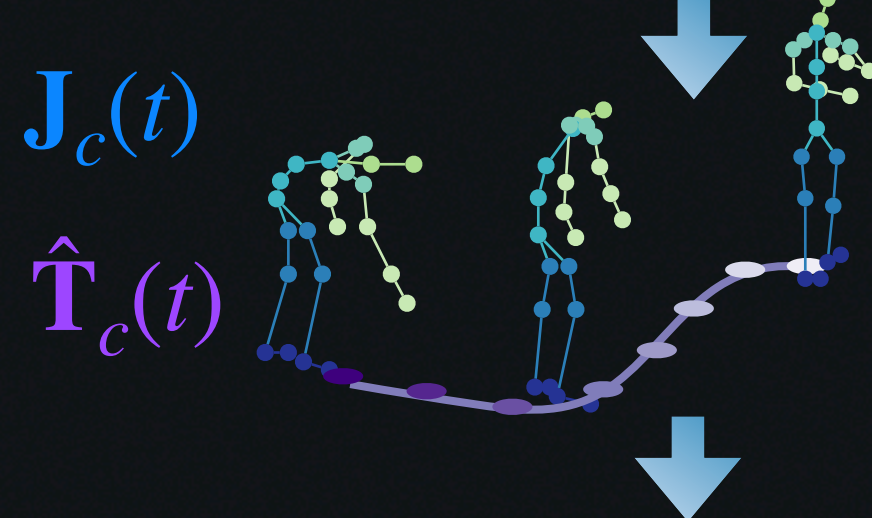
Trajectory-guided Body Tracker



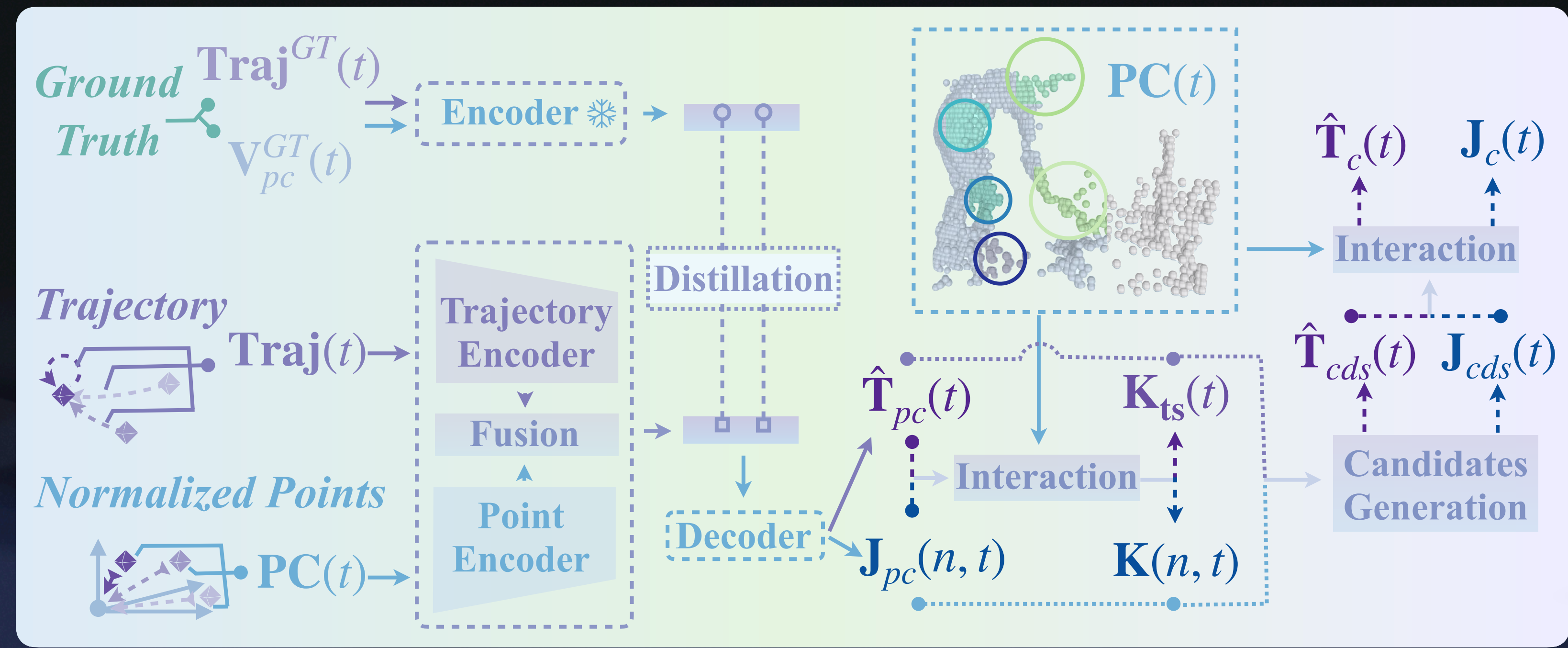
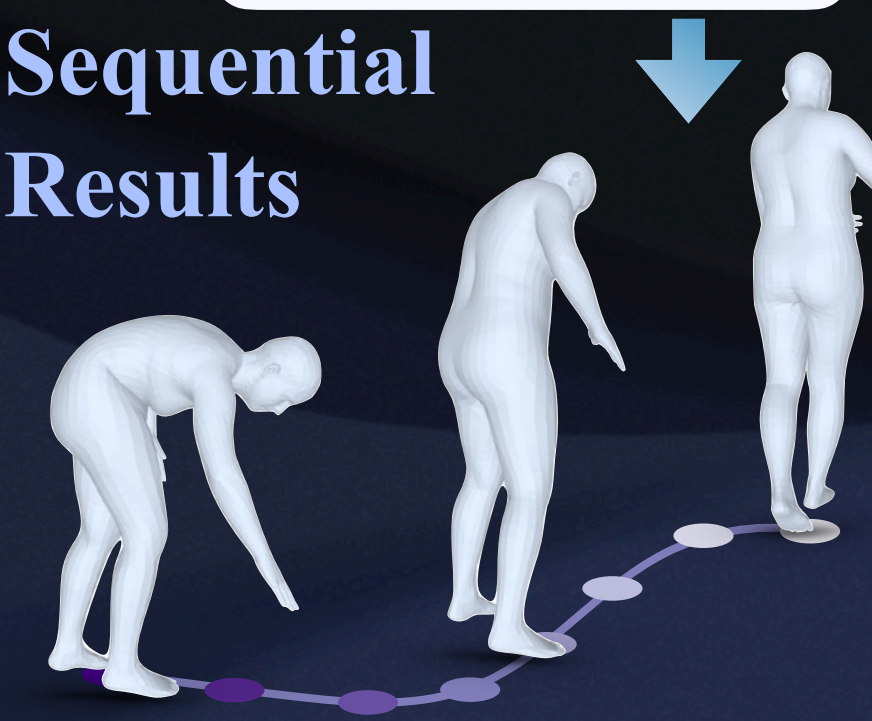
Noise-insensitive Velocity Predictor



Kinematic-aware Pose Optimizer



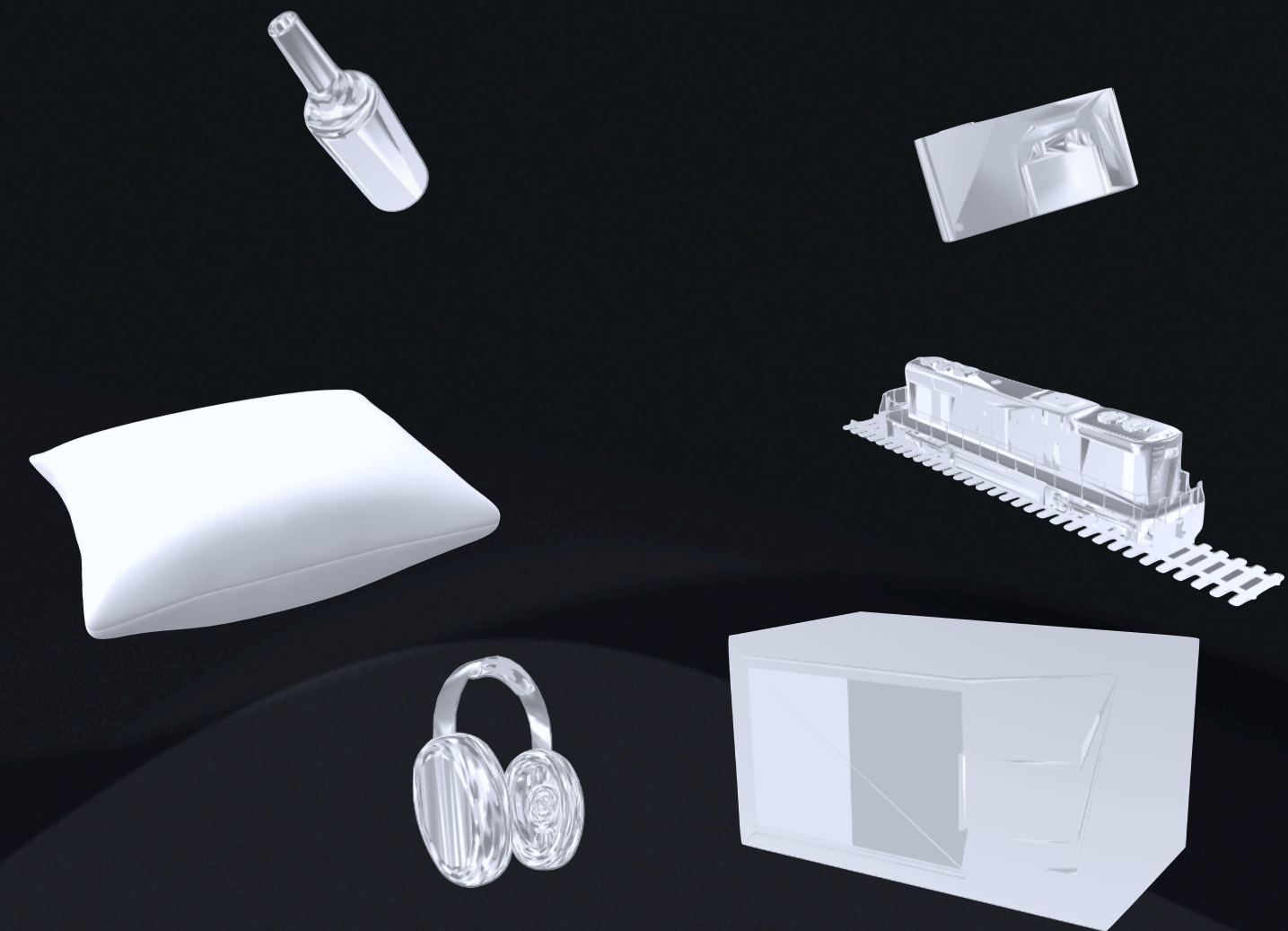
SMPL Solver



Dataset

NoiseMotion

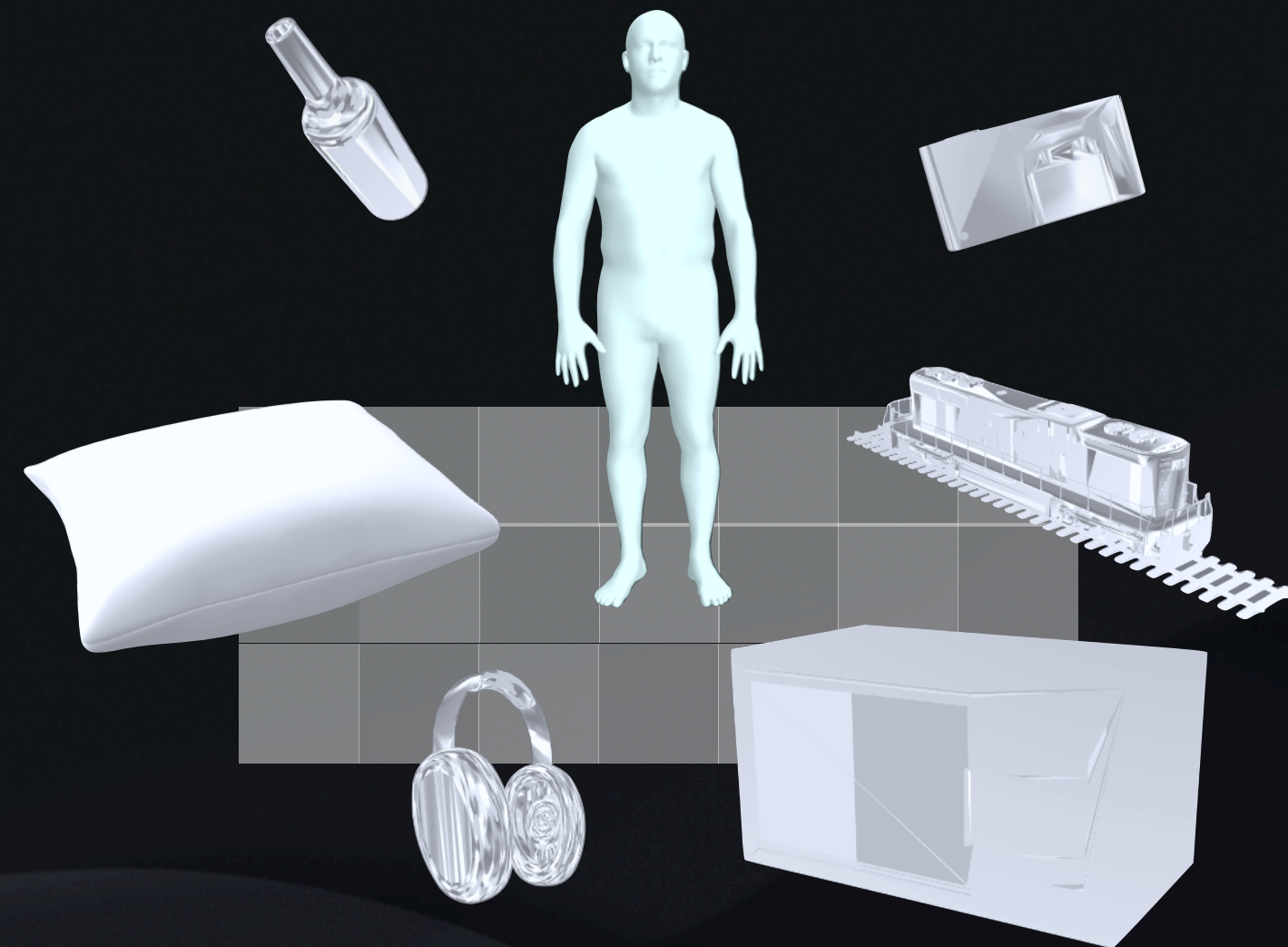
SURREAL



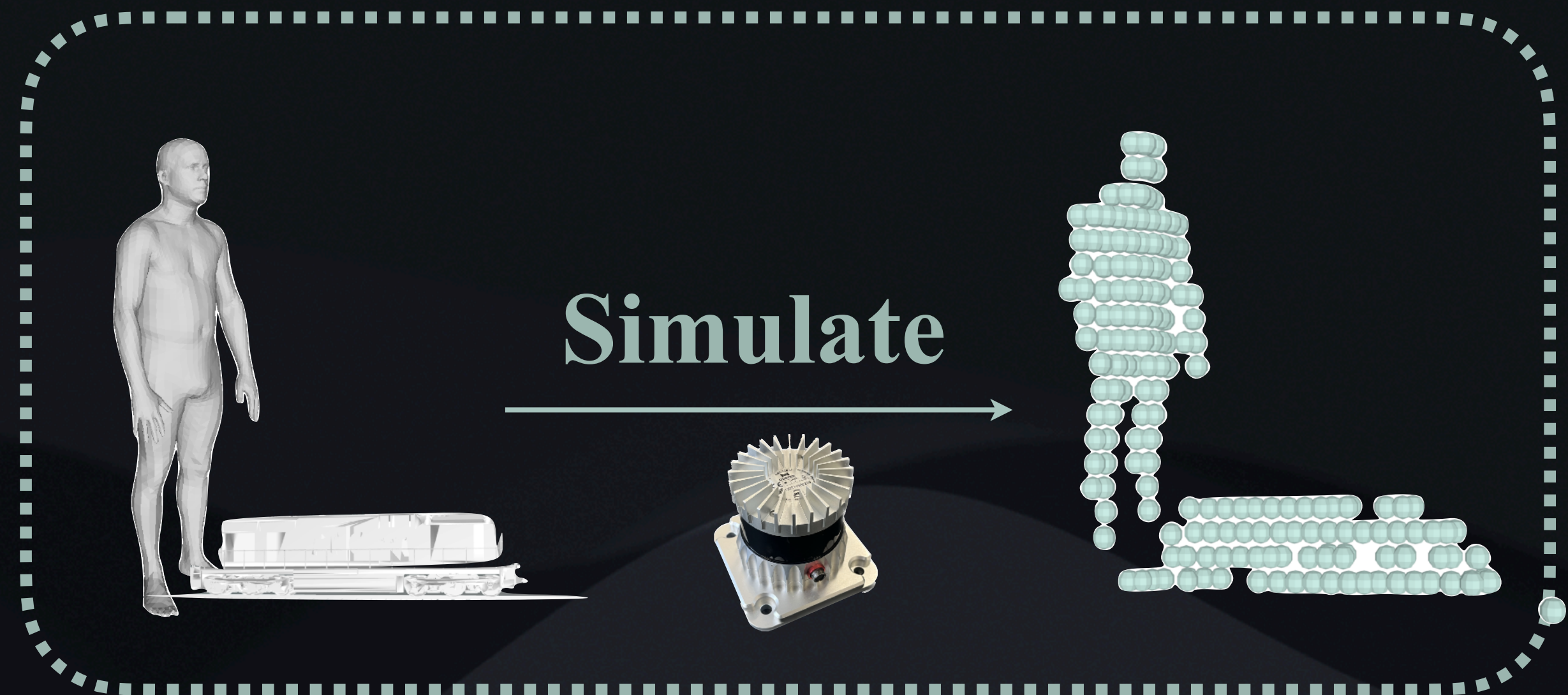
ShapeNet

NoiseMotion

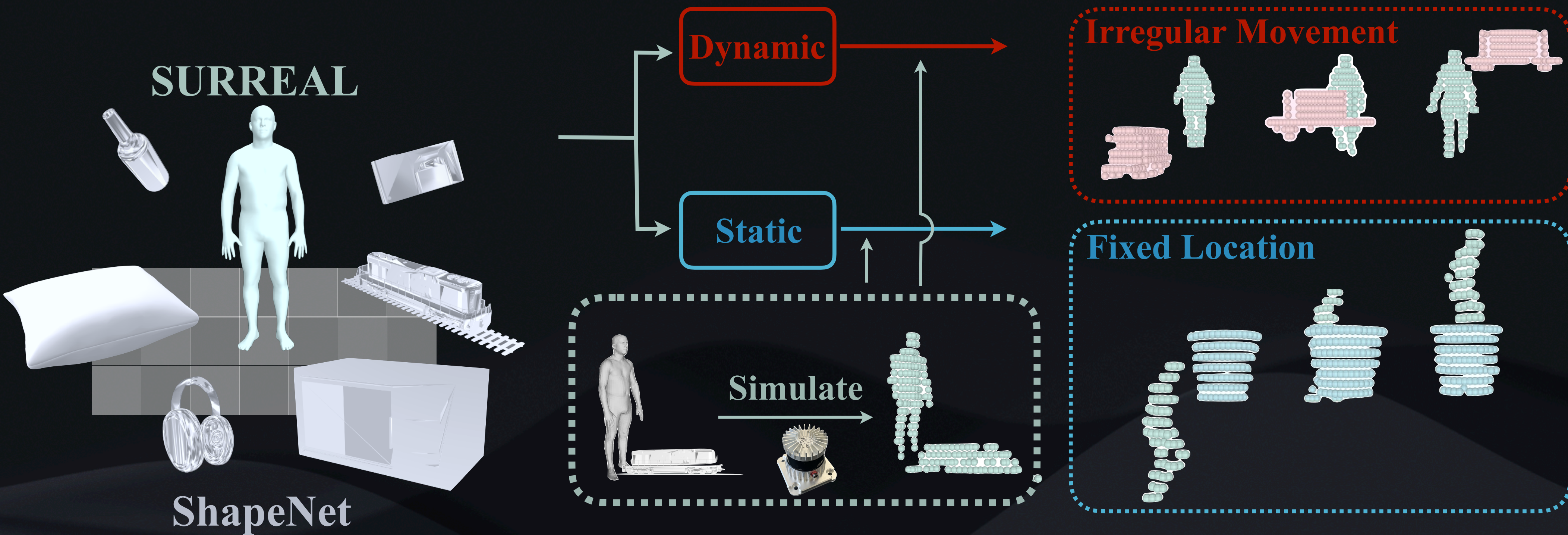
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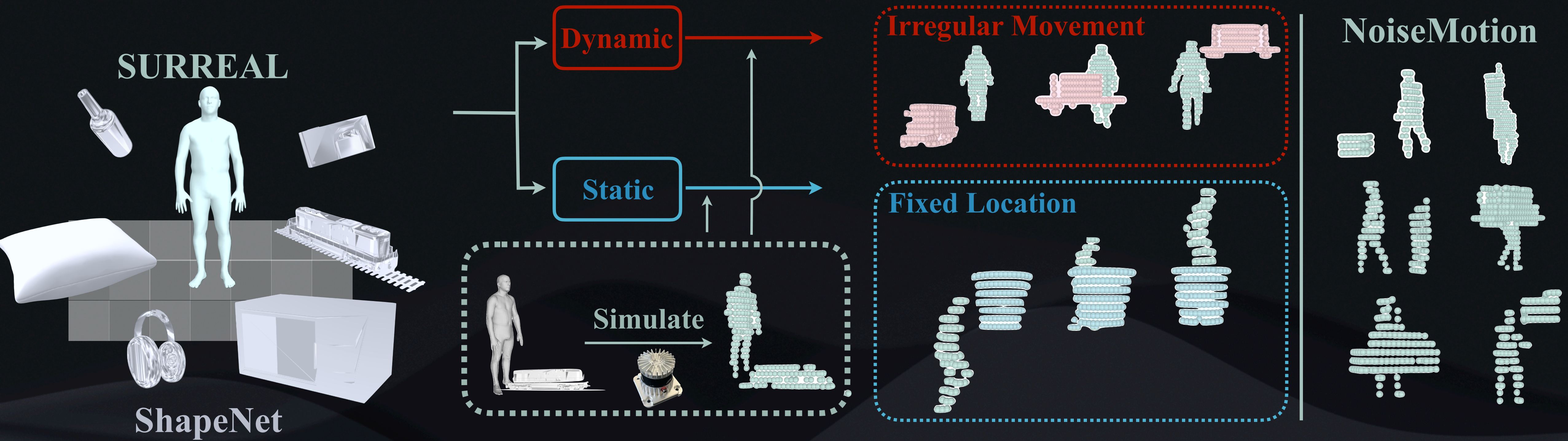
ShapeNet



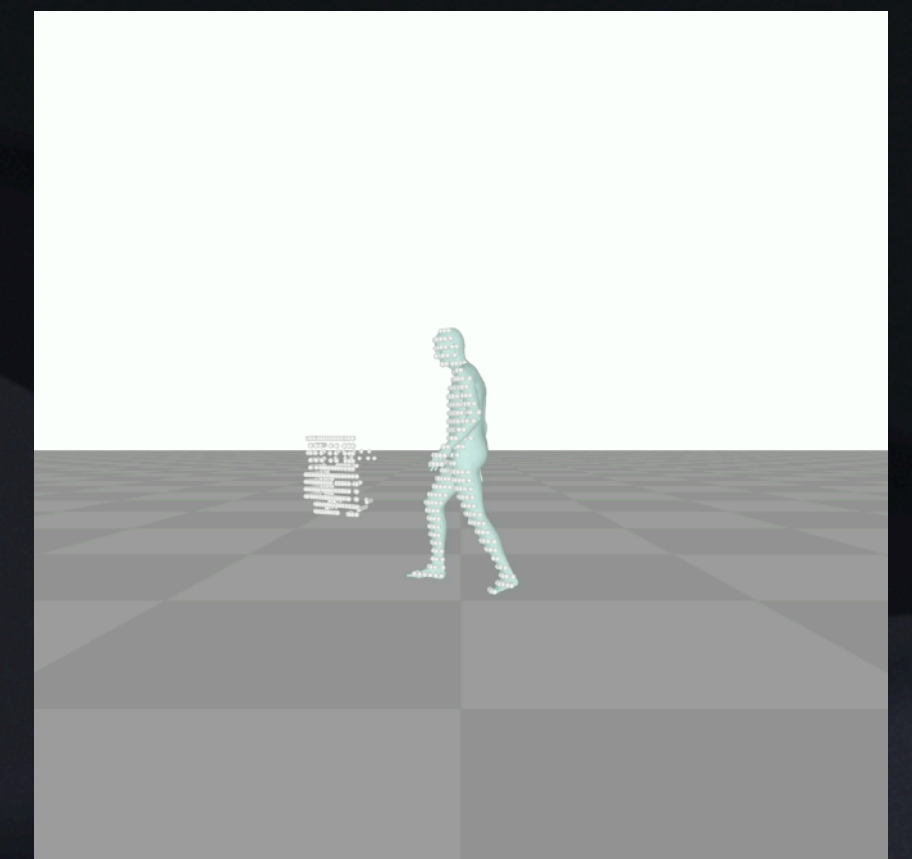
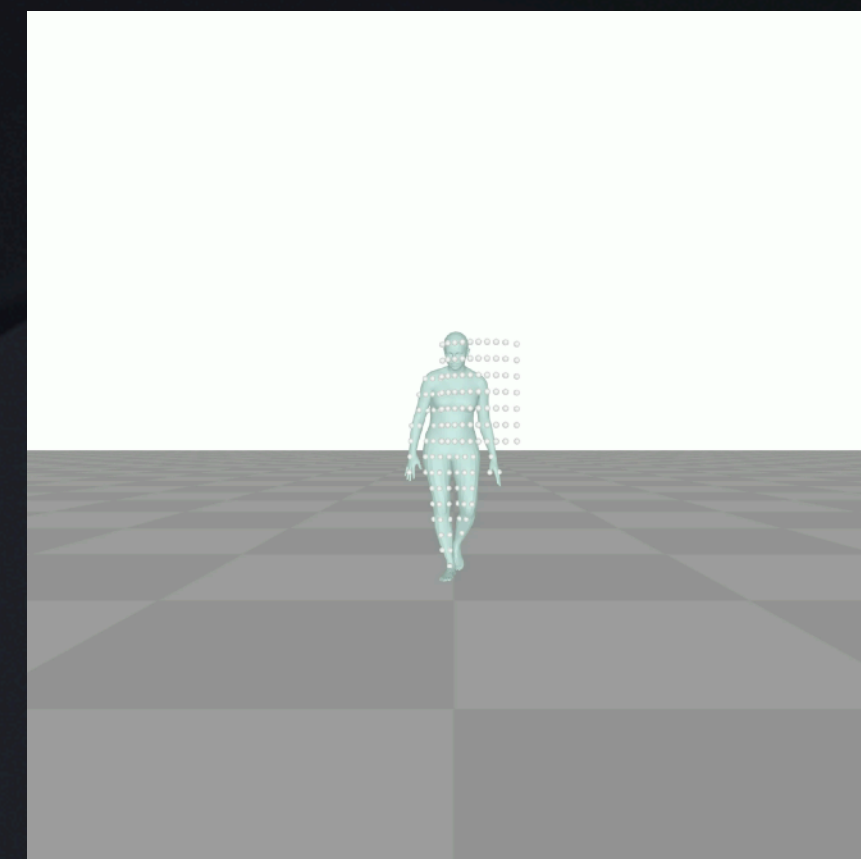
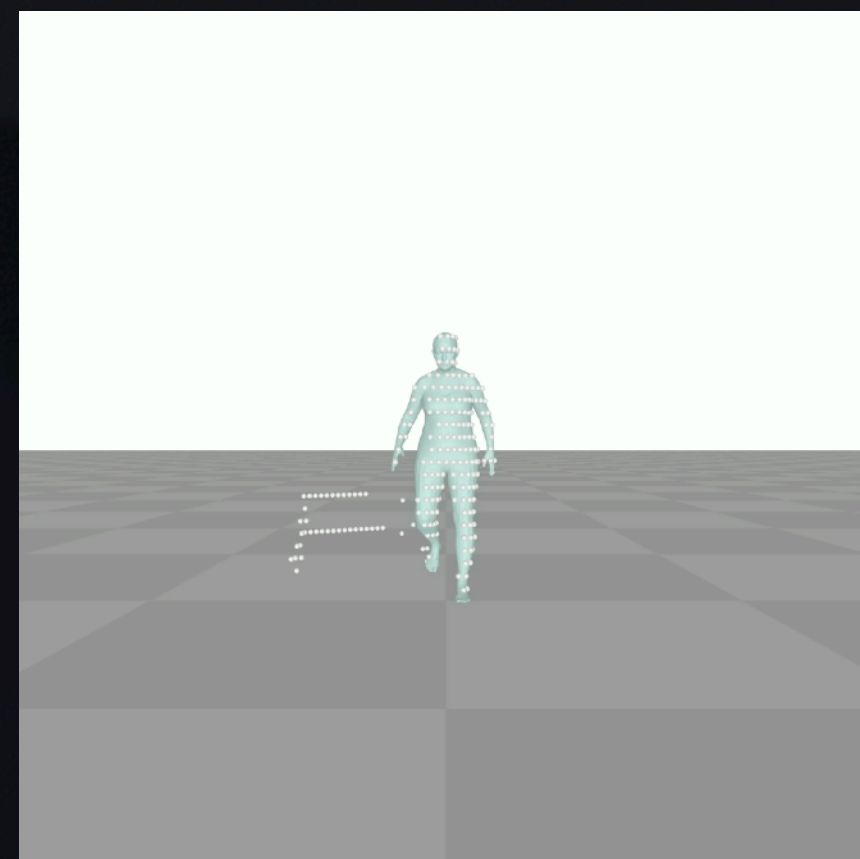
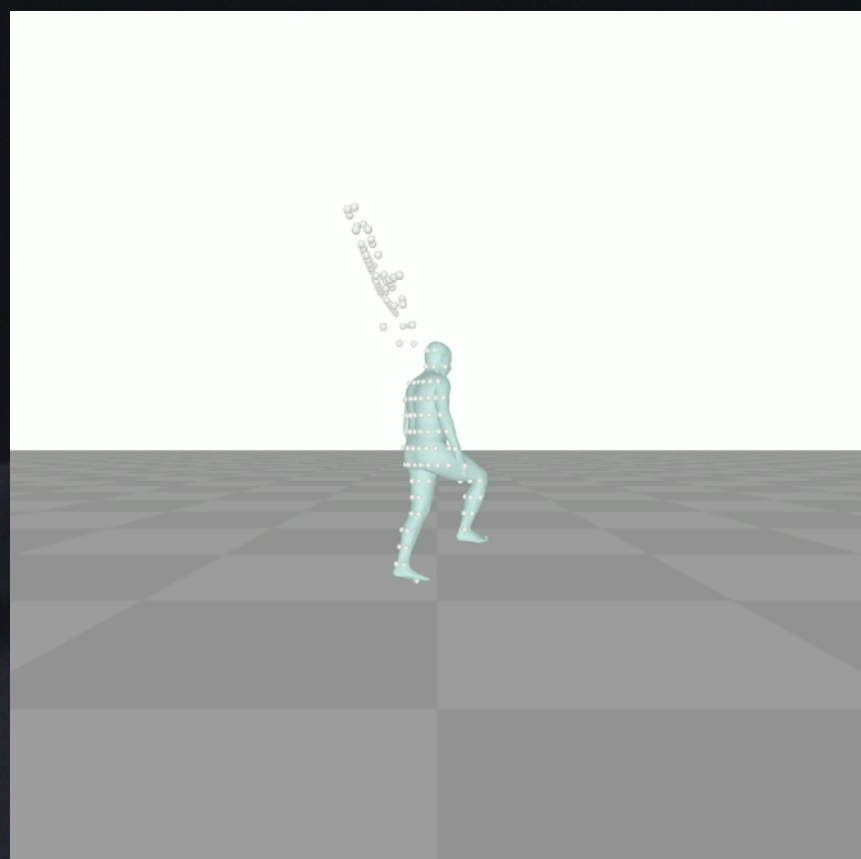
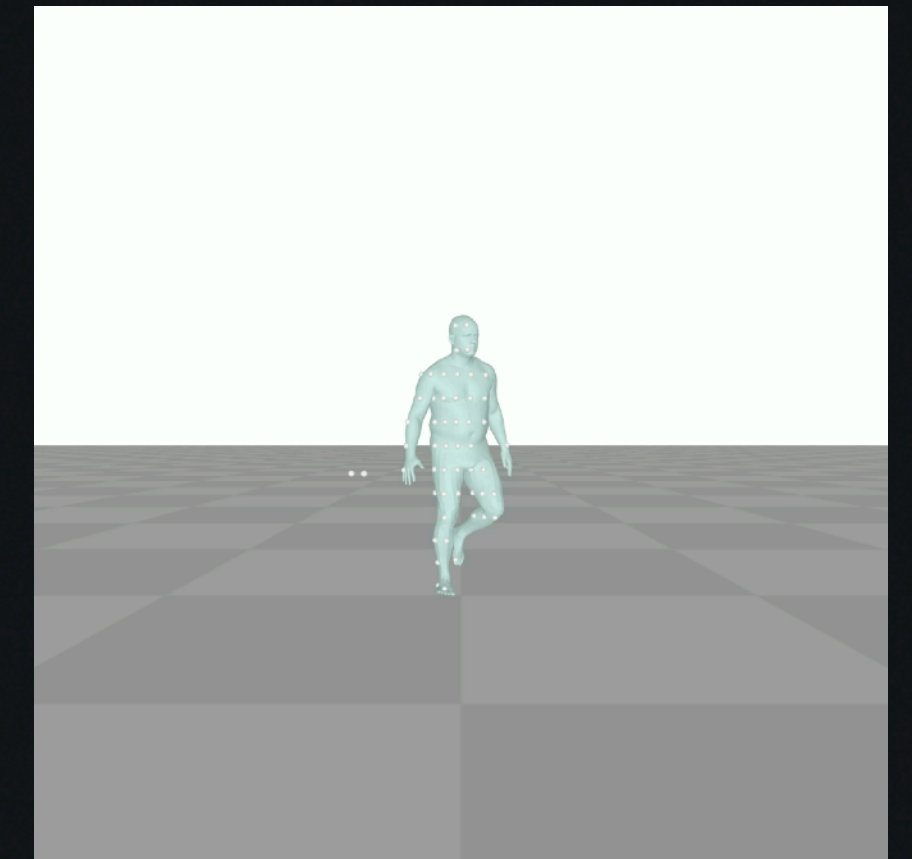
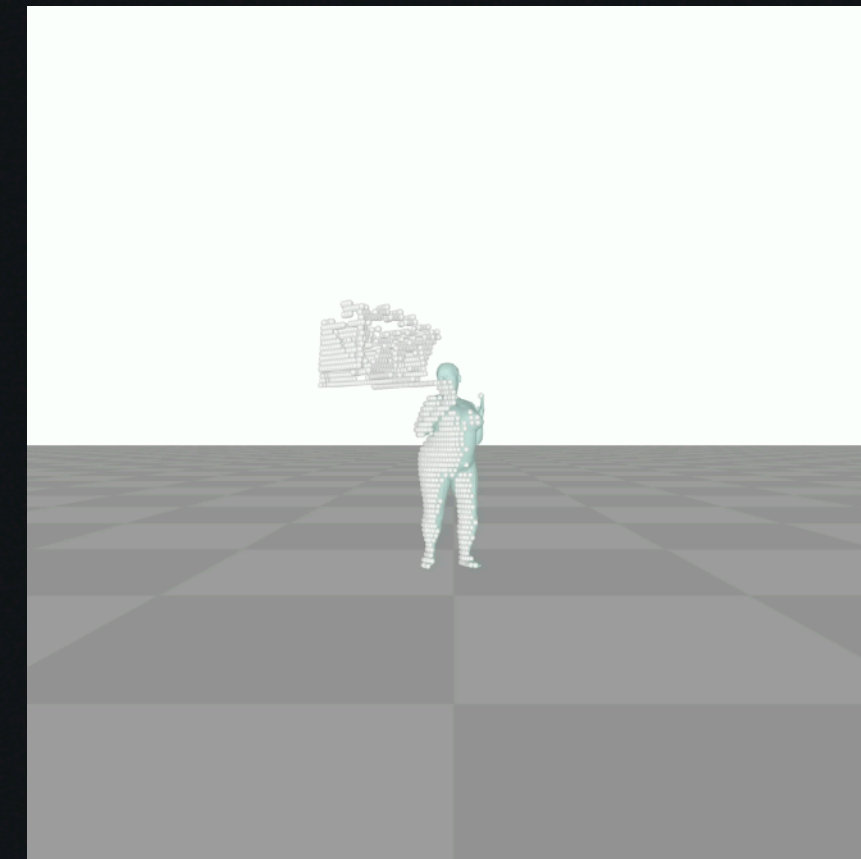
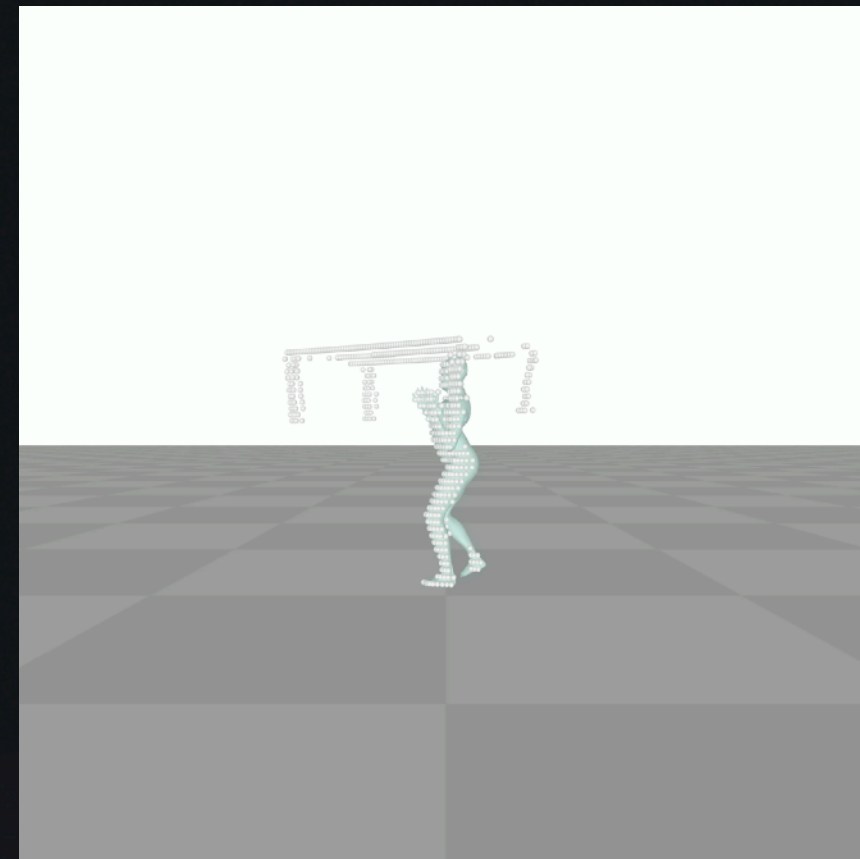
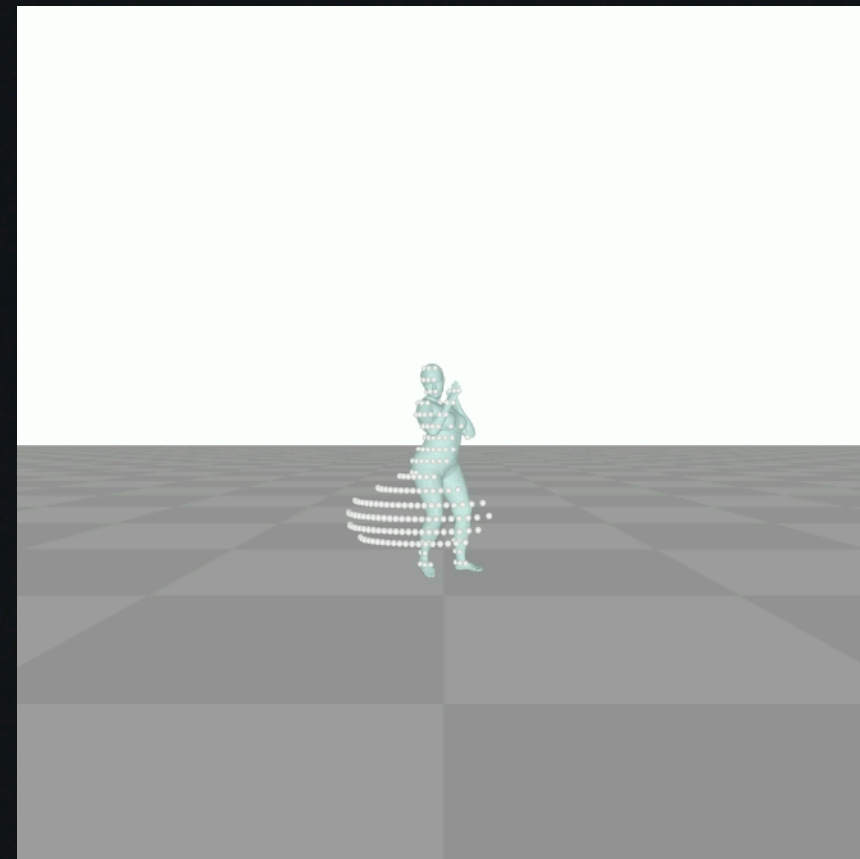
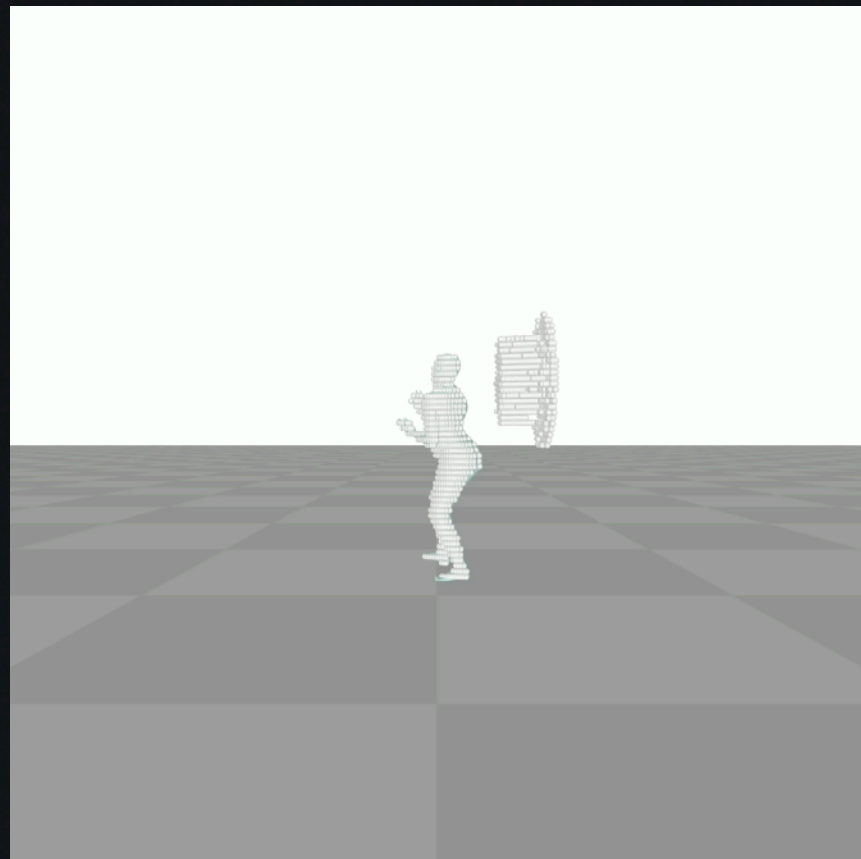
NoiseMotion



NoiseMotion



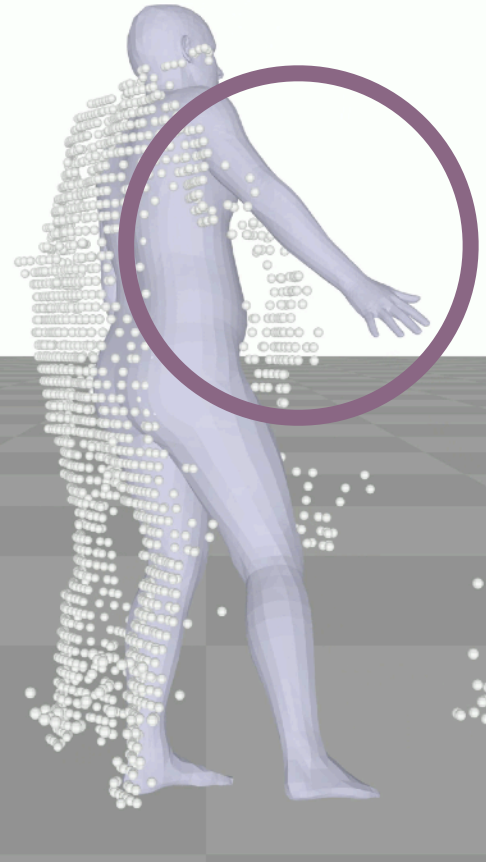
NoiseMotion



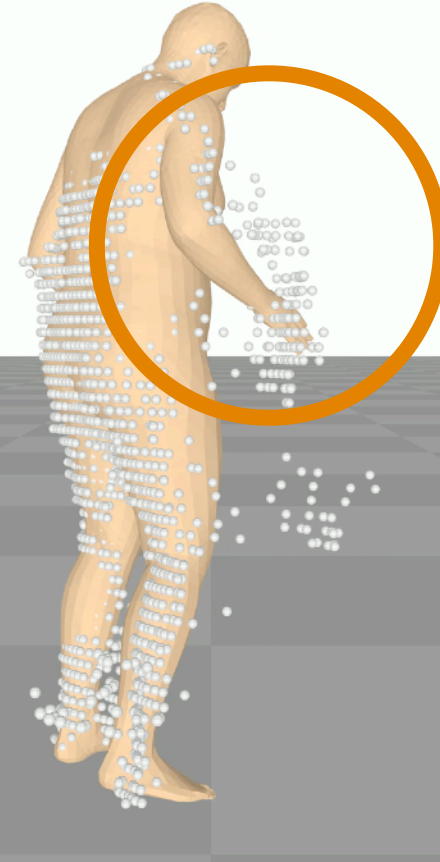
Comparison

Comparison in FreeMotion-OBJ

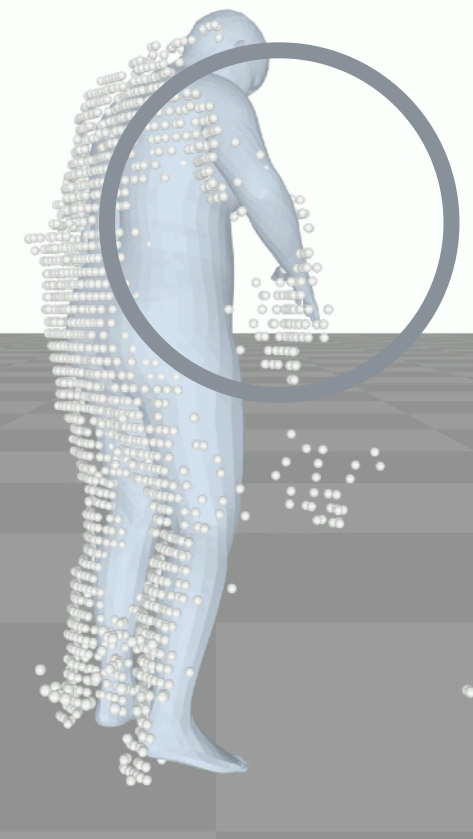
*LiveHPS**



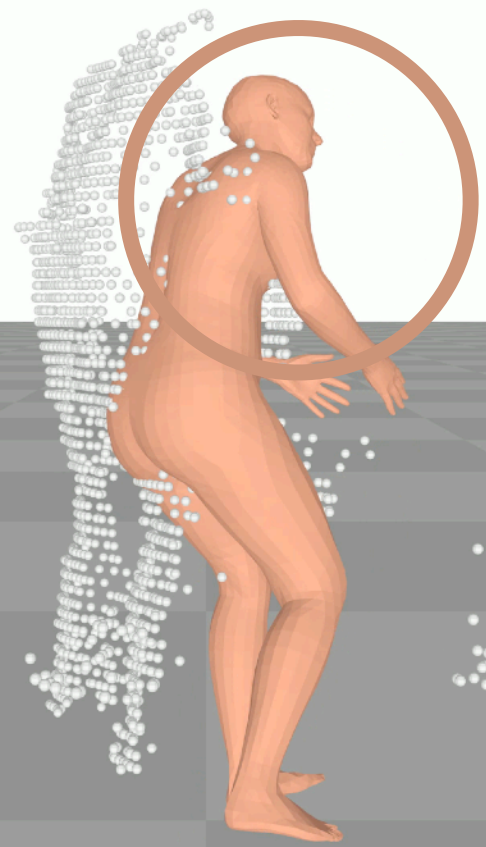
LiveHPS



Ours



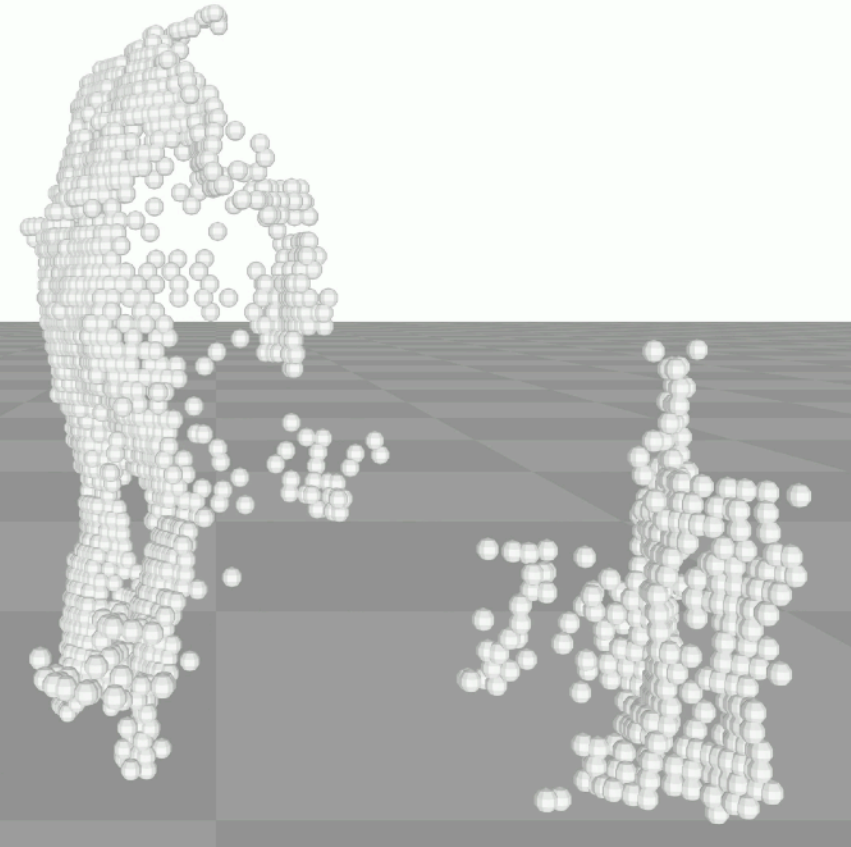
LiDARCap



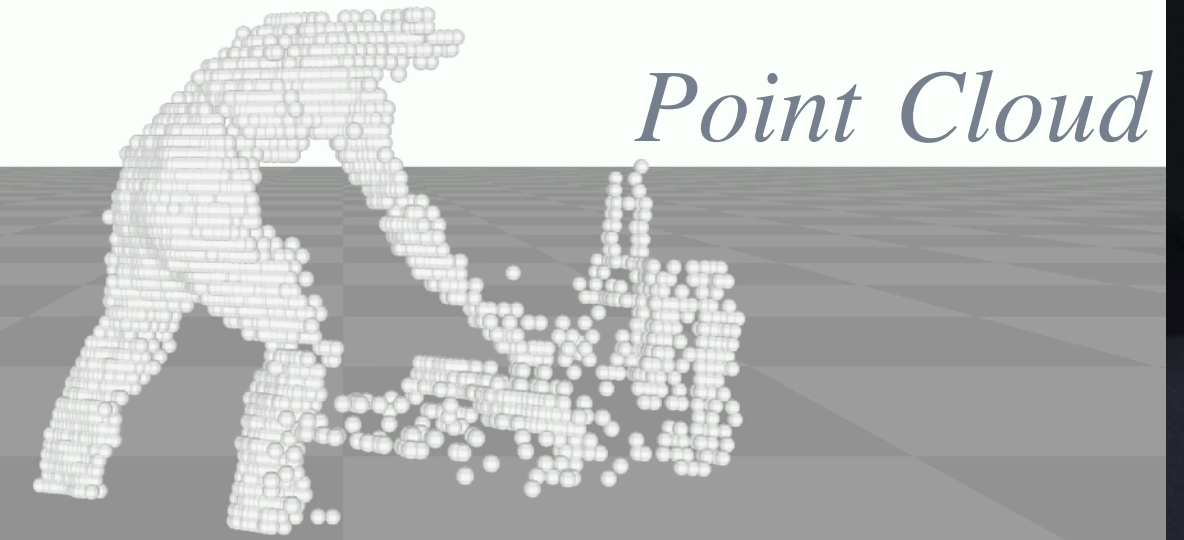
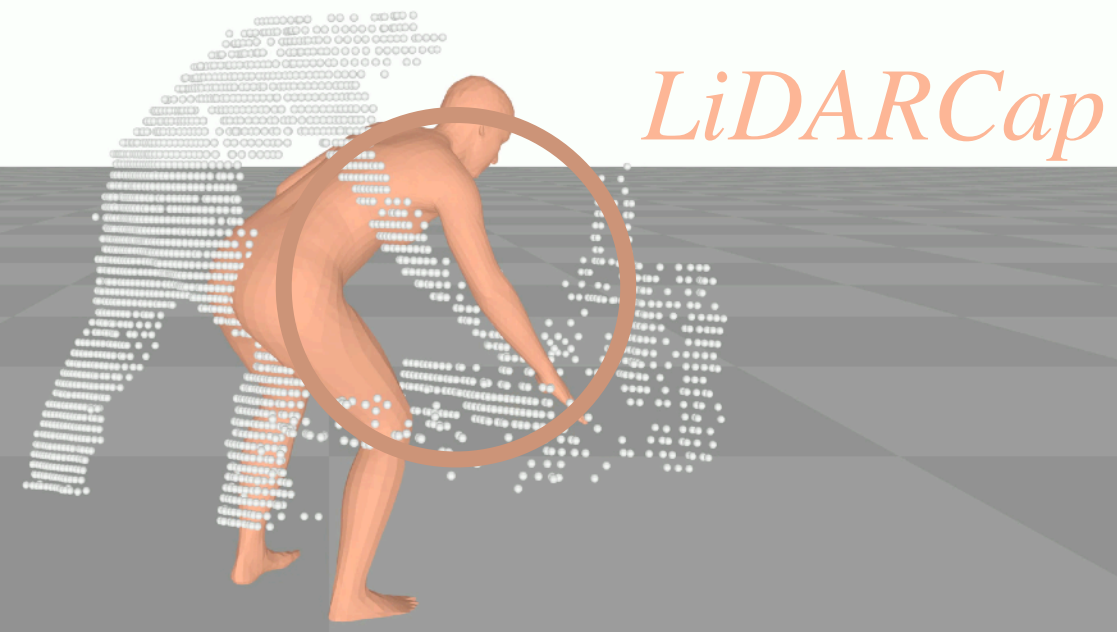
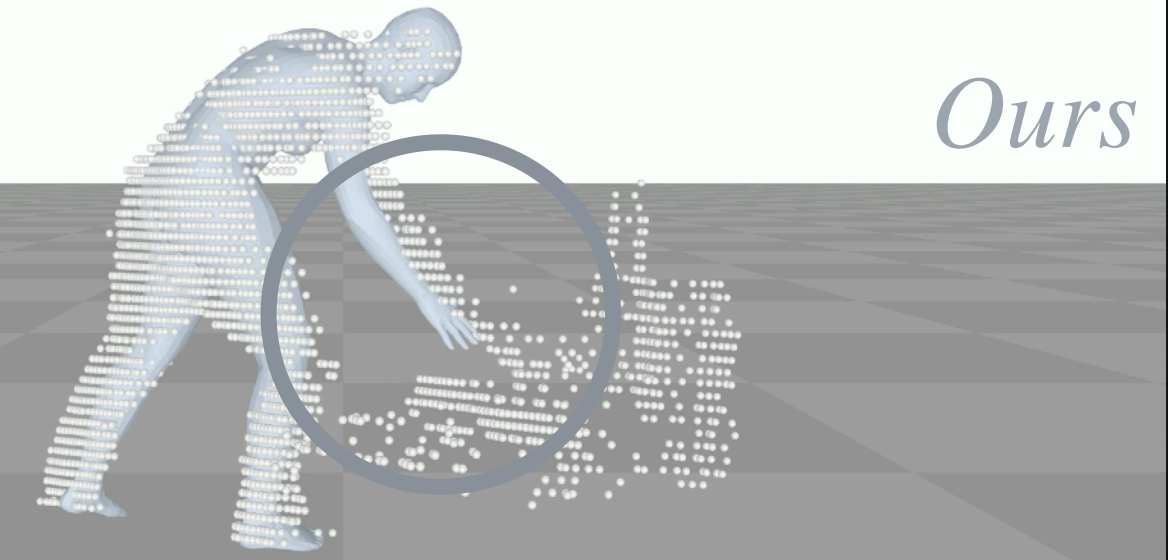
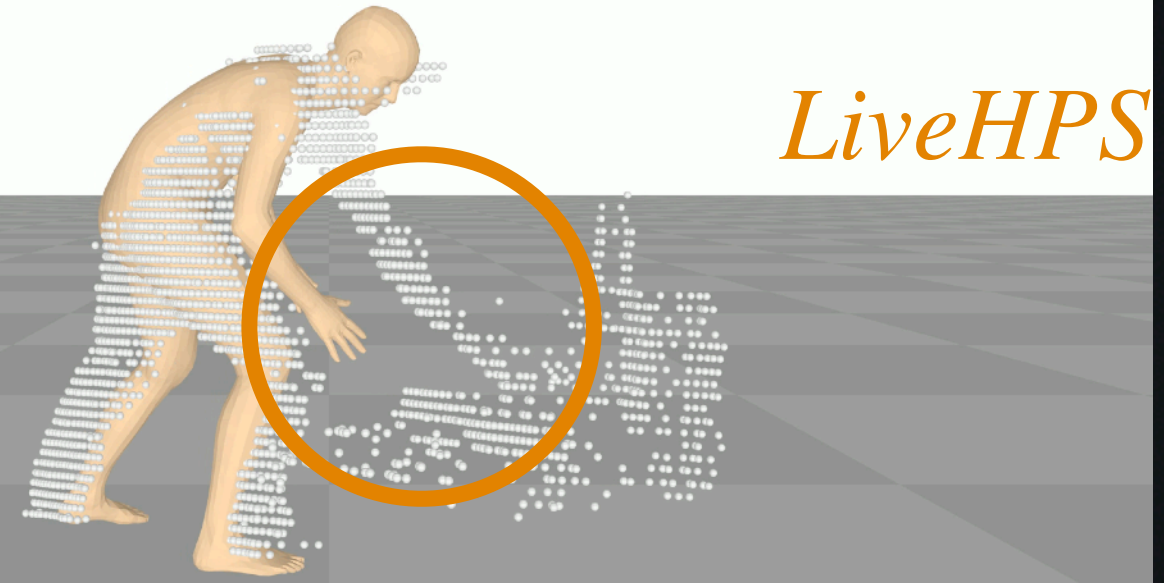
LIP



Point Cloud

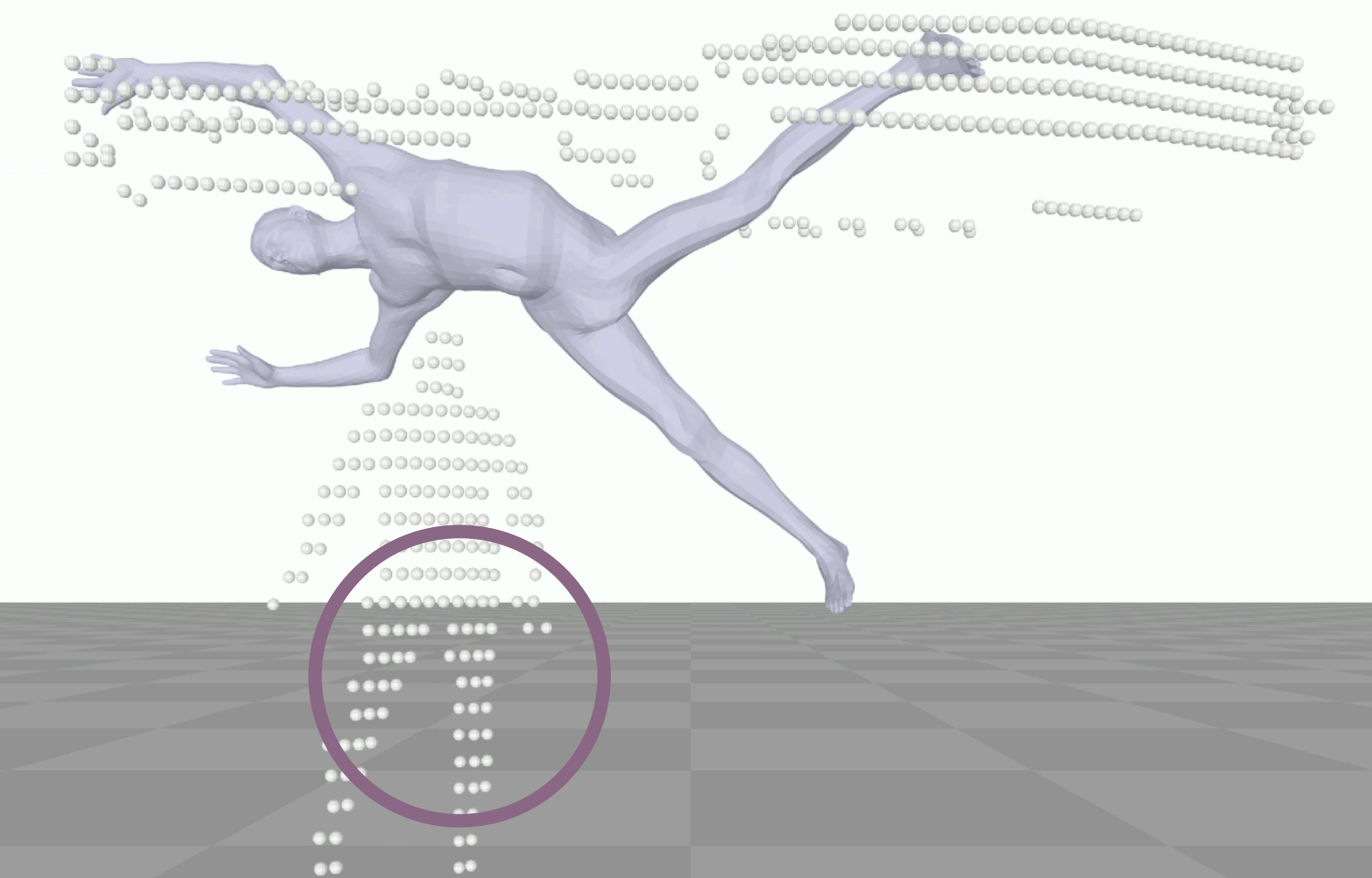


Comparison in FreeMotion-OBJ

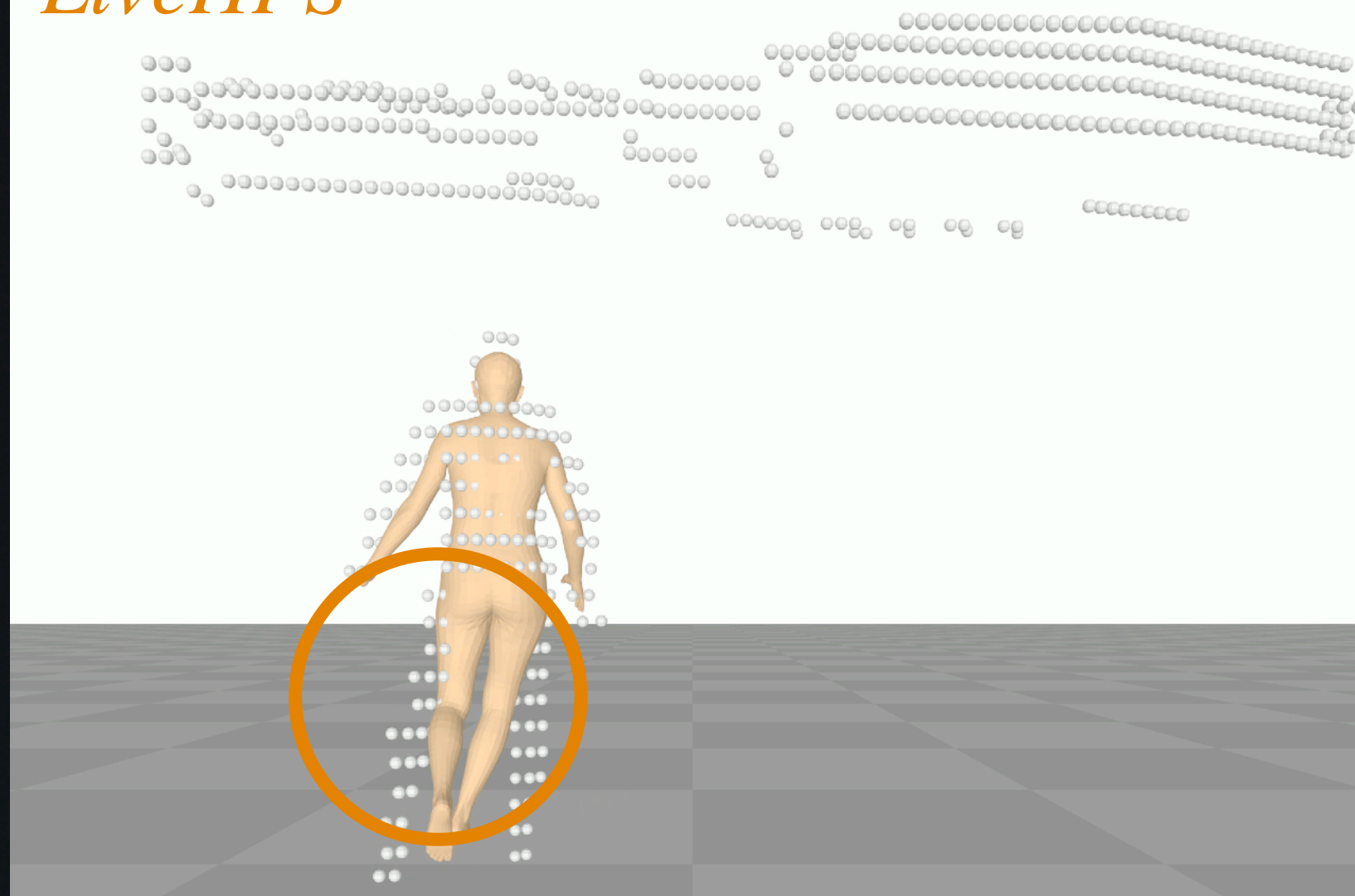


Comparison in NoiseMotion

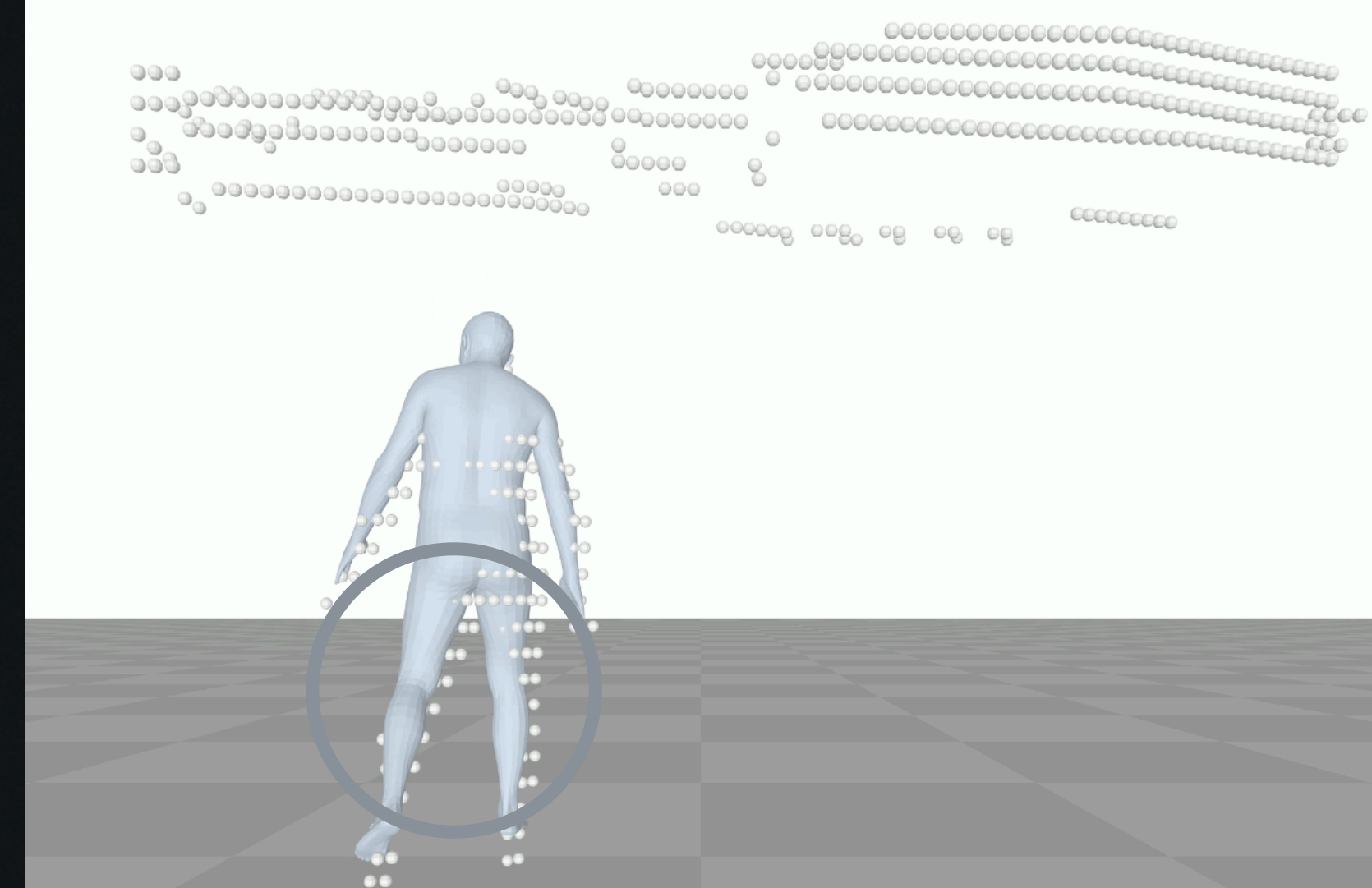
*LiveHPS**



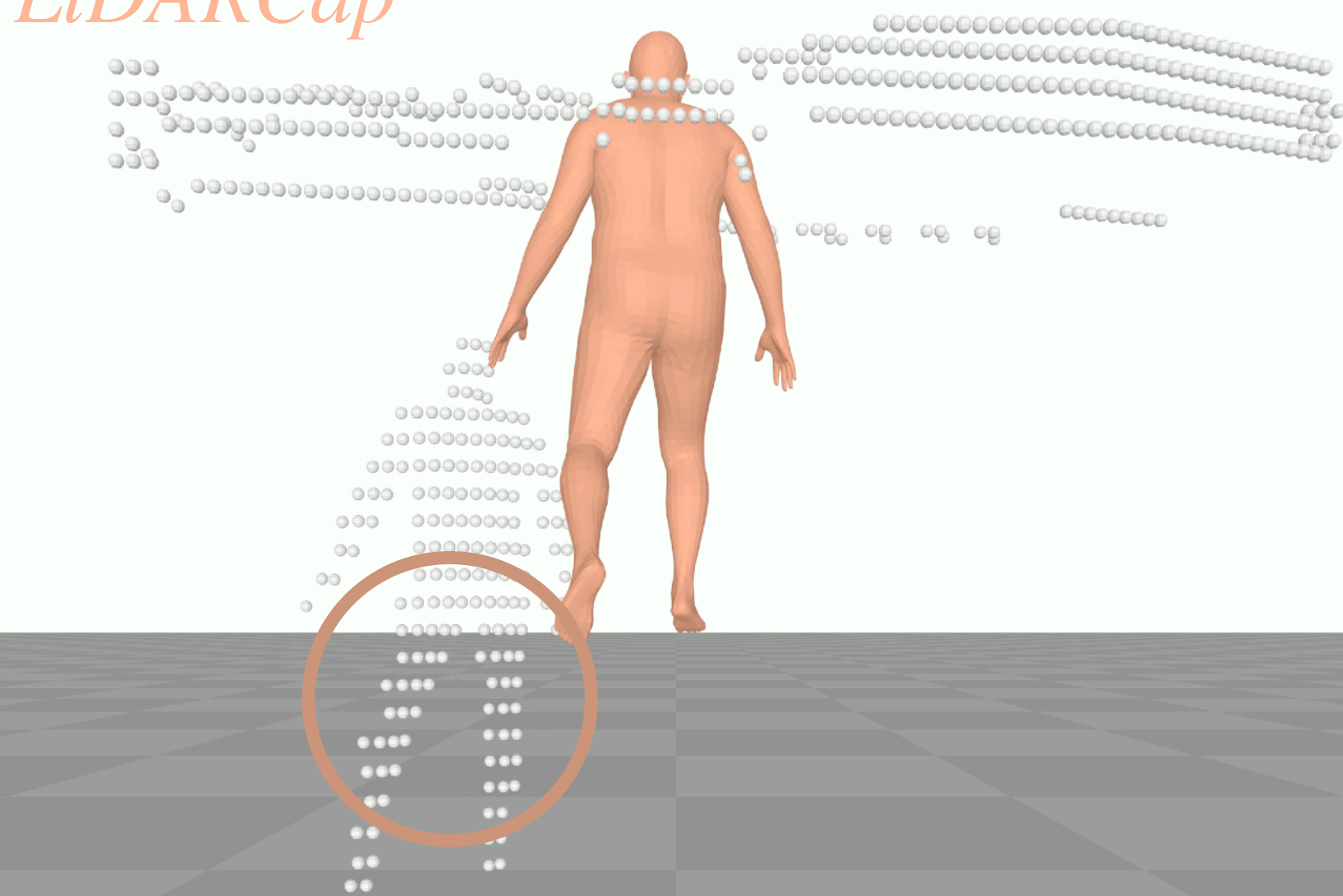
LiveHPS



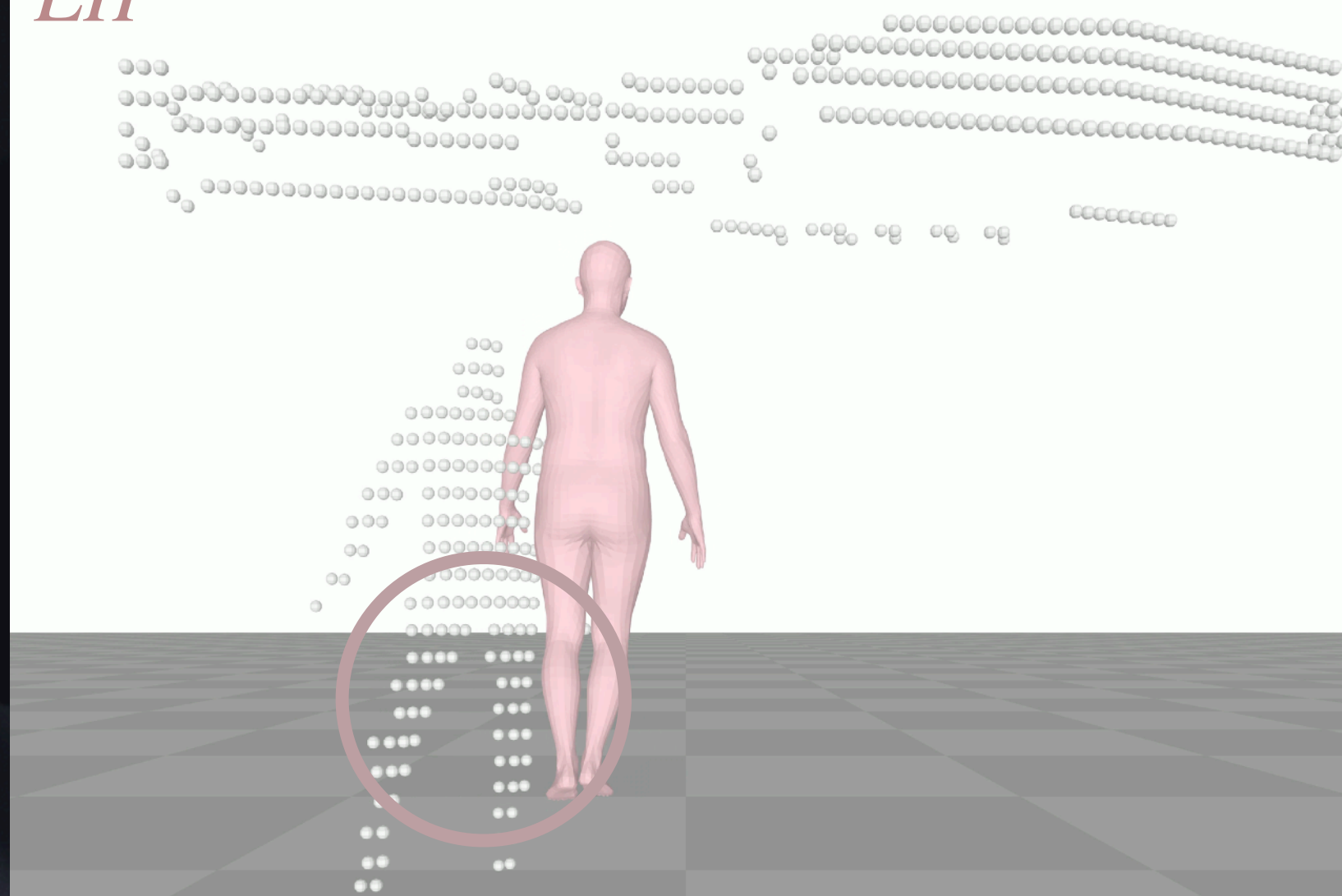
Ours



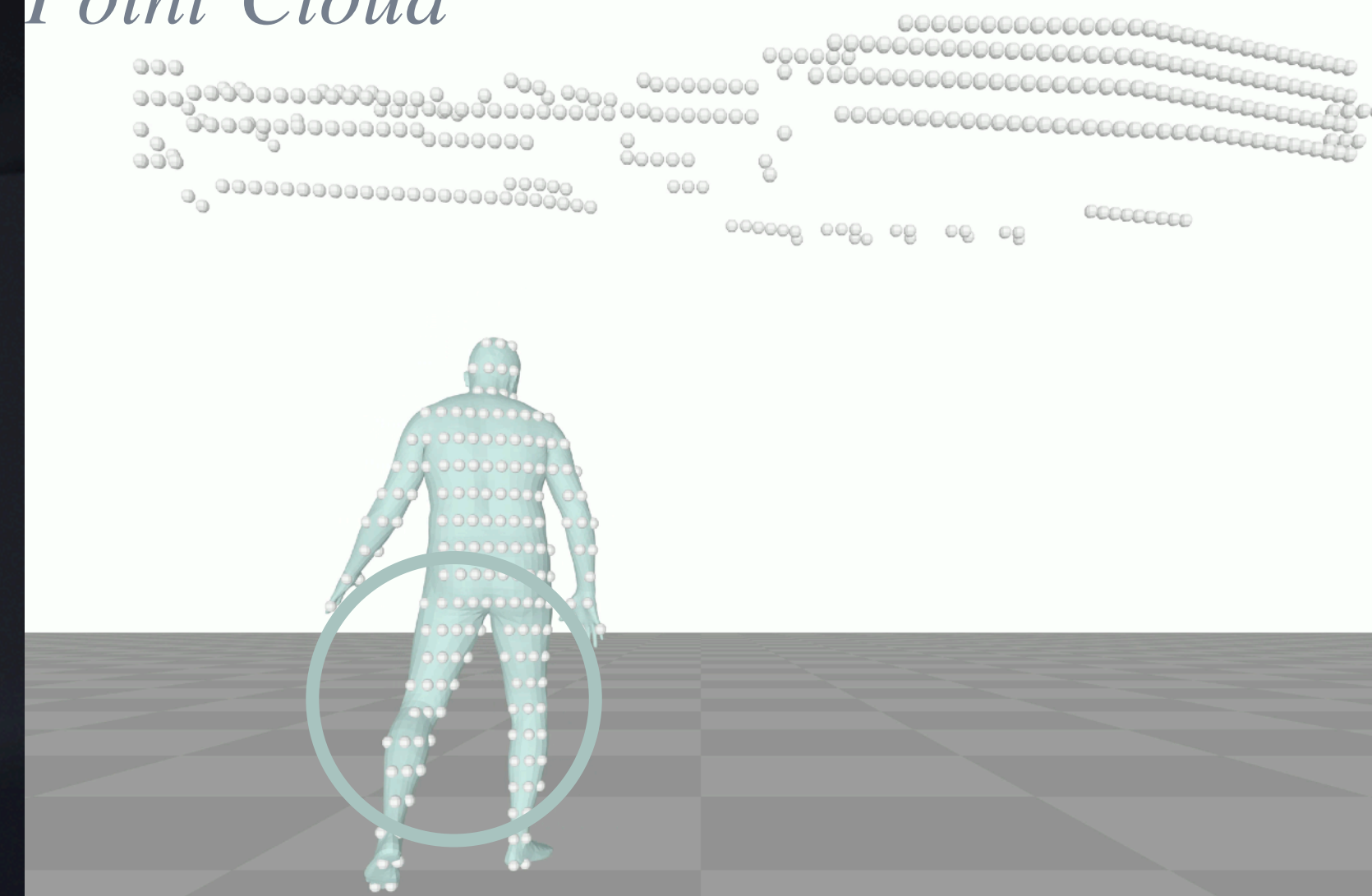
LiDARCap



LIP

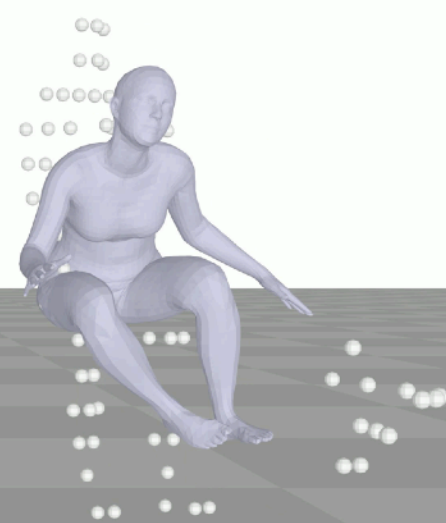


Point Cloud



Comparison in NoiseMotion

*LiveHPS**



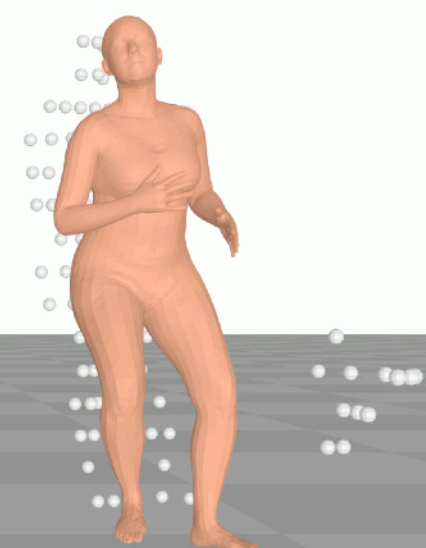
LiveHPS



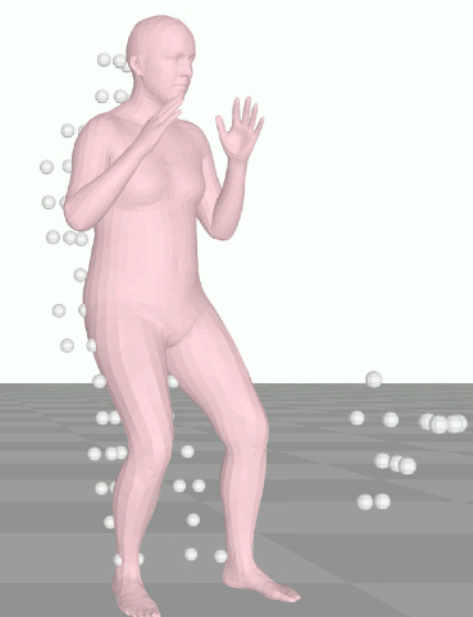
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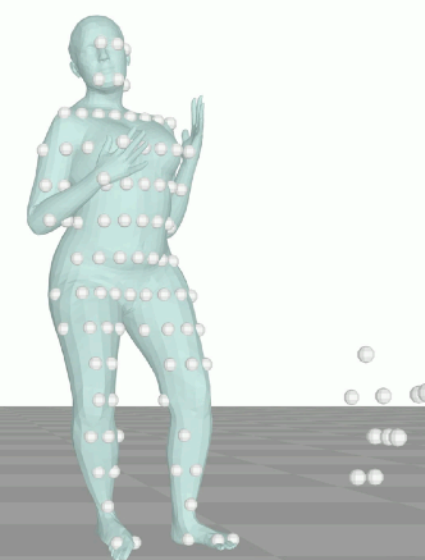
LiDARCap



LIP

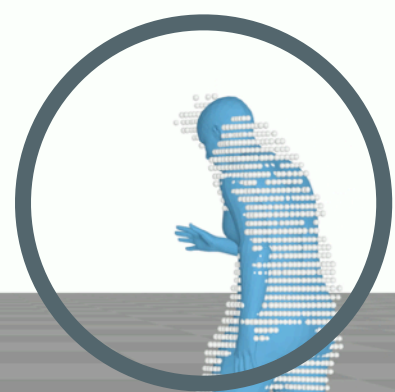


Point Cloud

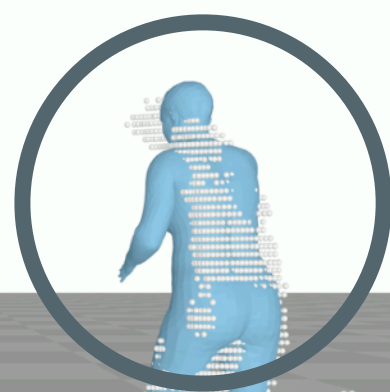


Evaluation

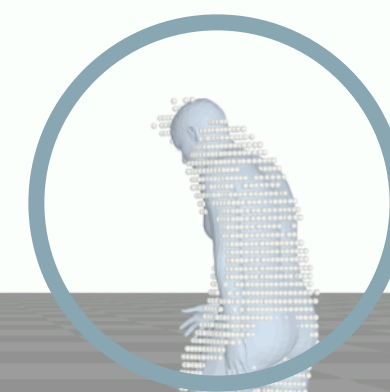
Network Module



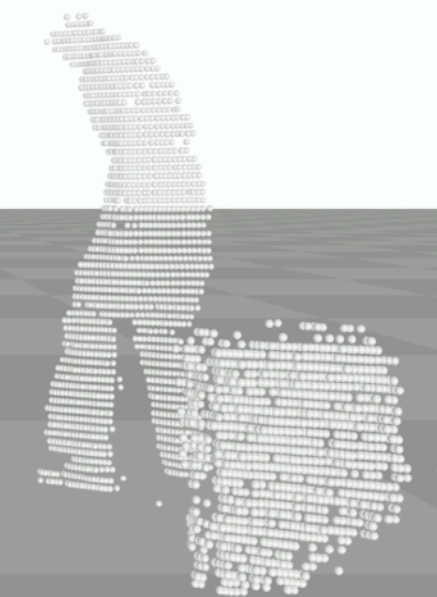
Ours w/o NVP&KPO



Ours w/o TBT

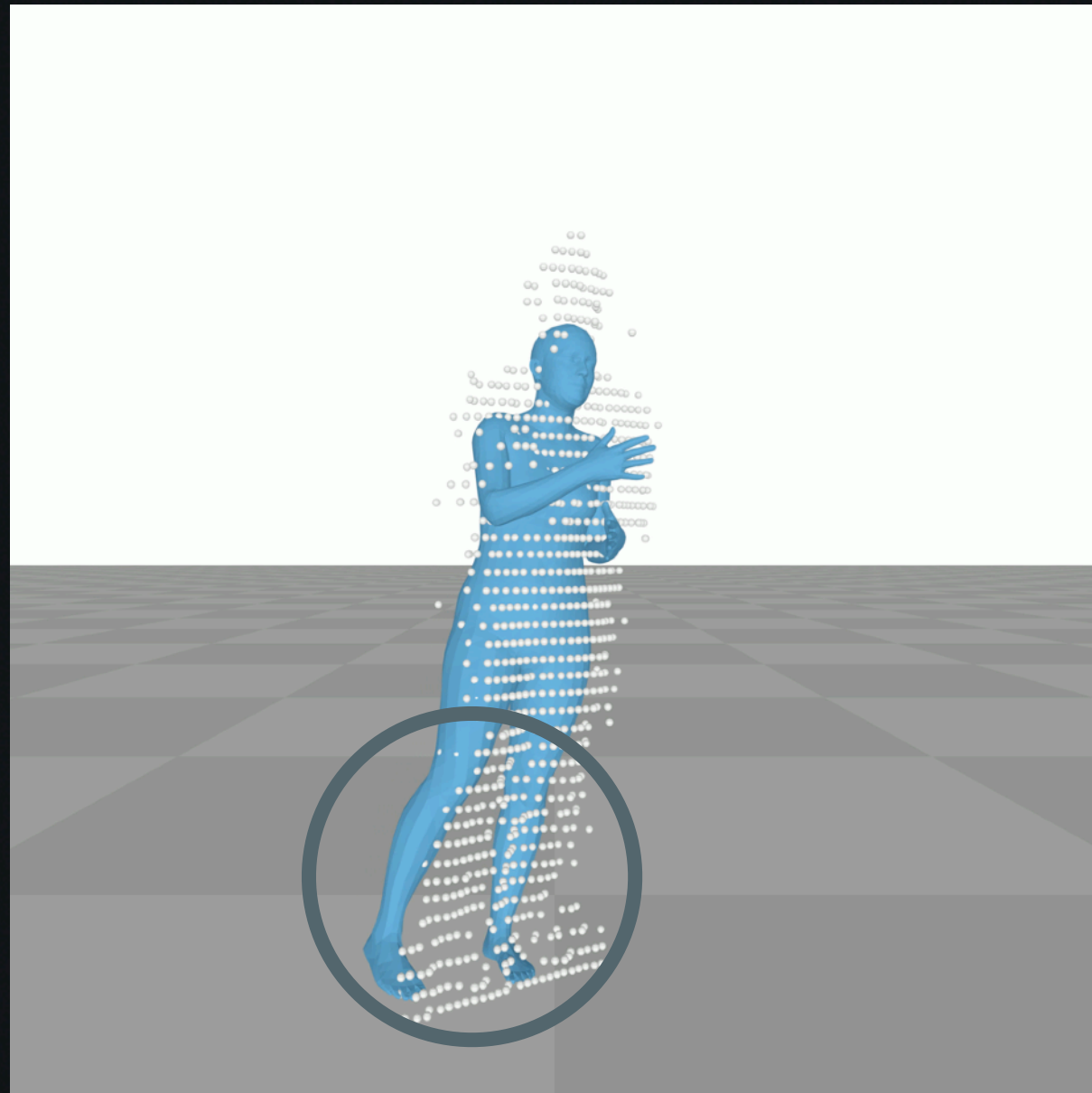


Ours

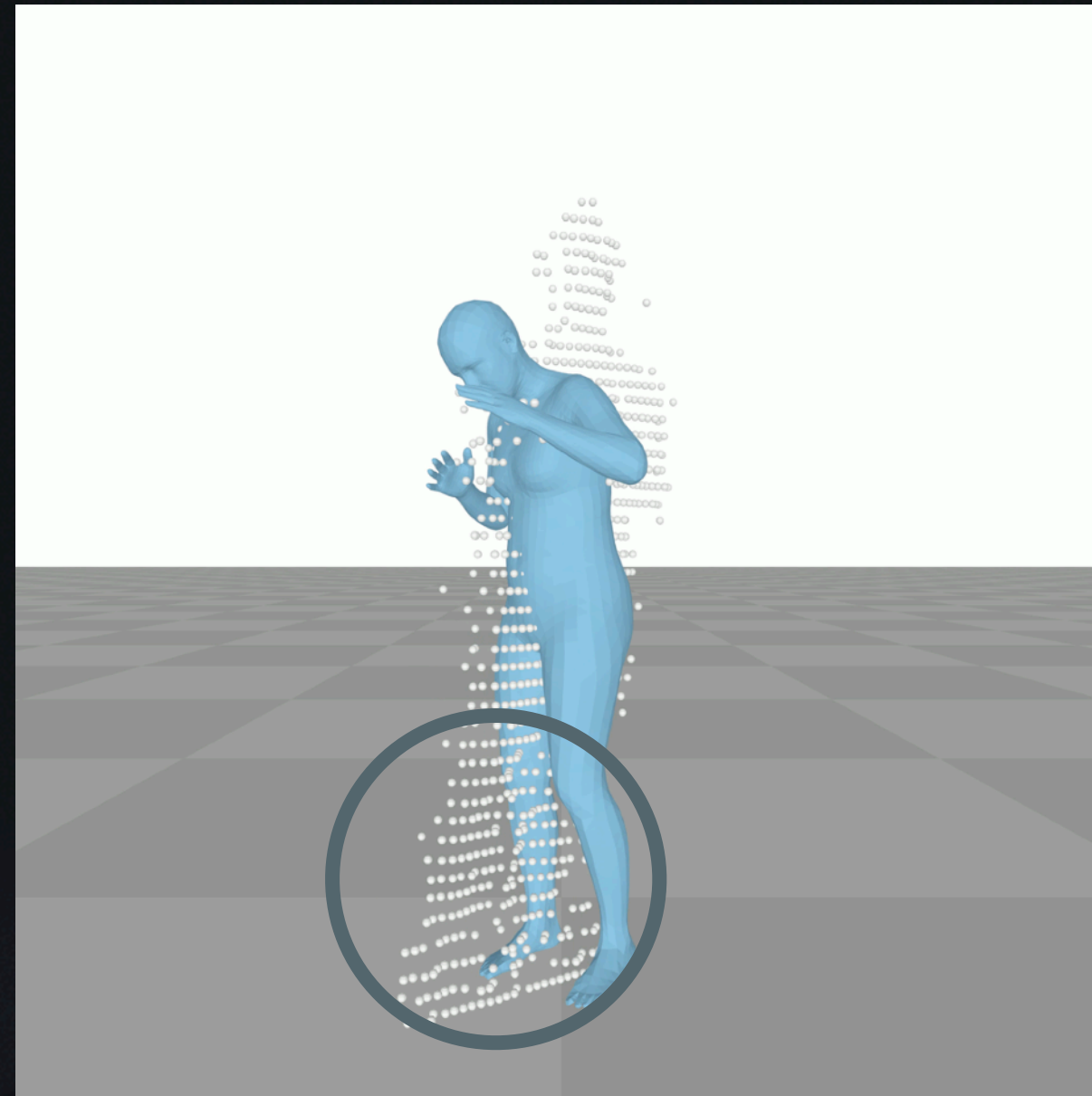


Point Cloud

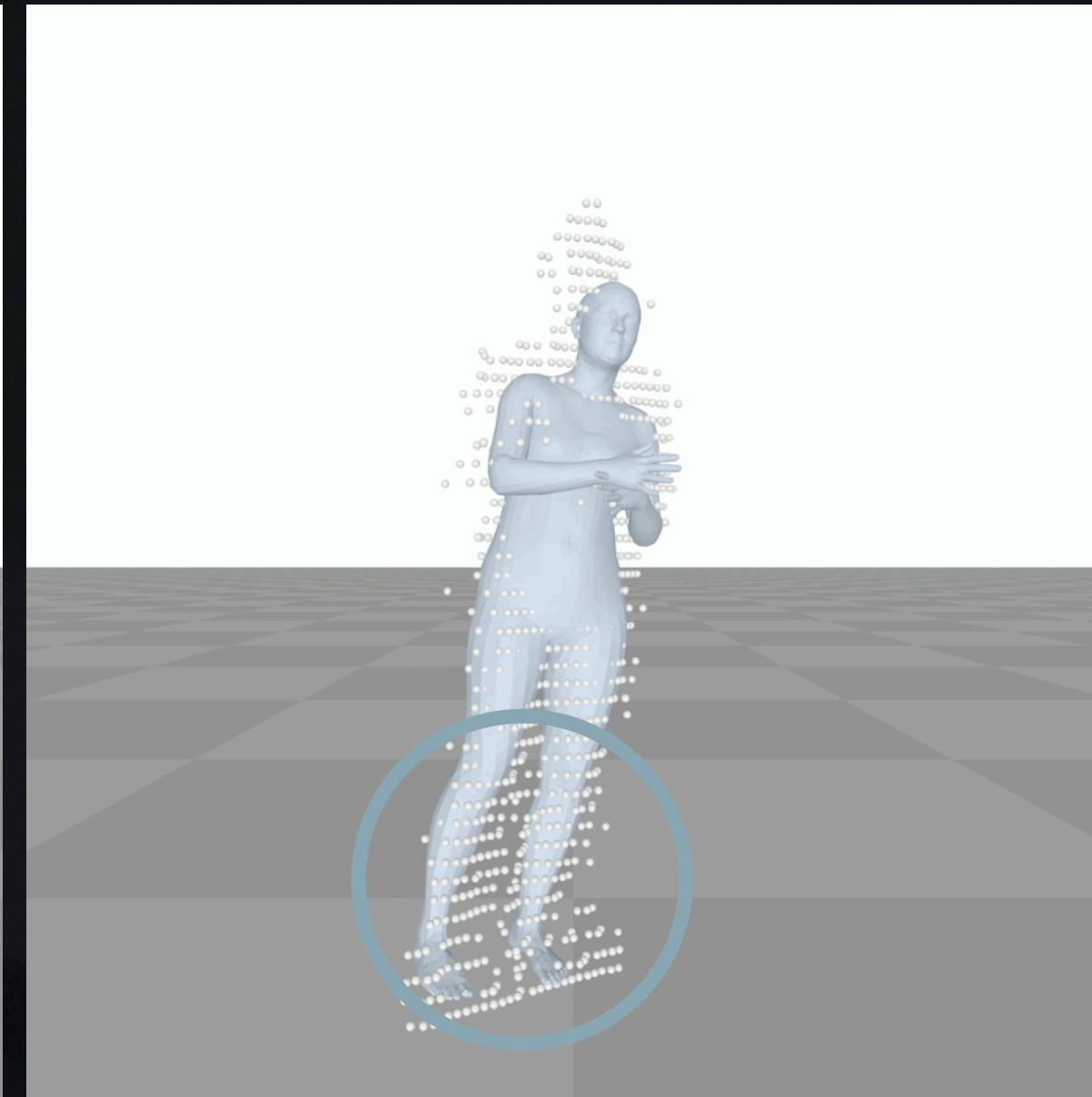
Trajectory-guided Body Tracker



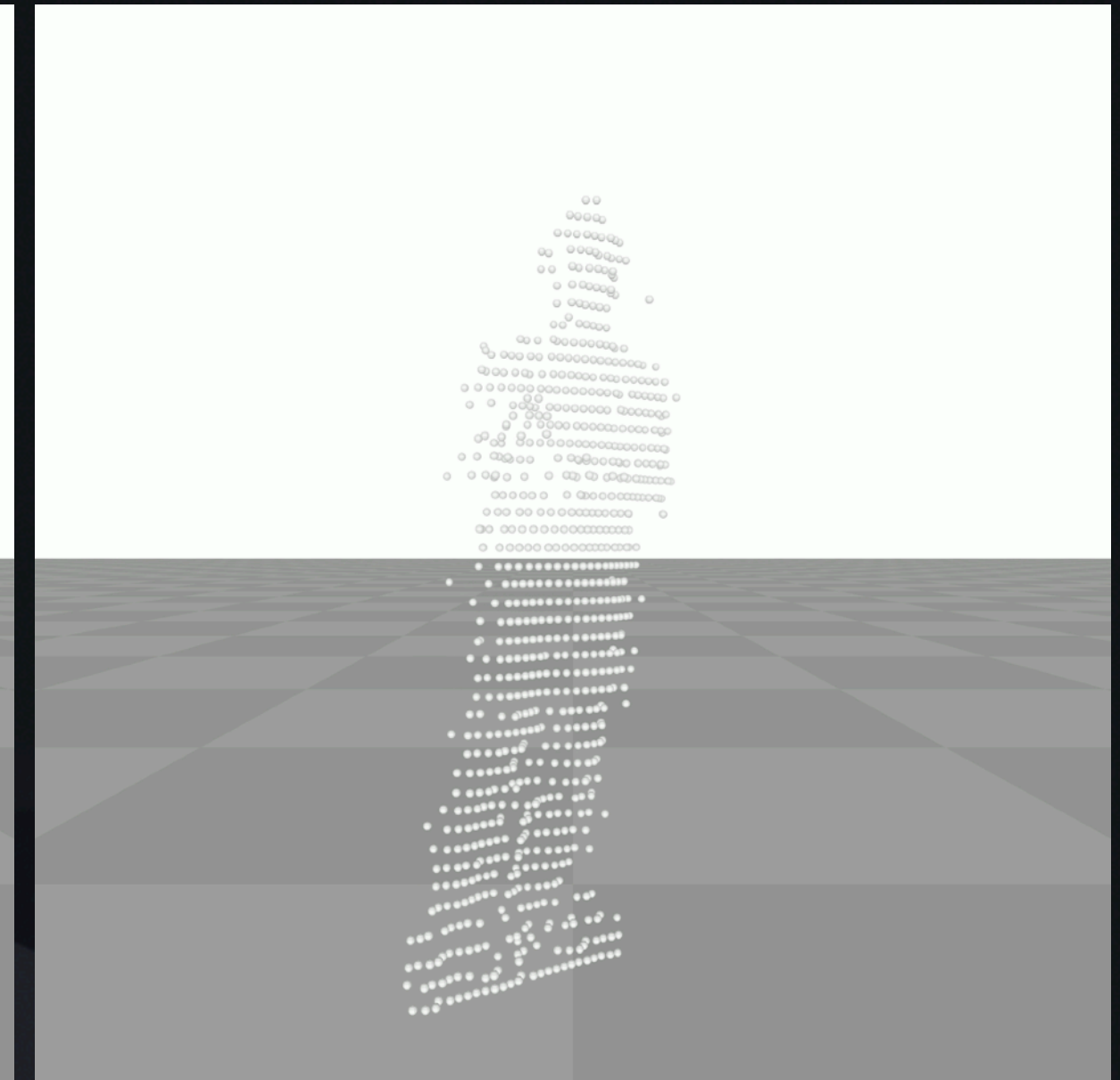
Frame-wise



Sequence-wise

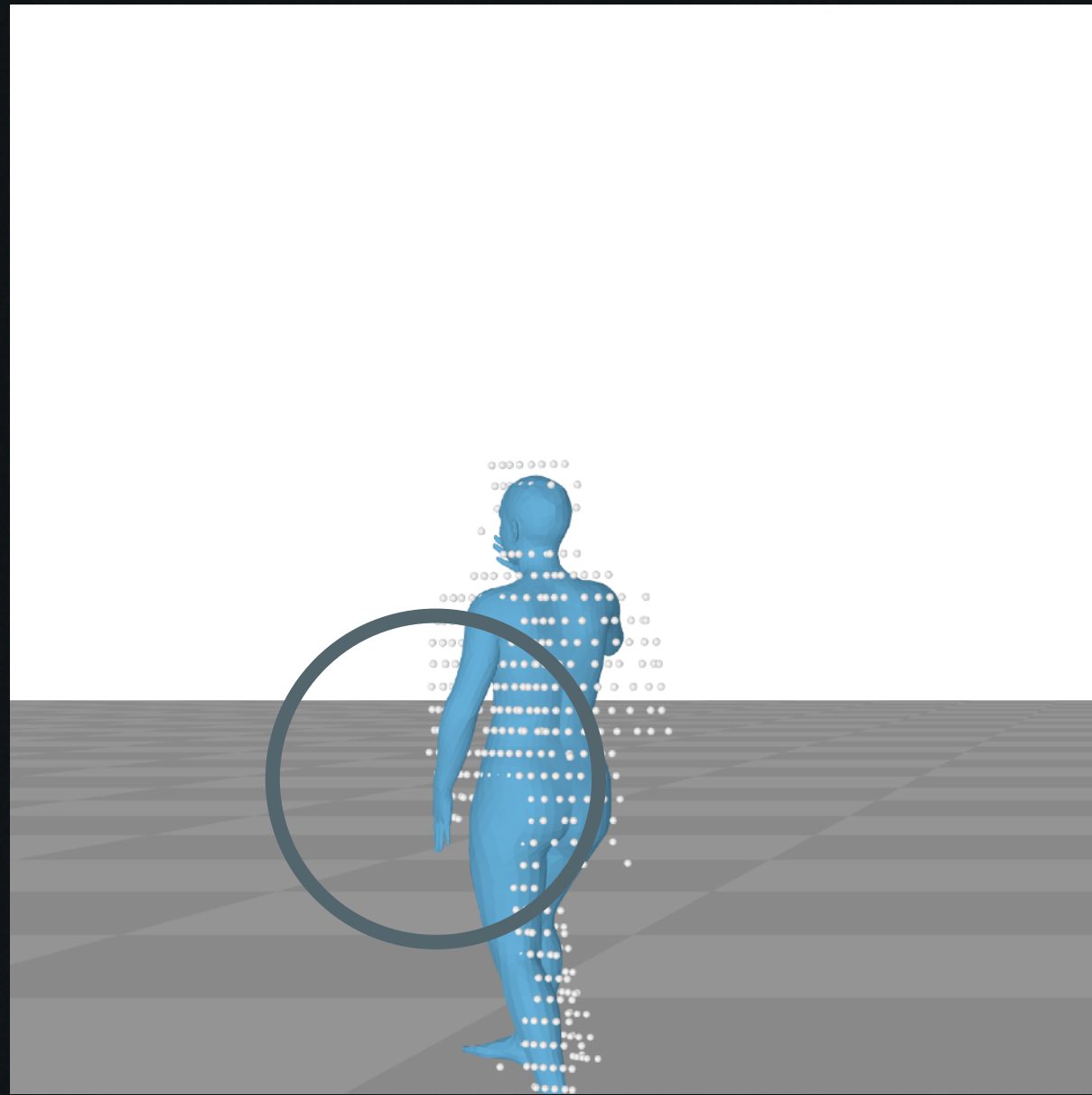


Ours

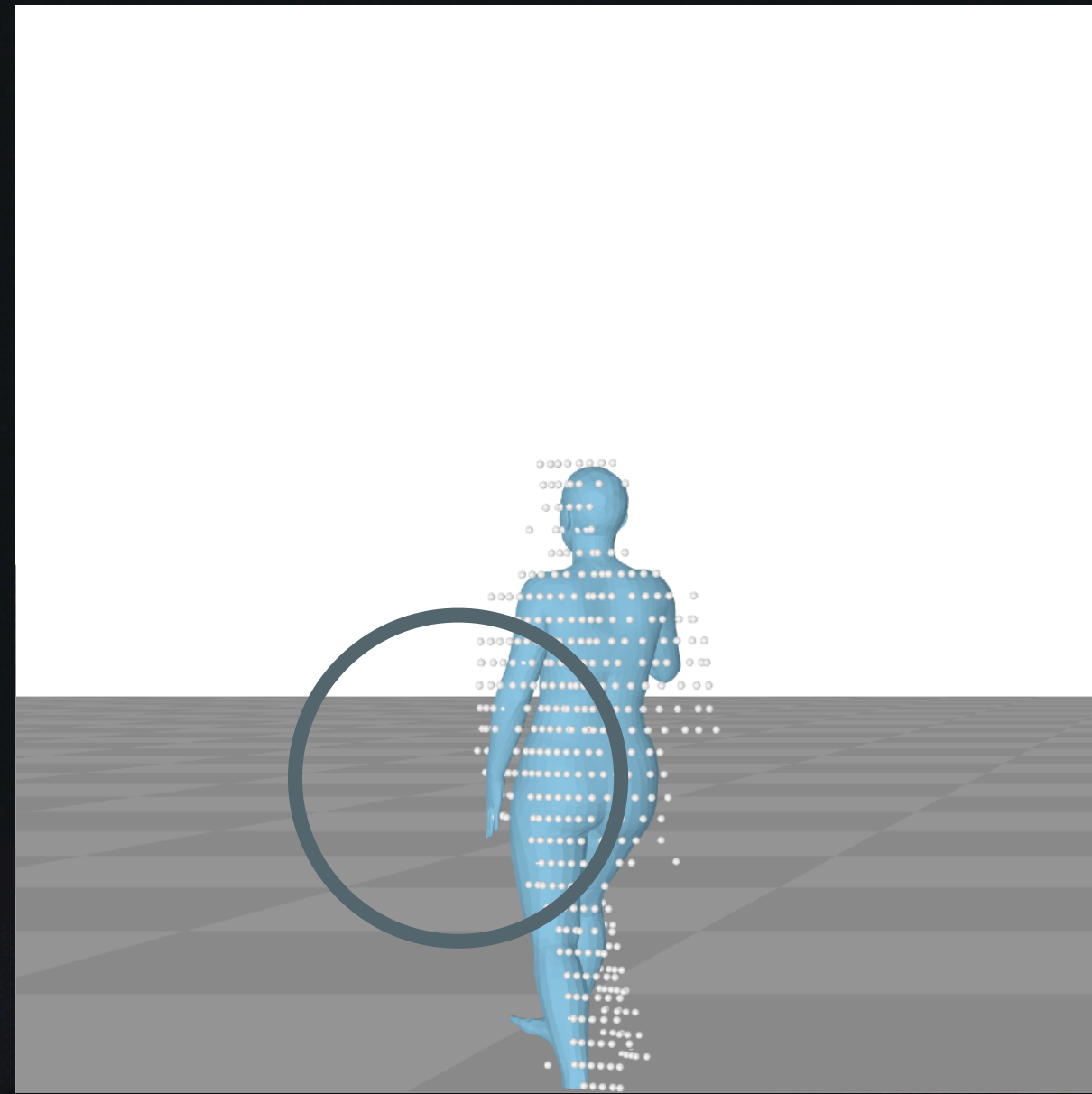


Point Cloud

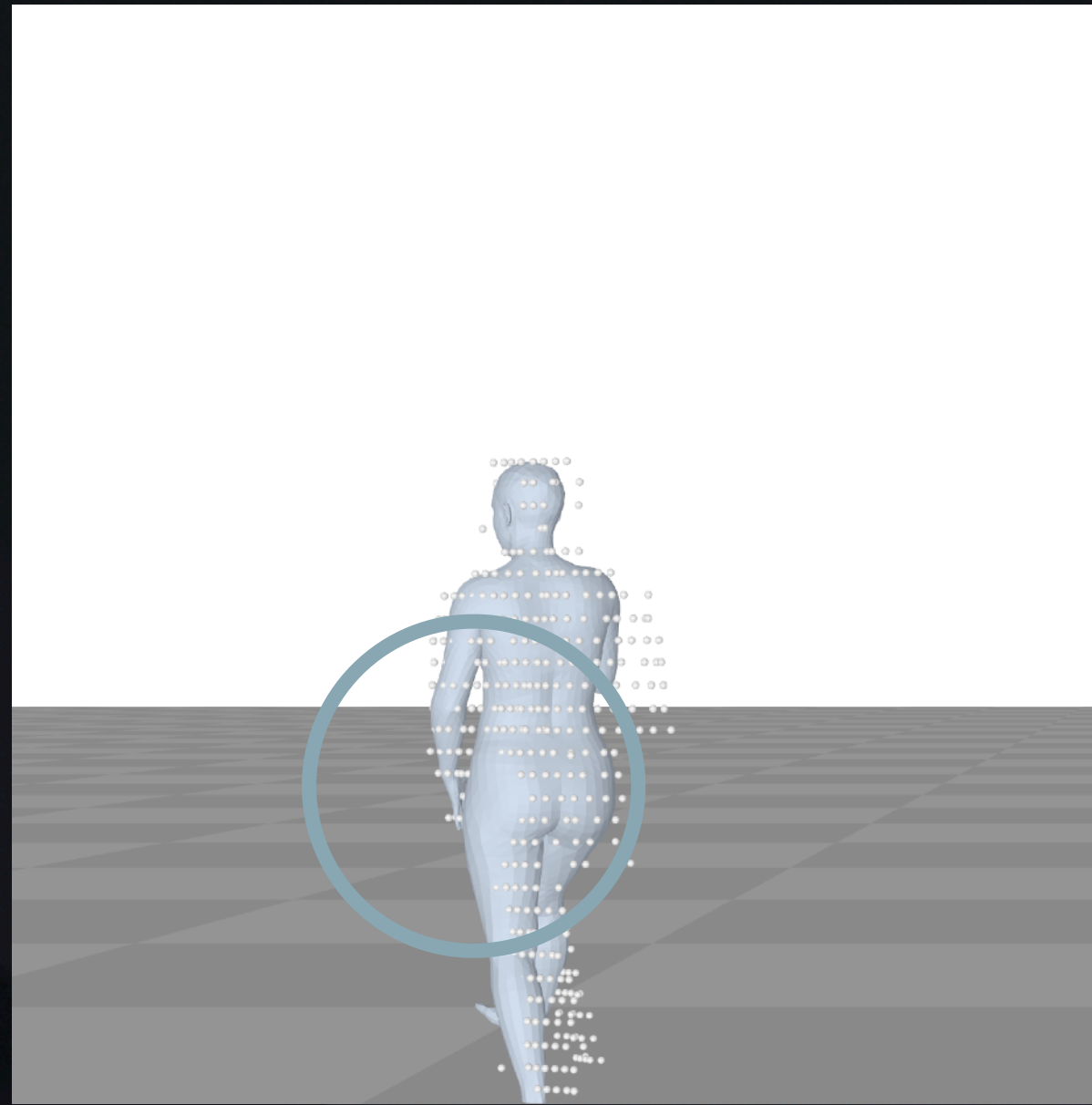
Kinematic-aware Pose Optimizer



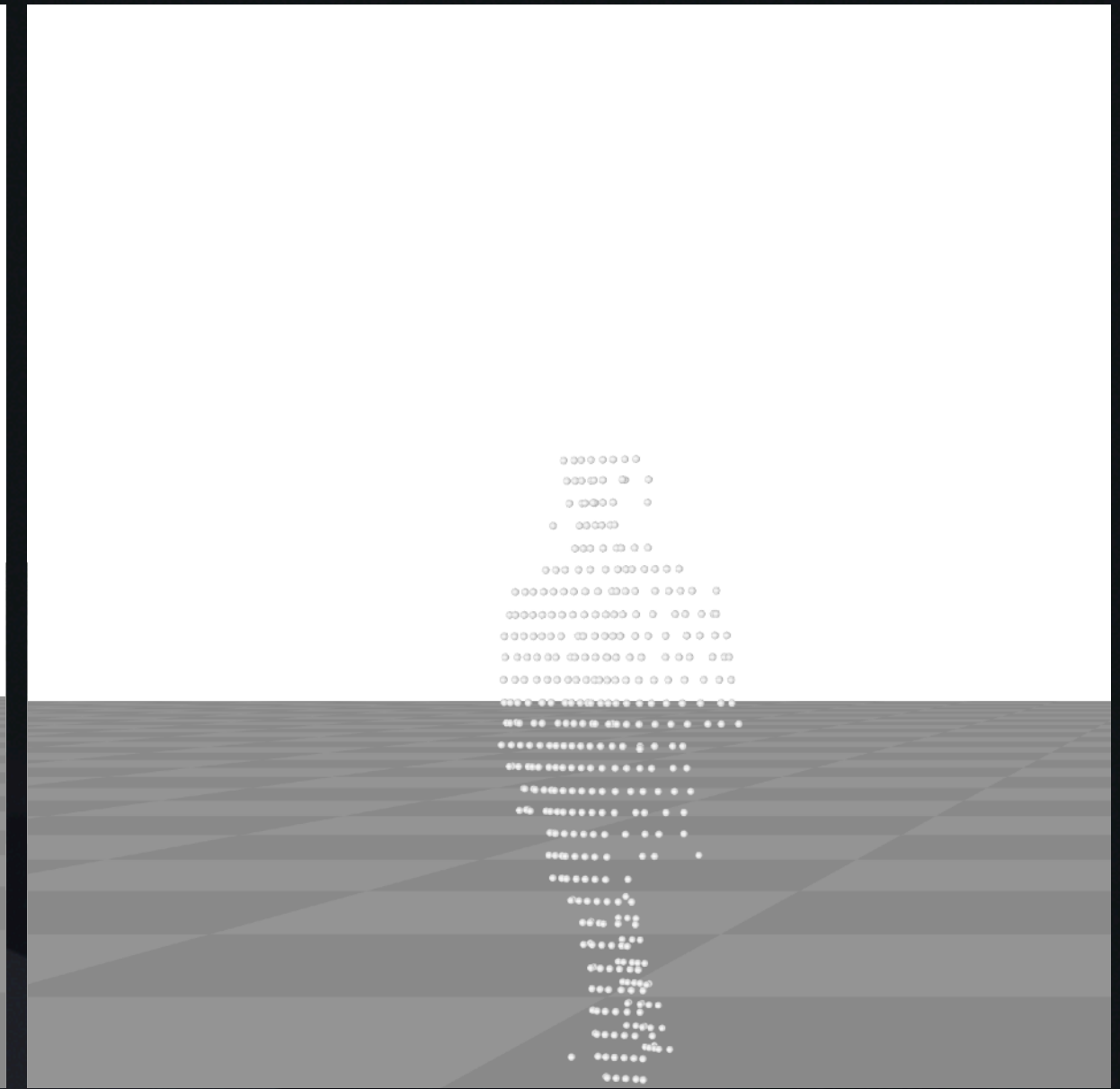
Short-term Optimizer



Long-term Optimizer



Ours

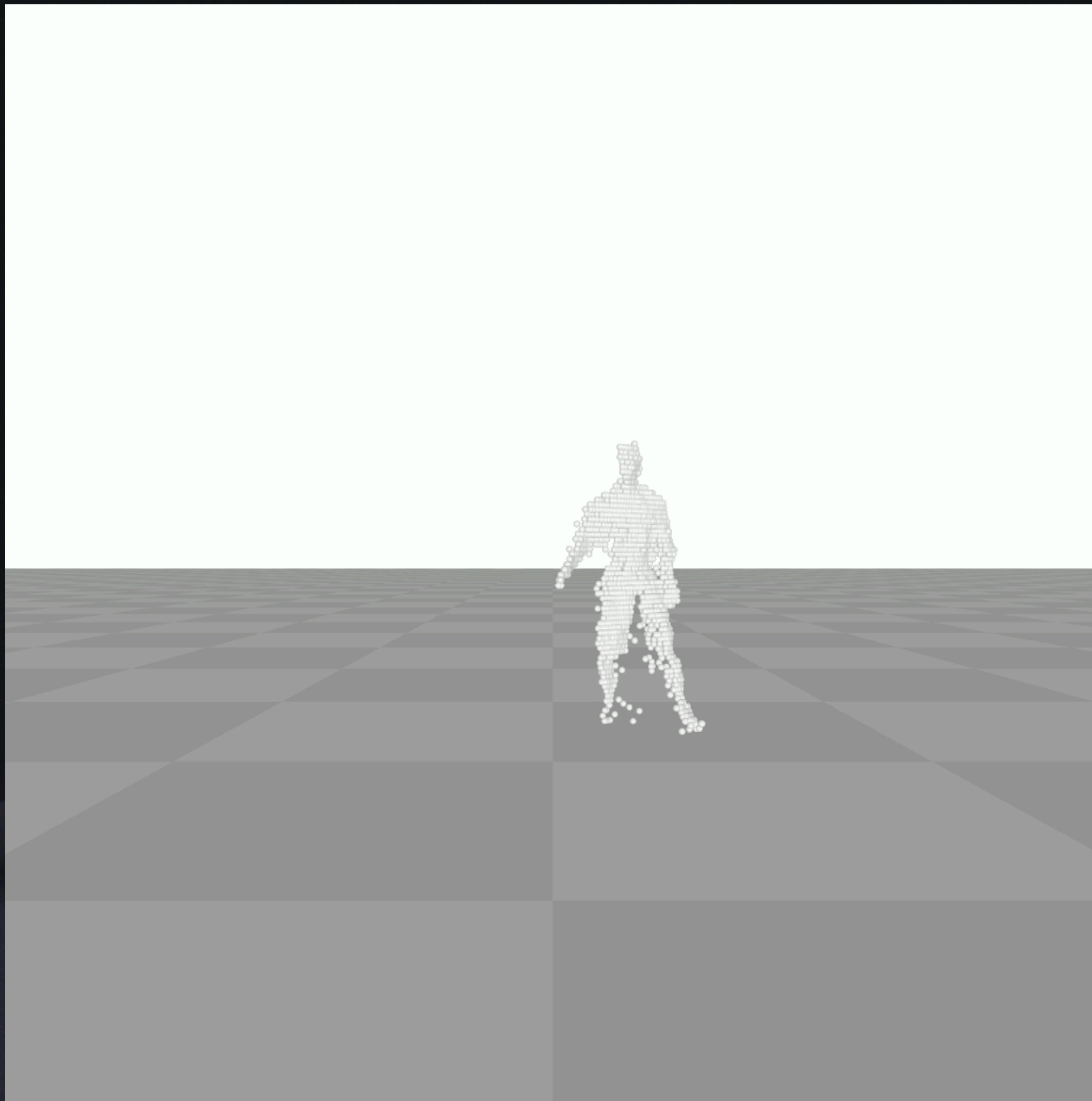


Point Cloud

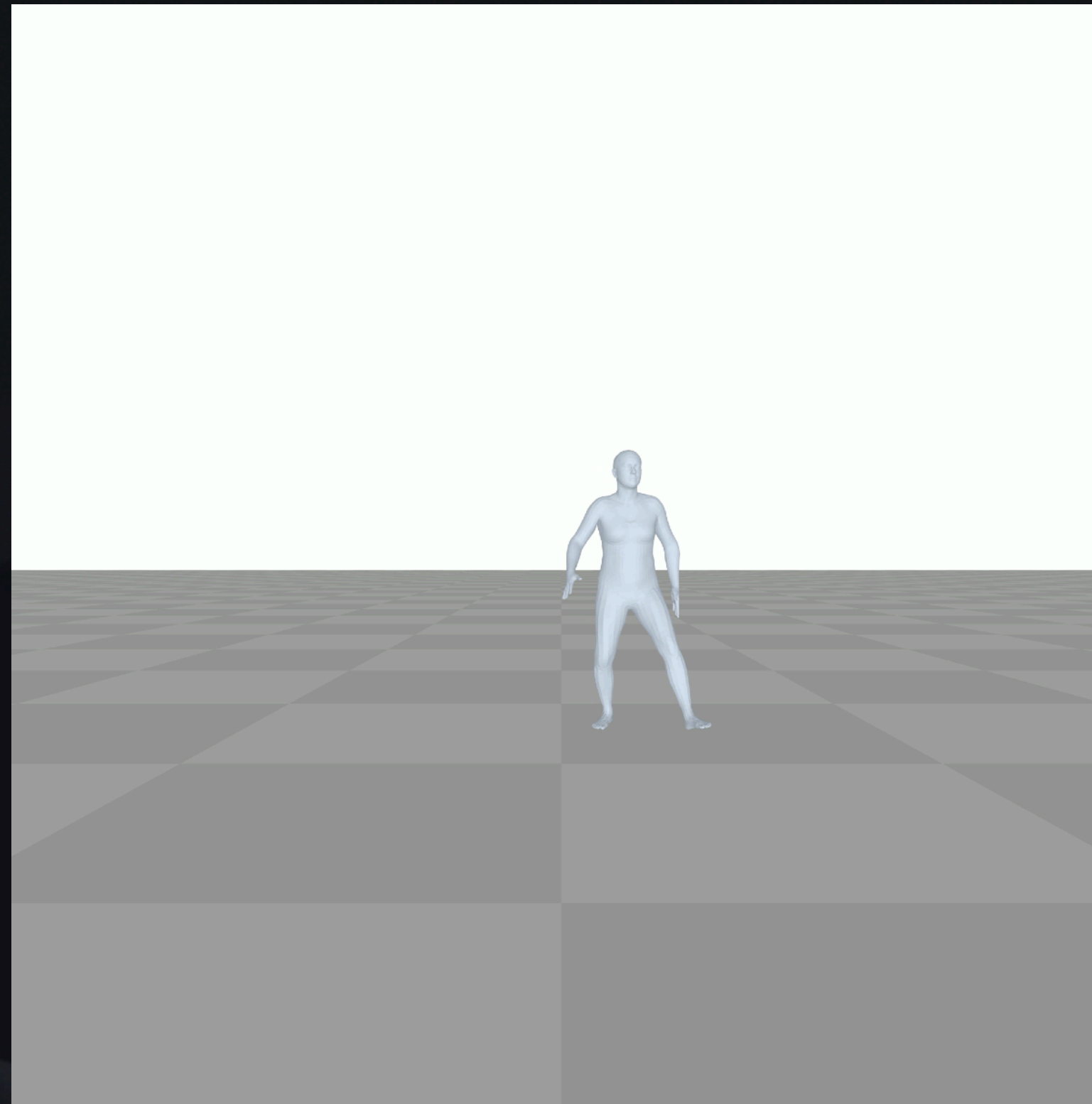
More Results(30 FPS)

More Results

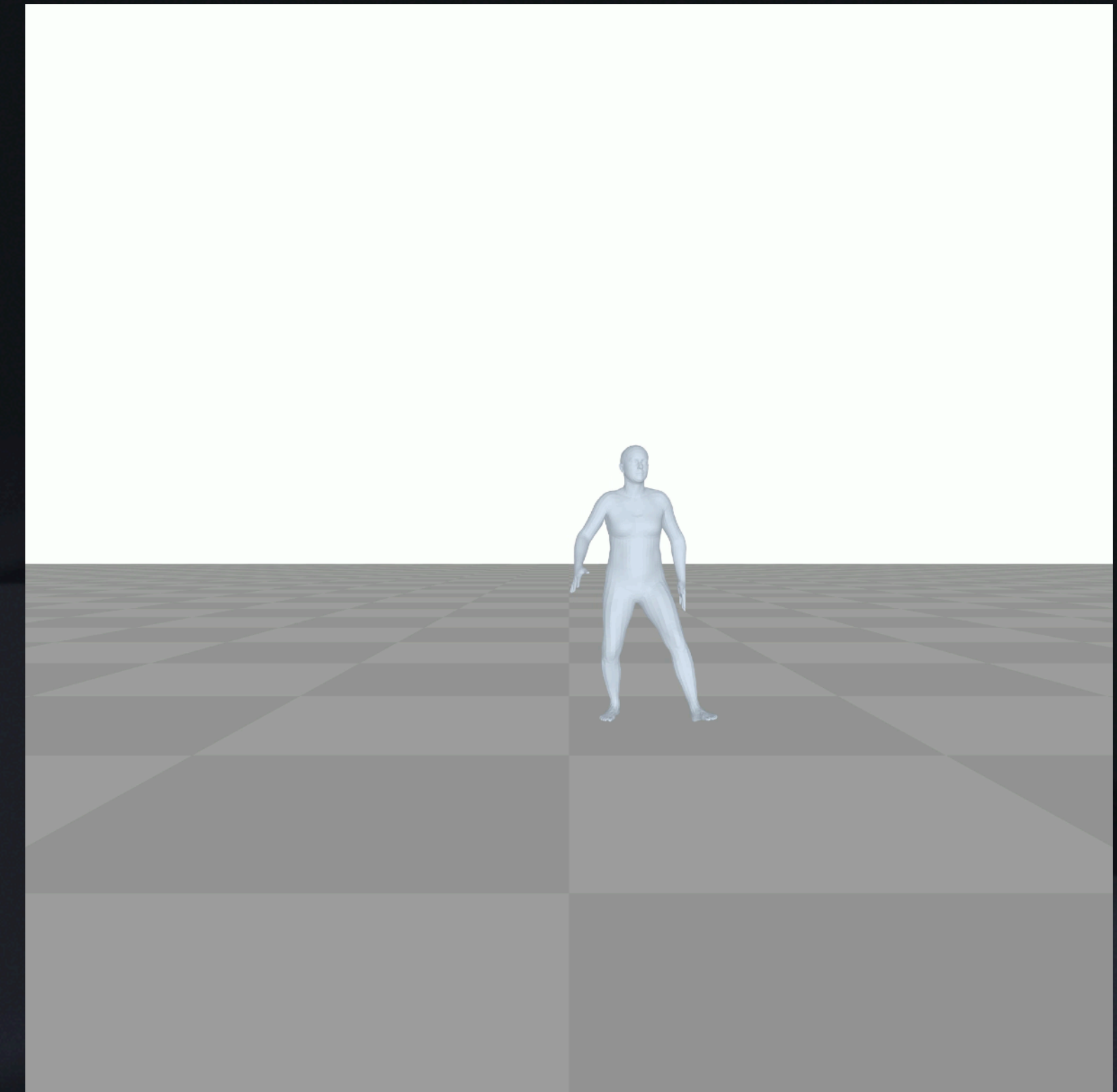
Point Cloud



10fps Results



30fps Results



Real-time Deployment

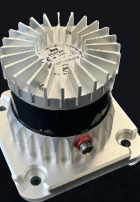
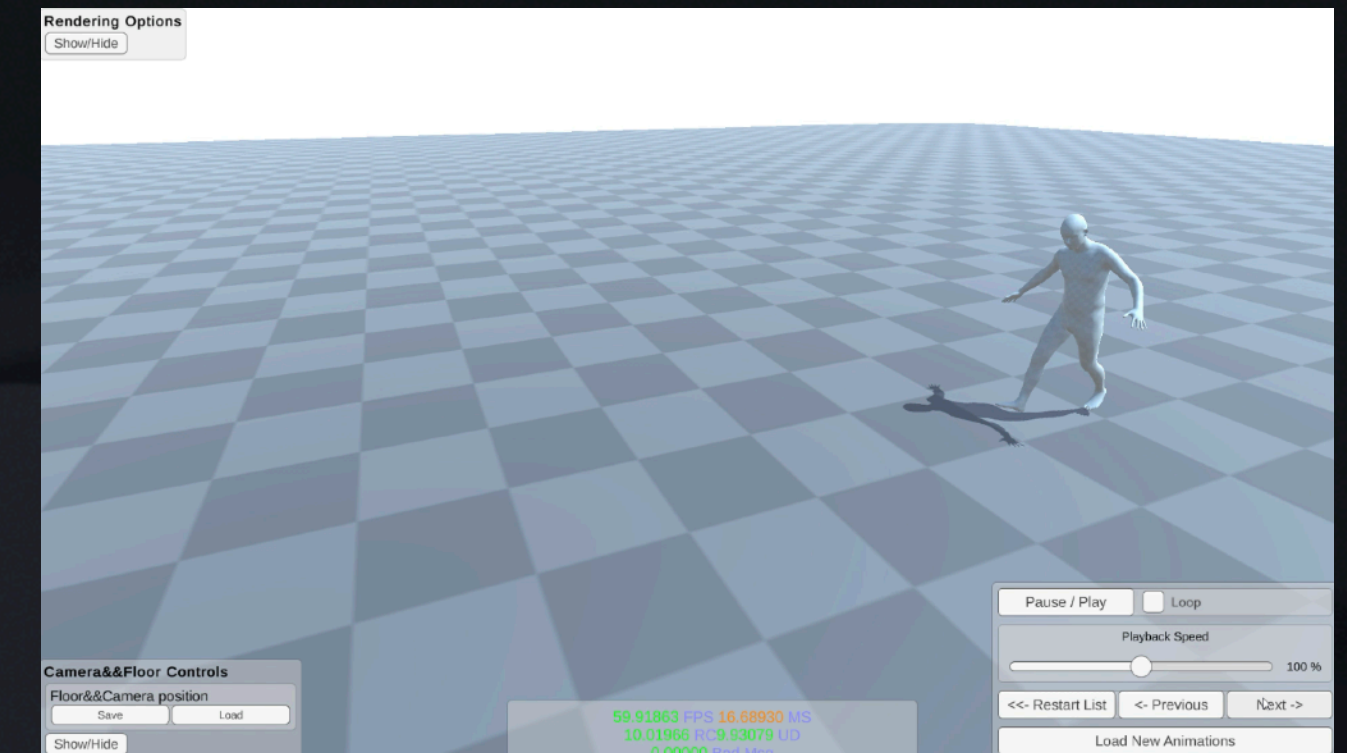
Real-time Deployment



Point Cloud



Result

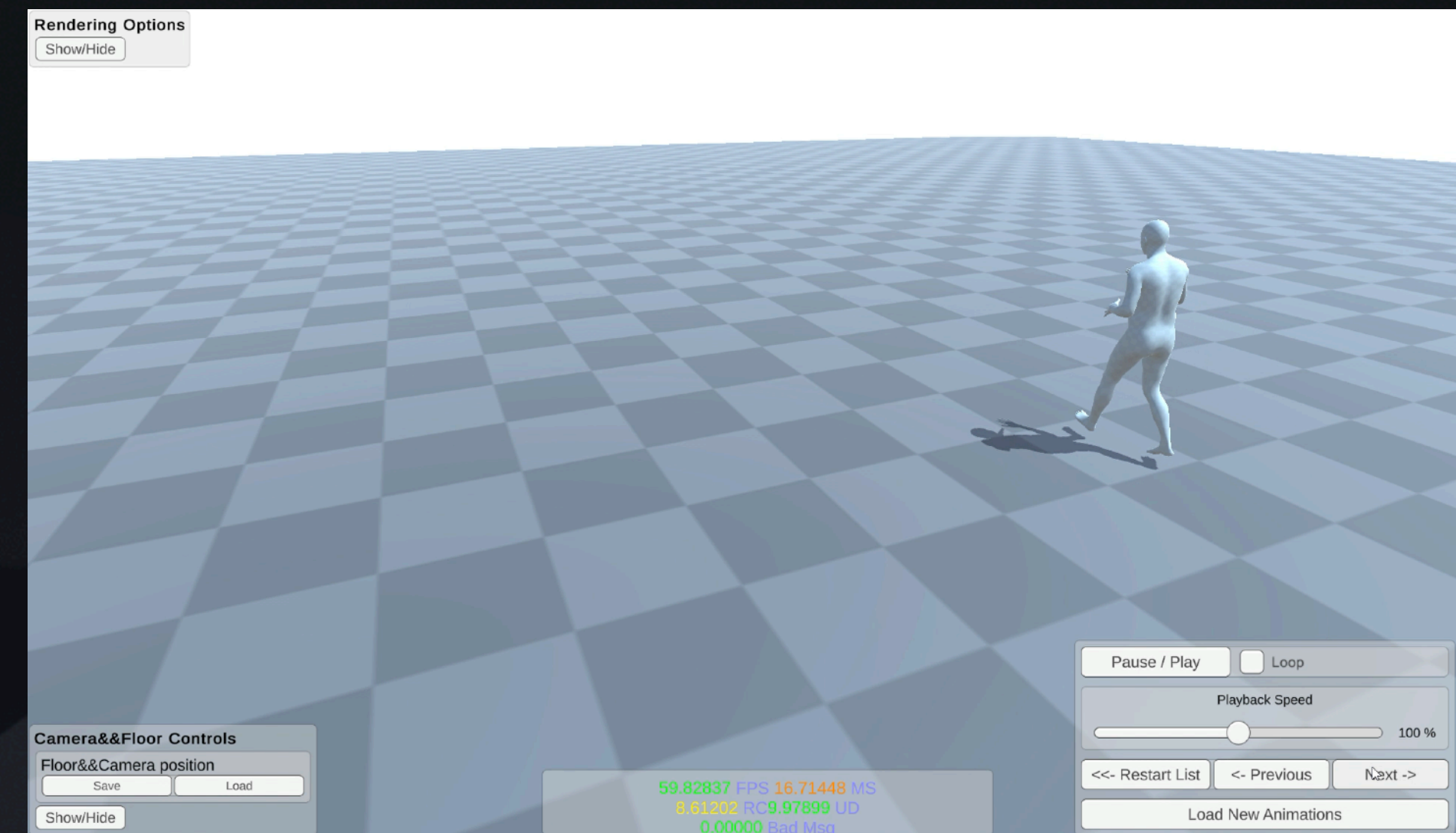
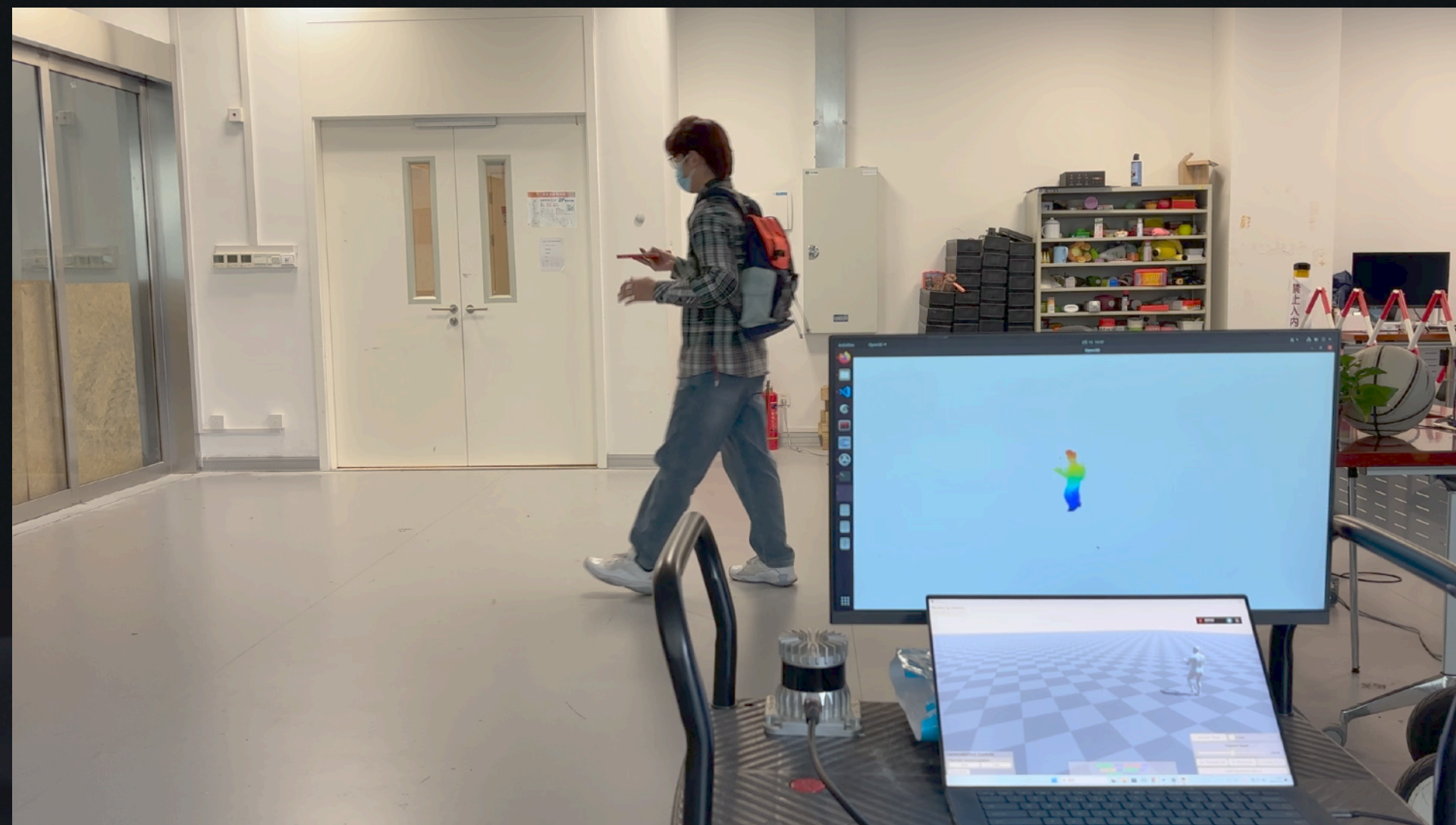


Data preprocessing

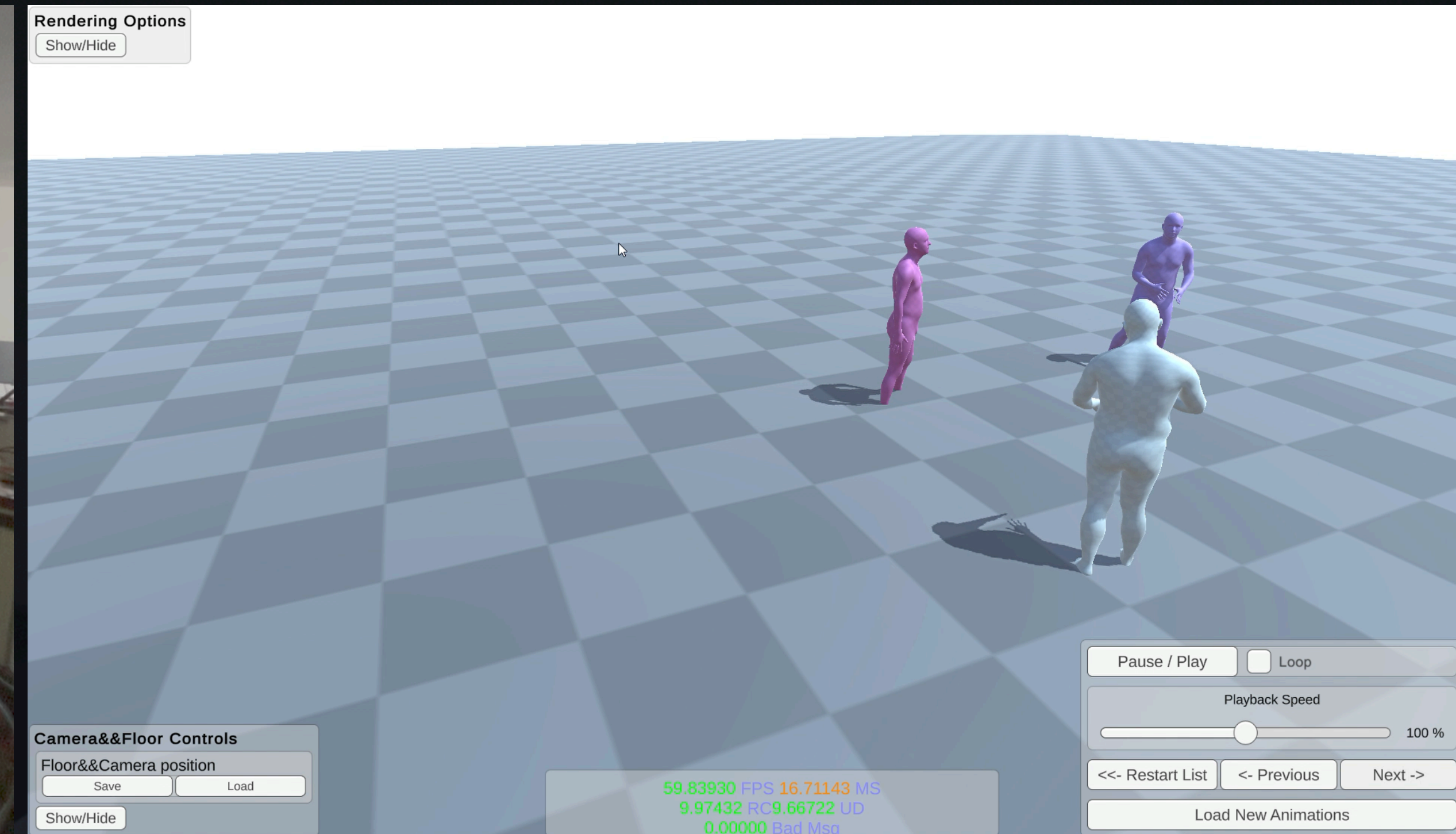
LiveHPS

Single Person Demo

Bag + Ping-Pong + Chair + Basketball + Fan + Flowerpot

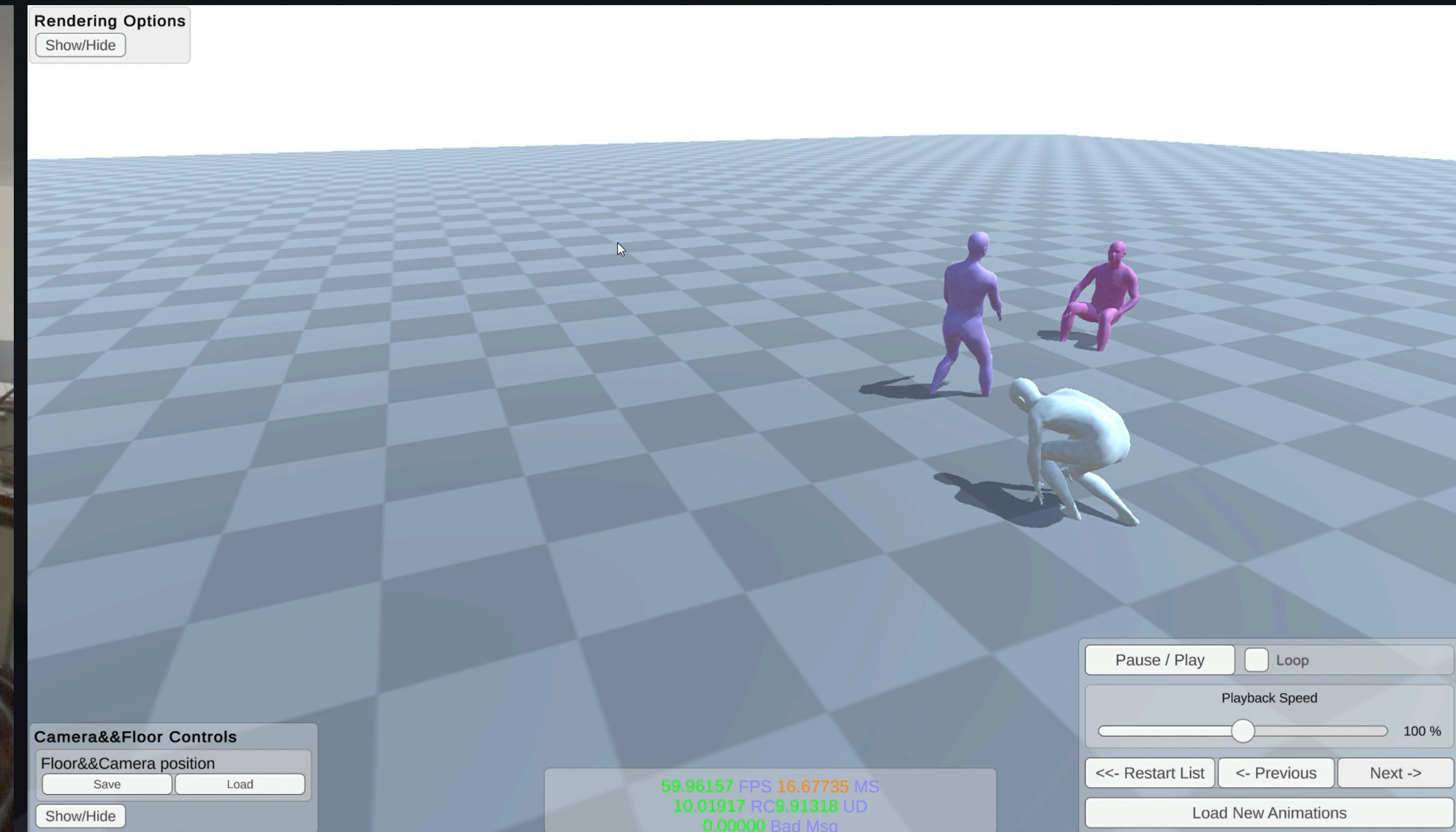
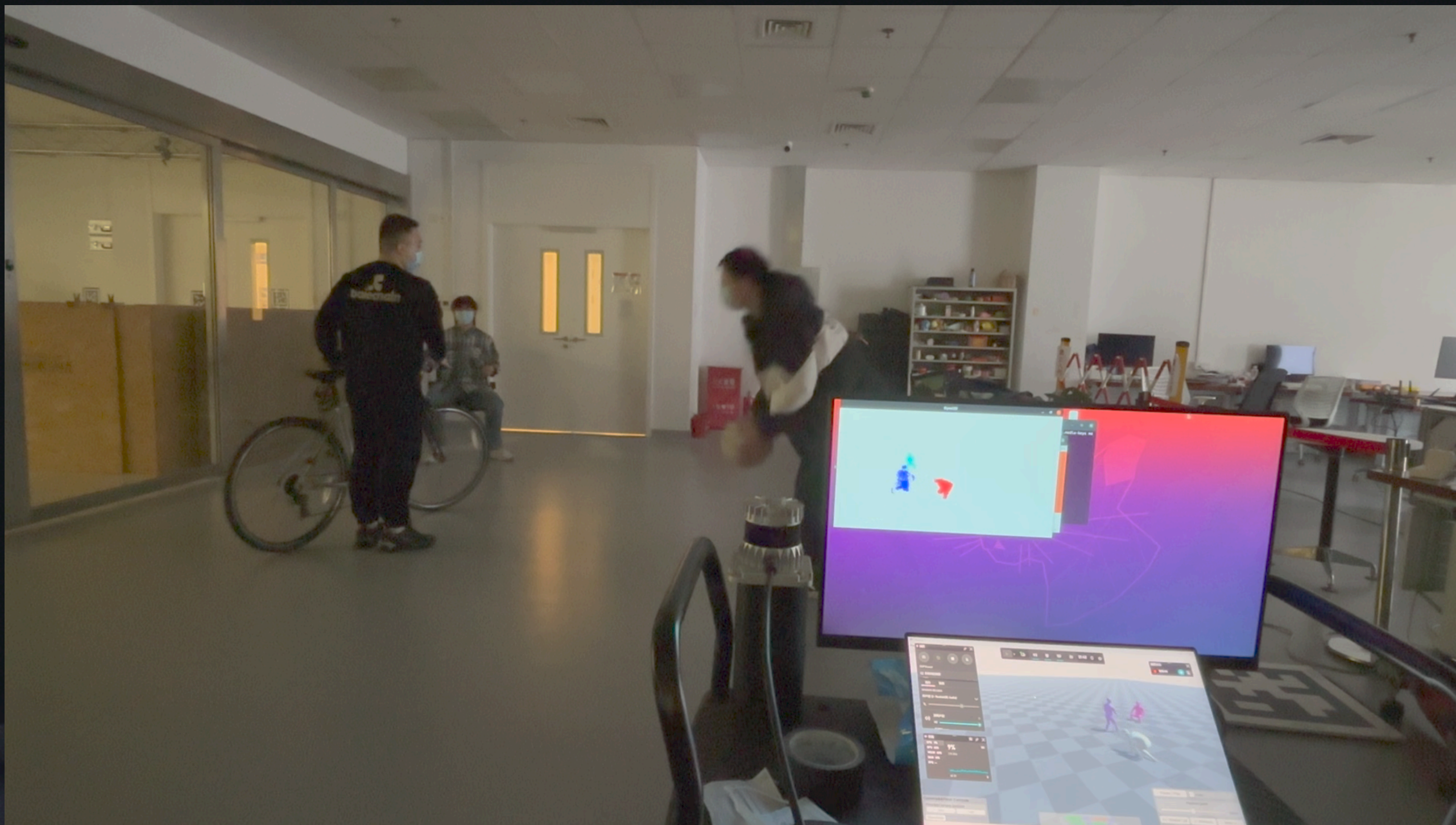


Multi-person Demo



Exchange chairs between two people in low light conditions

Multi-person Demo



In low light conditions, there is one person riding a bicycle, one person sitting, and one person playing basketball

Thank you!