



**ETH** zürich



# Learning Anchor Transformations for 3D Garment Animation

Fang Zhao<sup>1</sup>, Zekun Li<sup>1</sup>, Shaoli Huang<sup>1</sup>, Junwu Weng<sup>1</sup>, Tianfei Zhou<sup>2</sup>,  
Guo-Sen Xie<sup>3</sup>, Jue Wang<sup>1</sup>, Ying Shan<sup>1</sup>

<sup>1</sup> Tencent AI Lab <sup>2</sup> ETH Zurich <sup>3</sup> Nanjing University of Science and Technology

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# Summary

- This paper proposes an **anchor-based deformation model**, namely **AnchorDEF**, to predict 3D garment animation from a body motion sequence.



Figure 1. AnchorDEF is able to realistically deform the garment mesh, especially for loose-fitting garments, e.g., dresses.

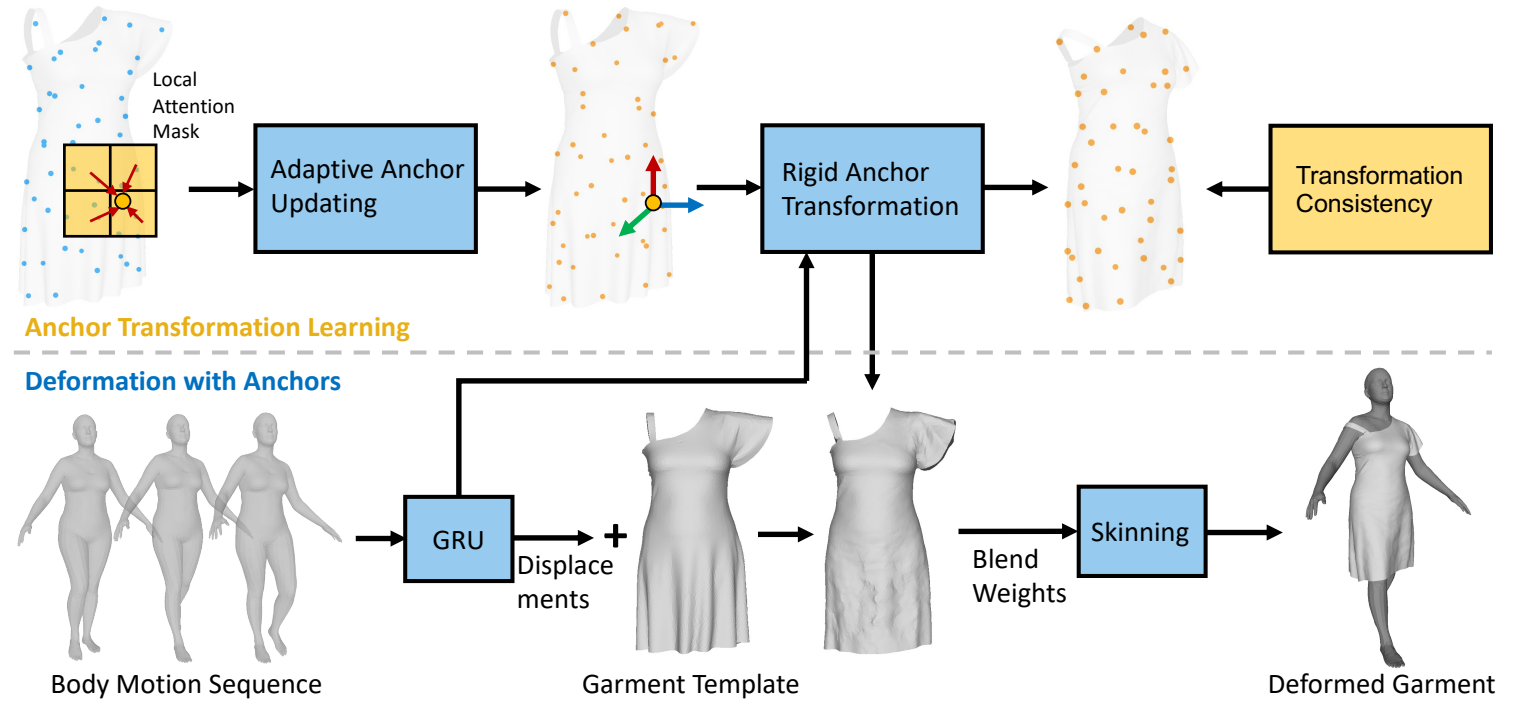


Figure 2. Overview of the proposed AnchorDEF.



# Motivation



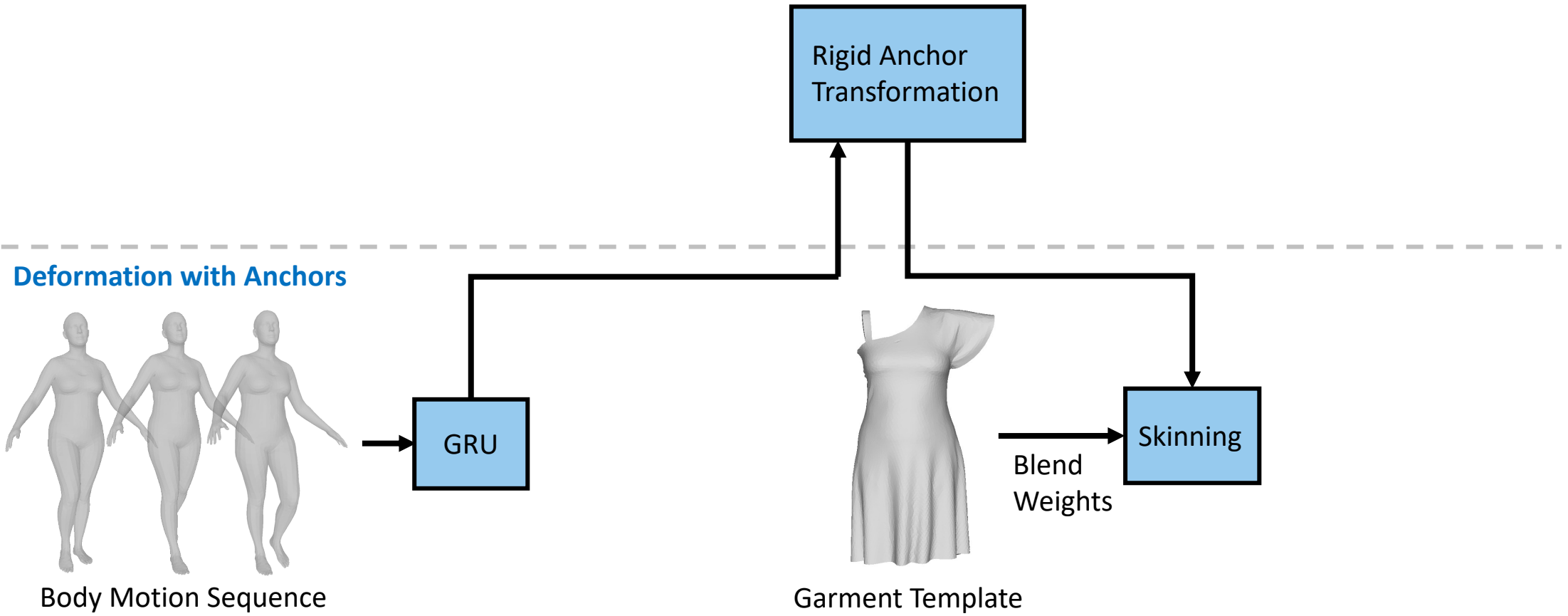
Physics based simulation (ARCSim, SIGGRAPH Asia 2012)



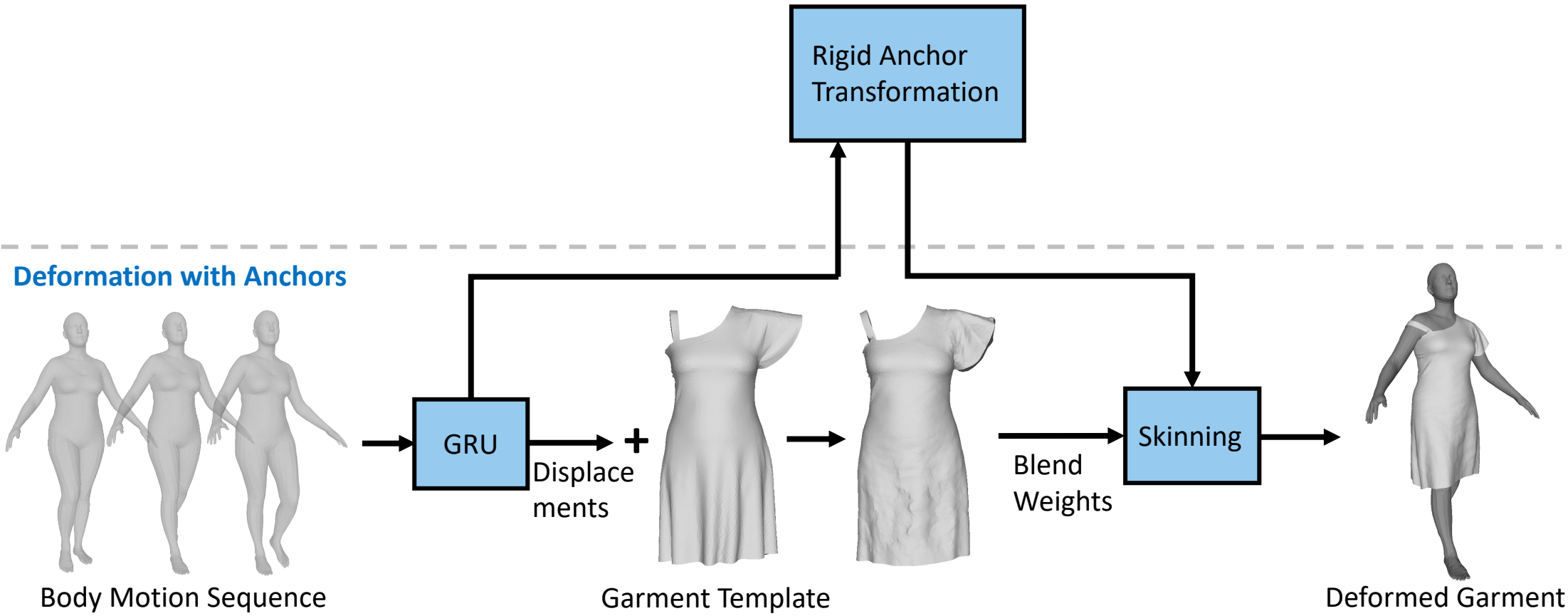
Data-driven methods (TailorNet, CVPR 2020)



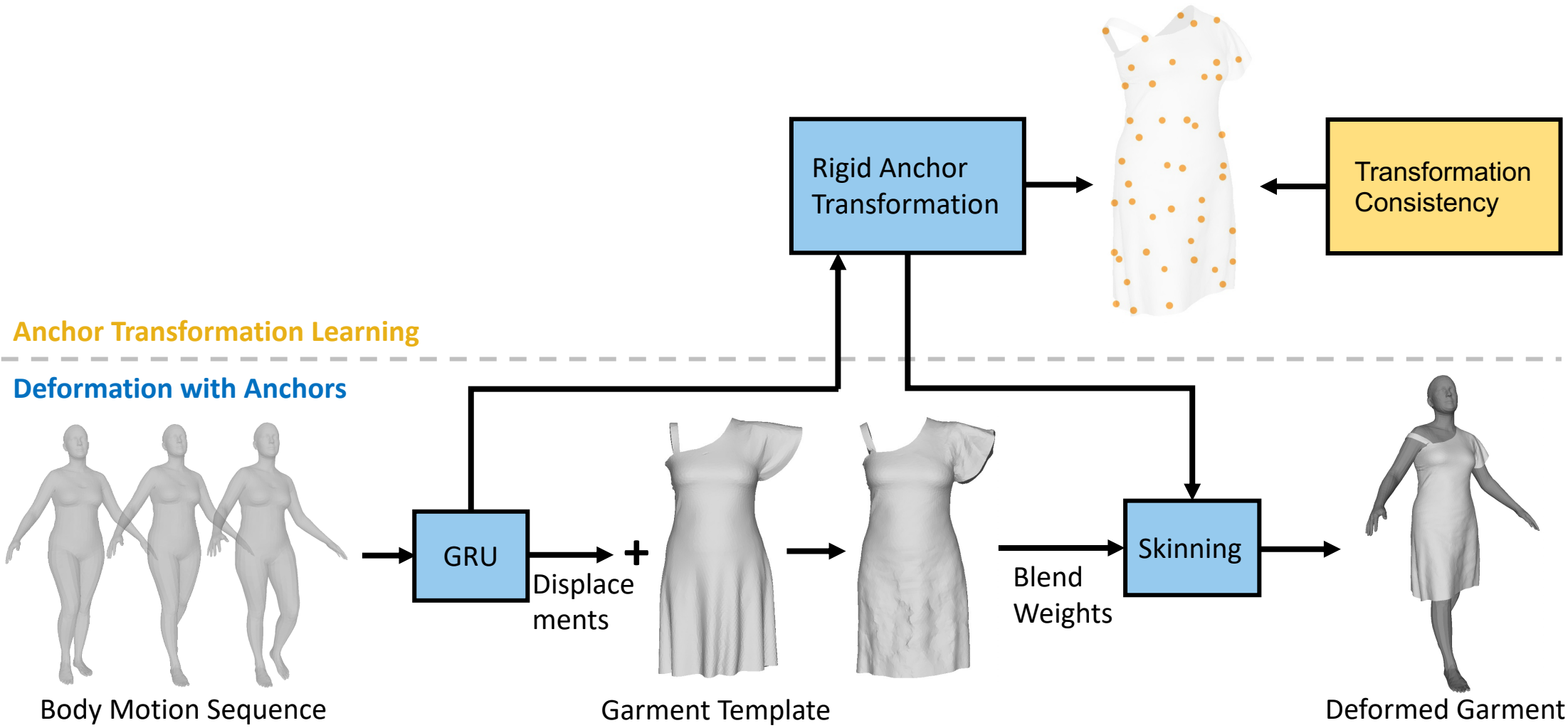
# Framework of AnchorDEF



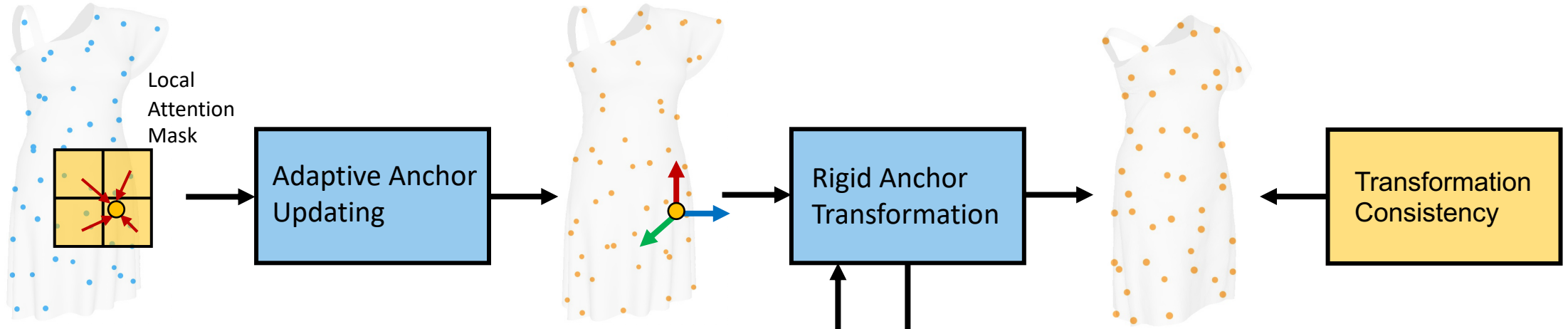
# Framework of AnchorDEF



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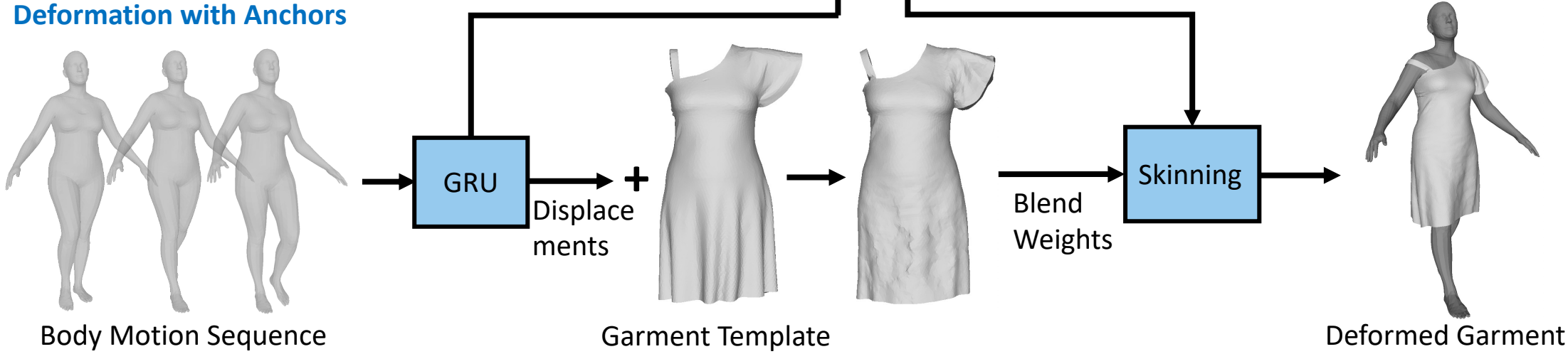


# Framework of AnchorDEF

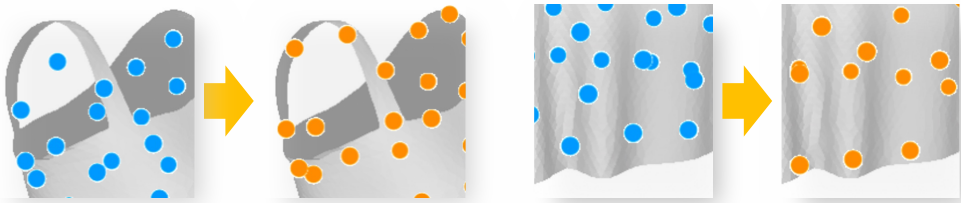


## Anchor Transformation Learning

## Deformation with Anchors



# Framework of AnchorDEF

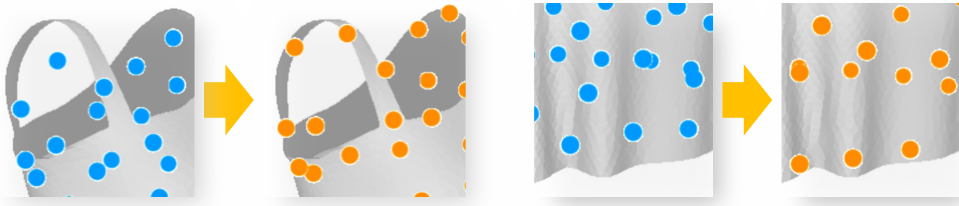


Examples of adaptive anchor updating by using the local attention mask with the mesh simplification as supervision.

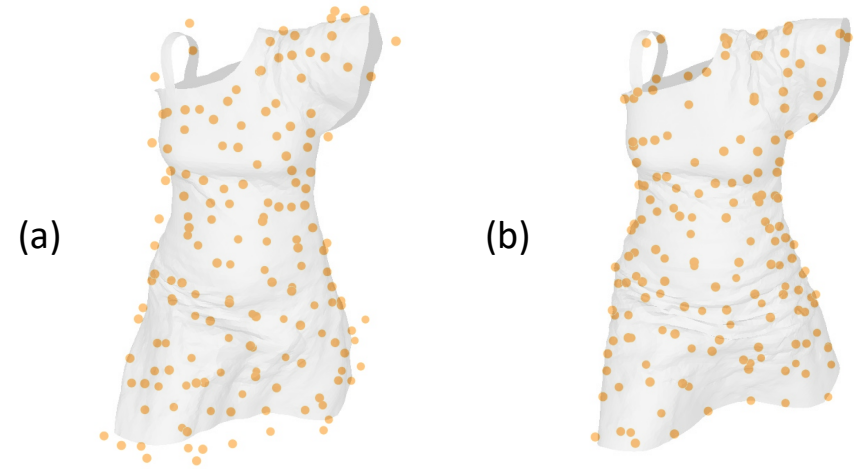




# Framework of AnchorDEF



Examples of adaptive anchor updating by using the local attention mask with the mesh simplification as supervision.

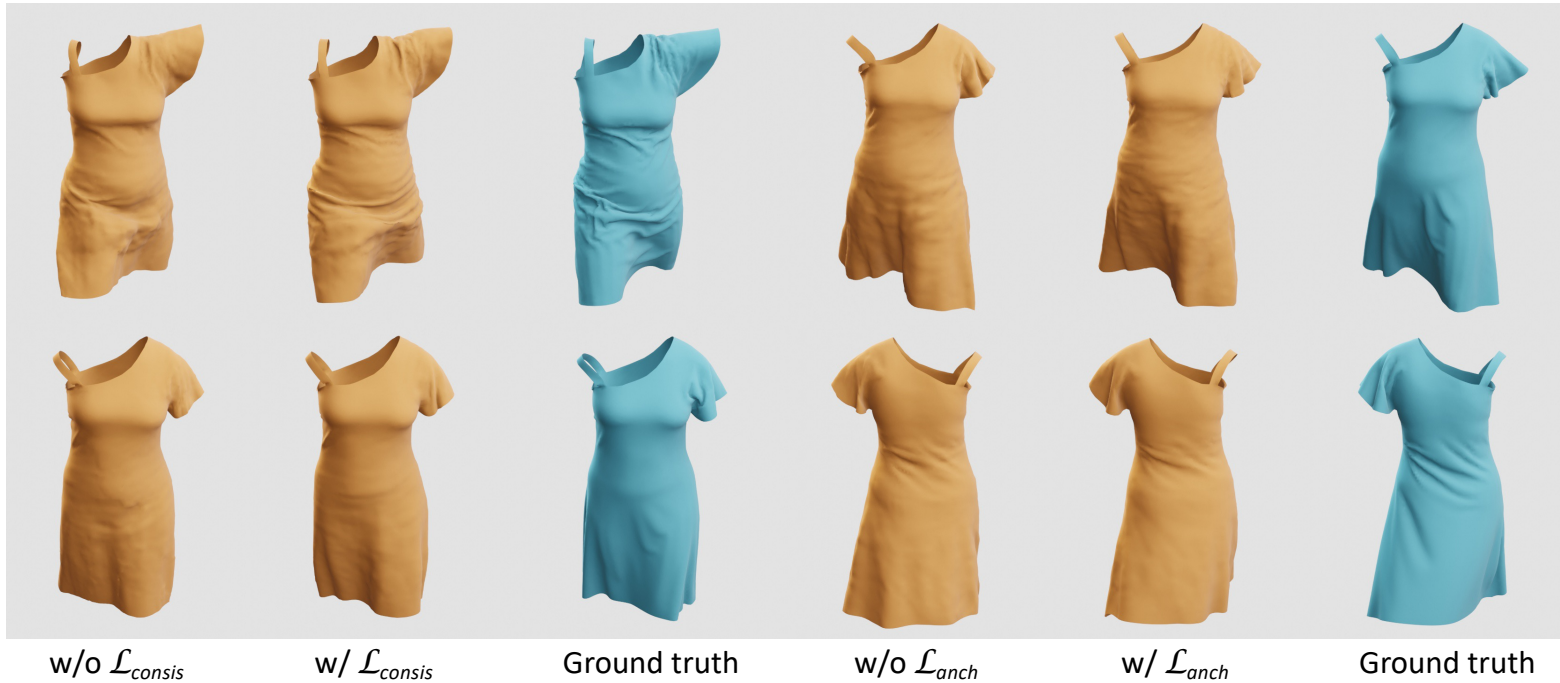


Visualization of anchors transformed by (a) only optimizing the mesh vertices during training and (b) AnchorDEF.



# Experiments

- Evaluation on anchor transformation consistency.

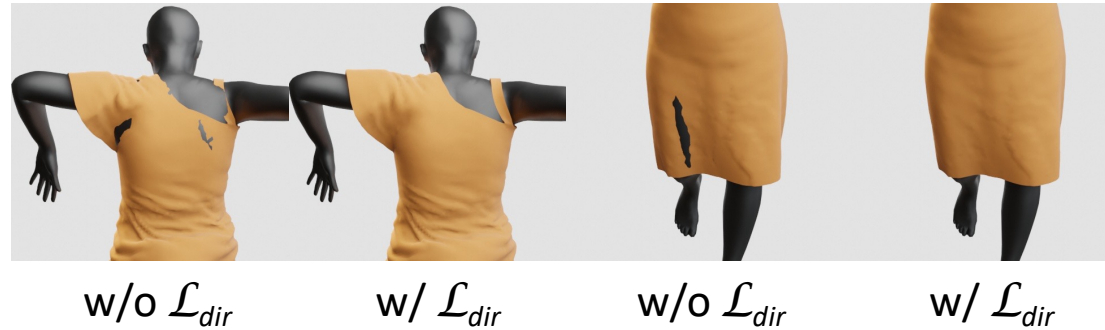


Methods	w/o $L_{consis}$	w/o $L_{anch}$	AnchorDEF
RMSE ↓	17.21	16.49	<b>16.05</b>
Hausdorff ↓	75.01	74.53	<b>74.20</b>
STED ↓	0.0595	0.0526	<b>0.0493</b>



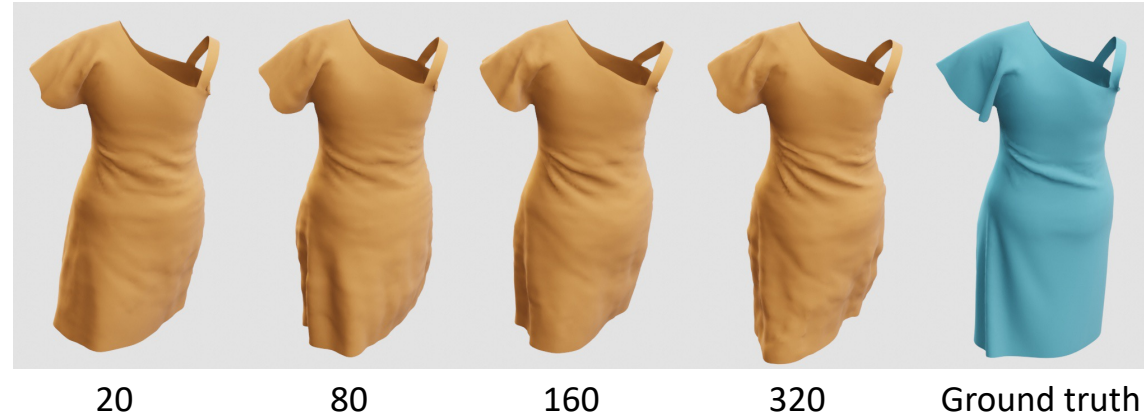
# Experiments

- Evaluation on the penalty on the direction from the target anchor to the transformed one.



# Experiments

- Evaluation on using different numbers of anchors.

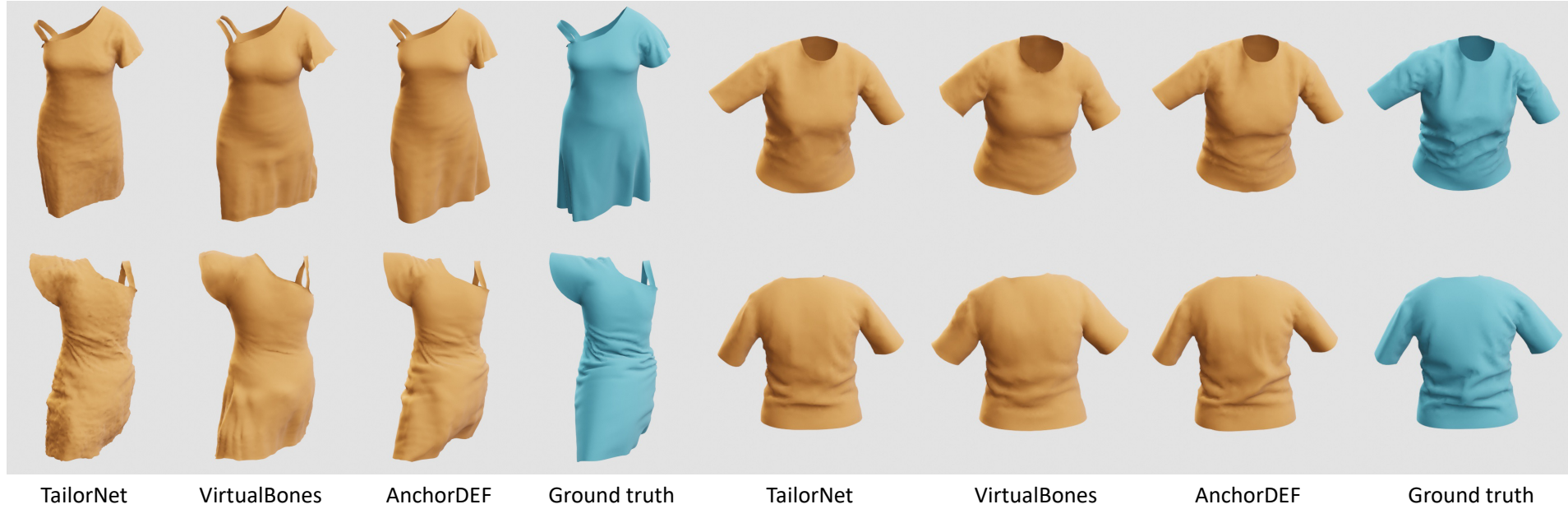


Num. Anchor	20	80	160	320
RMSE ↓	17.78	16.82	<b>16.05</b>	17.52
Hausdorff ↓	75.30	74.71	<b>74.20</b>	75.13
STED ↓	0.0620	0.0539	<b>0.0493</b>	0.0625



# Experiments

- Comparison with related 3D garment deformation methods on different types of garments.



Methods	Dress			T-shirt		
	RMSE ↓	Hausdorff ↓	STED ↓	RMSE ↓	Hausdorff ↓	STED ↓
TailorNet [27]	22.95	76.80	0.0757	9.90	27.02	0.0418
VirtualBones [26]	19.91	83.39	0.0722	10.52	31.51	0.0452
AnchorDEF	<b>16.05</b>	<b>74.20</b>	<b>0.0493</b>	<b>6.25</b>	<b>26.31</b>	<b>0.0262</b>



Thank you!

