UnrealEgo: A New Dataset for Robust Egocentric 3D Human Motion Capture
—Supplementary Material—

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This supplementary material provides more details on our assets, including realistic 3D human models and environments, and motion modification. Please also watch the supplementary video[3] for dynamic visualization of UnrealEgo.

A Asset List

A.1 Characters

We use 17 realistic RenderPeople 3D human models (commercially available) [2], *i.e.,* nine female and eight male. Table 9 summarizes the RenderPeople models that we use for UnrealEgo. These models are rigged and skinned based on the default 3D human skeleton of Unreal Engine [3] as shown in Fig. 9. Readers are referred to RenderPeople web page [2] for more details on their human models.

Table 9: List of characters.

Model name	Gender	Skin color	Clothes	Shoes
rp_adanna_rigged_003	Female	Dark brown	Scrubs	Sneakers
rp_amit_rigged_003	Male	Dark brown	T-shirts, jeans	Sneakers
rp_carla_rigged_001	Female	Dark brown	Suit jackets, slacks	High heels
rp_claudia_rigged_002	Female	Pale white	Long sleeves, slacks	High heels
rp_eric_rigged_001	Male	Light brown	Long sleeves, vest, slacks	Brogues
rp_janna_rigged_002	Female	White	Scrubs	Sneakers
rp_joko_rigged_003	Male	White	Turnout coat, bunker gear	Bunker gear
rp_joyce_rigged_005	Female	Black	Dress with long pants	High heels
rp_kyle_rigged_001	Male	Light brown	Scrubs	Sneakers
rp_manuel_rigged_001	Male	White	T-shirts, jeans	Sneakers
rp_maya_rigged_003	Female	Pale white	Long sleeves, shorts, tights	Sneakers
rp_nathan_rigged_003	Male	Light brown	T-shorts, jeans	Sneakers
rp_rin_rigged_007	Female	White	Dress	High heels
rp_scott_rigged_005	Male	White	T-shorts, safety vest, athletic pants	Hiking boots
rp_serena_rigged_004	Female	Black	Short sleeves, shorts	Sneakers
rp_shawn_rigged_004	Male	Moderate brown	Scrubs	Sneakers
rp_sophia_rigged_003	Female	Moderate brown	No sleeves, jeans	Flats

[3] https://4dqv.mpi-inf.mpg.de/UnrealEgo/

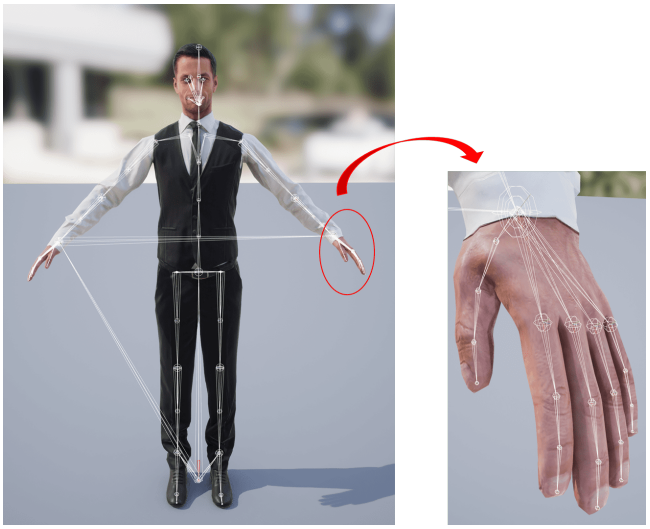


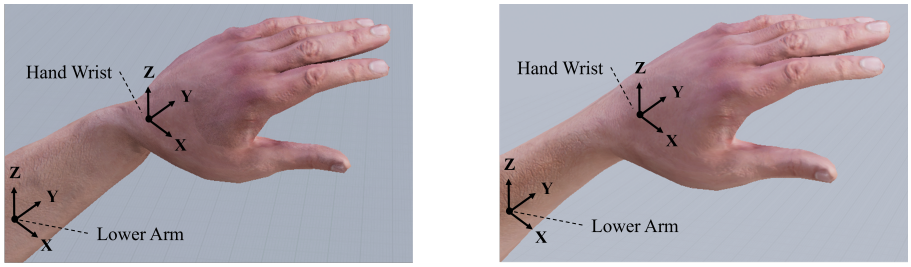
Fig. 9: The skeleton of the RenderPeople models.

A.2 3D Environments

We provide the asset list of 3D environments used for UnrealEgo in Table 10. All of the environments are commercially available on the UnrealEngine marketplace. Ray tracing is enabled if the environments support it or rasterization rendering is used otherwise. Also, the rendering process of UnrealEngine includes deferred shading, global illumination, lit translucency, post-processing, and GPU particle simulation utilizing vector fields. Please also take a look at the UnrealEngine documentation [18] for more details on their rendering system.

Table 10: List of 3D environments used in UnrealEgo.

Environment name	Ray-tracing	Example scenes
ArchViz Interior [4]	✓	North-American rooms
Big Office [5]	✓	Offices, cafeterias, playrooms, restrooms, elevators
Downtown West Modular Pack [8]	✓	Outdoor shopping mall, roads, water fountain
Hutong/Chinese Alleyway Pack [10]	✓	Alleys, bicycle parking
Japanese Restaurant Interior & Exterior [11]	✓	Traditional Japanese izakaya
Realistic Lab. Laboratory Equipment [15]	✓	Lab rooms
Modern Chinese Interior [13]	✓	Chinese rooms
Modular Building Set [14]	✓	Old buildings
Kyoto Alley [12]		Traditional Kyoto shopping roads, temples
Science Lab [16]		Lab rooms
City Subway Train Modular [7]		Trains
CityPark [6]		Parks, roads, bridges, gardens, tennis courts, baseball fields, football fields, water fountain
Factory Environment Collection [9]		Heavy truck manufacturing lines, warehouses, offices, changing rooms
Suburb Neighborhood House Pack [17]		North-American houses, kitchens, rooms, stairs, gardens, pools, roads



(a) Original lower arm (b) Modified lower arm

Fig. 10: Modification for the lower arm distortion in Mixamo motions [1]. The lower arms of the original Mixamo motions often show unnatural distortion. Therefore, we provide 70% of rotation of hand wrists around the Y axis to that of lower arms to maximize the plausibility of arm movements.

B Motions

As mentioned in Section 3.1 of the main paper, we utilize Mixamo motions [1] and modify them using UnrealEngine [3] to enhance their plausibility and diversify the motion data. Here, we use the default functions of UnrealEngine, *i.e.,* the control rig, to manually fix some motions that involve self-penetration or unnatural body distortion. In particular, we work on the problem of lower arm distortion. The main issue here is that the Mixamo motions lack rotation information of the lower arms of the UnrealEngine skeleton. Due to this, the original motions show unnatural distortion of the lower arms as shown in Fig. 10-(a). To alleviate this issue, we add constraints on the amount of rotations of the lower arms. Specifically, we provide 70% of rotations of hand wrists around the Y axis to those of the lower arms to maximize the plausibility of arm movements. We show the modified version in Fig. 10-(b).

Also, we manually diversify the motions in various ways, including the speed of motions, arm movements, foot stance, and head rotations. The change of the head rotations is especially important for egocentric datasets because the slight change will lead to a dramatic change of egocentric views even with similar poses. Please note that xR-EgoPose [19] also uses the Mixamo motions as mentioned in Section 2.2. However, our manual modifications allow UnrealEgo to provide motions with more different types of poses than xR-EgoPose as discussed in Section 3.2.

Moreover, unlike previously proposed datasets [19,20], UnrealEgo does not contain the exact same motions captured in multiple different scenes. This makes UnrealEgo a unique dataset with the largest variety of motions.

References

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