

https://virtualhumans.mpi-inf.mpg.de/neuralgif/



Neural-GIF: Neural Generalized Implicit Functions for Animating People in Clothing

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Goal: We present Neural-GIF, to animate people in clothing as a function of body pose. Neural-GIF learns directly from scans, models complex clothing and produces pose-dependent details for animation.







- Neural-GIF, an implicit based re-posable character, which can be directly learned from 3D scans. Our model can represent complex character/clothing scans of varied topology and geometry.
- We introduce a canonical mapping network, which learns continuous skinning field in 3D space and unpose 3D points surrounding the scan to canonical T-pose, without explicit supervision.
- We introduce a displacement field network, which shifts points in the canonical space before evaluating the SDF, yielding in fine details and deformation.

Idea: Generalized Implicit Functions (Scarloff and Pentland, 1991) $\mathbf{R} \in \mathbb{R}^{3 imes 3} \; \mathbf{t} \in \mathbb{R}^{3}$ $\mathcal{S} = \{\mathbf{p}, f(\mathbf{p}) = \tau\}$ $\mathcal{S}' = \{\mathbf{p}', f'(\mathbf{p}') = \tau\}$ $f(\mathbf{p}) = \begin{cases} 0, & \text{if } \mathbf{p} \in \text{outside} \\ 1, & \text{if } \mathbf{p} \in \text{inside} \end{cases}$ $\mathcal{S}' = \{\mathbf{p}', f(\mathbf{R}^{-1}(\mathbf{p}' - \mathbf{t})) = \tau\}$

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$$\mathbf{p} = \left(\sum_{i=1}^{K} \mathbf{w}_i \mathbf{B}_i\right)^{-1} \mathbf{p}'$$

Dataset	NASA [18]	
	- Point2Surface ↓	IoU↑
CAPE [31]	10.67	0.918
ClothSeq	23.26	0.780
DFAUST [13]	10.52	0.939





