AvatarMix: Identity-Preserving Cross-Avatar Composition for Outfit Personalization

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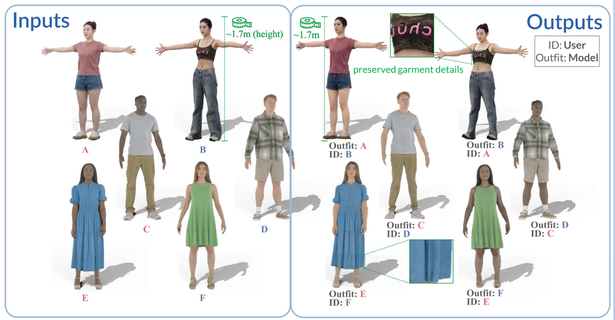
Task & Motivation



Task: for outfit personalization, combine User's identity with Model's outfit, preserve high-fidelity 3DGS appearance

Why is this hard?

- 2D-to-3D try-on can degrade garment **texture** and **view consistency** [1].
- Layered garment & body transfer can introduce **intersections** [2].

Failure example of 2D-to-3D try-on [1]: red dotted boxes show view-inconsistent garment details.

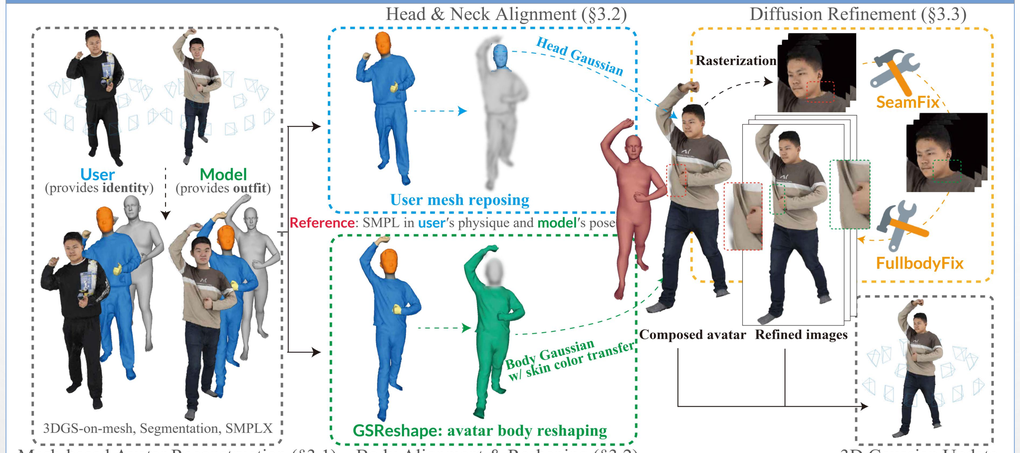
Motivation & Key Idea

- To avoid view inconsistency and intersection artifacts, **compose** reusable avatar's **head & body** instead of regenerating outfits.
- To **preserve identity** beyond the face, match the clothed body to the User's **physique** and **skin tone.**
- To **reduce hallucinated** changes in high-quality regions, **refine only seams and reshaping artifacts.**

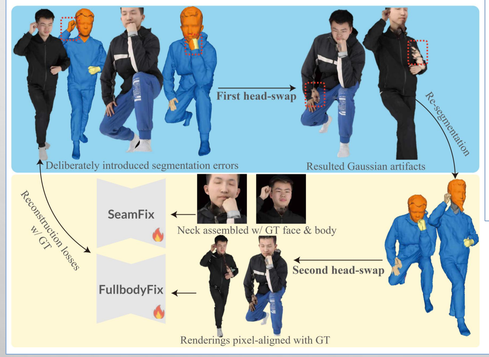
Contributions

- Cross-avatar **composition** for 3DGS outfit personalization.
- GSReshape for body-shape-aware **clothed-body retargeting**.
- SeamFix + FullbodyFix for localized and full-body **artifact repair**.

Method



Training Artifact Refiners



Mesh-based Avatar Reconstruction
Reconstruct mesh based 3DGS avatars from multi-view images [3,4], with semantic segmentation and SMPL fitting.

Cross-Avatar Composition
Align the User's head & neck to the Model pose, then **combine** with Model's clothed body. **Transfer** User's **skin-tone** to body for identity preservation.

GSReshape
Retarget the clothed body to the user's physique by **jointly deforming** the mesh and the attached Gaussians [5].

Seam/FullbodyFix
Repair **seam** and **reshaping artifacts**, then use the refined views to update the composed 3DGS avatar [6].

- Cross-avatar compositions **lack pixel-aligned GT** for training artifact refiners.
- **Two head-swaps** synthesize pairs: A→B introduces artifacts; B→A returns to A's layout for GT alignment.
- Seam/FullbodyFix learn artifact removal; refined multi-view renders then update the composed 3DGS avatar.

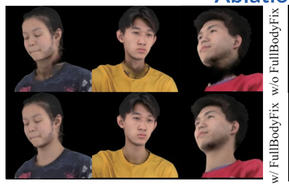
Results

Quantitative Results on THUman2.0 [9]

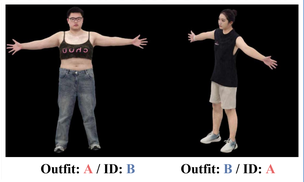
Method	Outfit DINO ↑ [7]	Head + Neck DINO ↑ [7]	Warp RMSE ↓ [8]	User Preference ↑
VTON360 [1]	0.633	0.786	0.0276	8.7%
TIP-Editor [10]	N/A	0.356	0.0388	2.6%
Ours	**0.883**	**0.818**	**0.0175**	**88.7%**

Additional Qualitative Results

Ablations



Stress Test: Cross-Gender Pair



Key Takeaways

- **Compose** first, **repair** locally.
- Mesh-based Gaussians make **geometric identity transfer** practical.
- Diffusion refinement acts as **cleanup**, instead of full outfit generation.

Limitations / Future work

- Requires high-quality mesh-based Gaussian avatars as input.
- FullbodyFix is currently triggered by visual inspection.
- Animatable transfer remains future work.

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References

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