SMPLitex: A Generative Model and Dataset for 3D Human Texture Estimation from Single Image

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dancasas.github.io/projects/SMPLitex

Goal

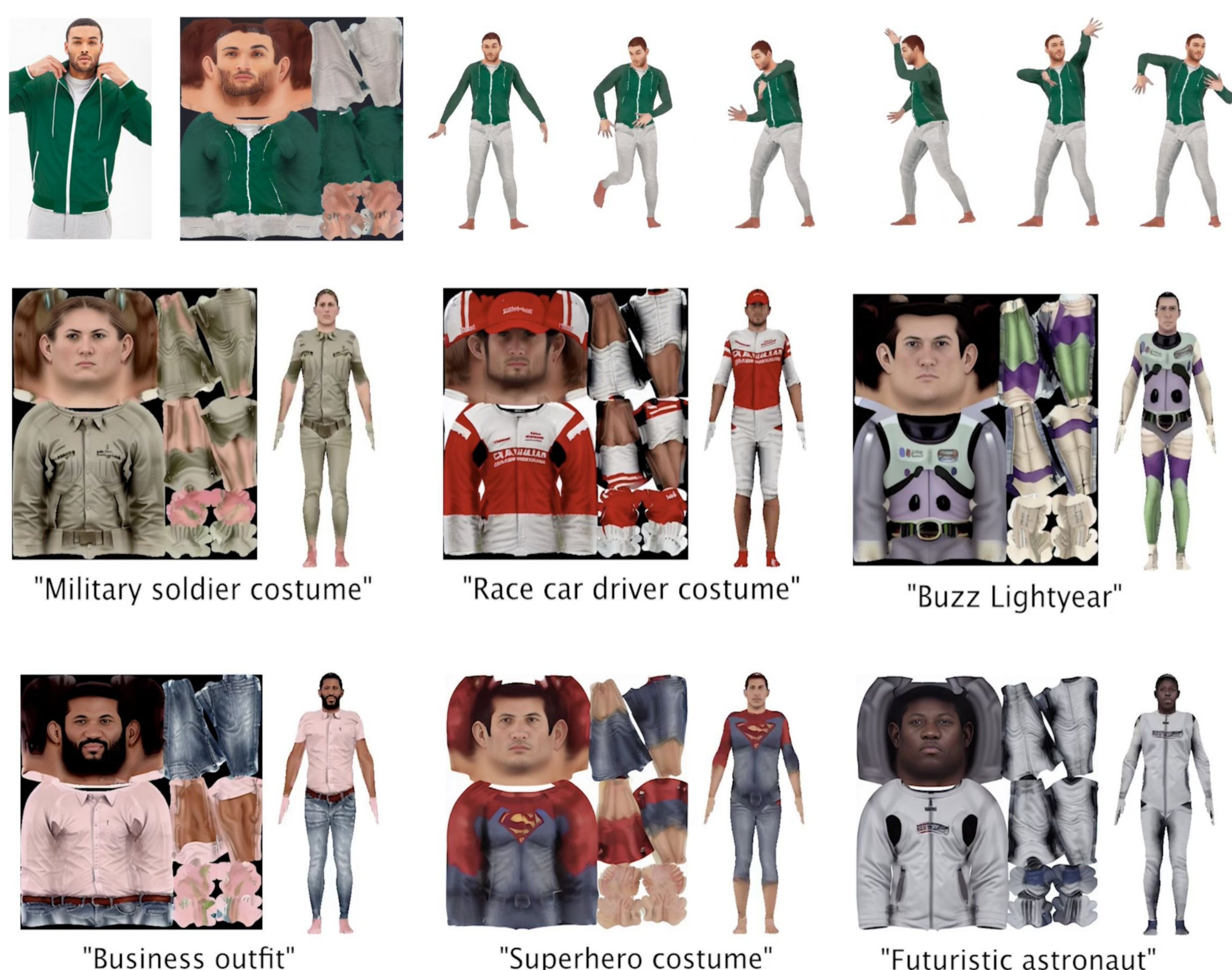Estimate the complete 3D appearance of a human from a single RGB image.

Contributions

- A new generative model for 3D human textures that can be used as a drop-in replacement for textures in any SMPL-based pipeline.
- A novel diffusion-based method to infer 3D human textures from single RGB input.
- A new dataset of high-quality 3D human textures that significantly surpasses the detail, diversity, and size of existing datasets.
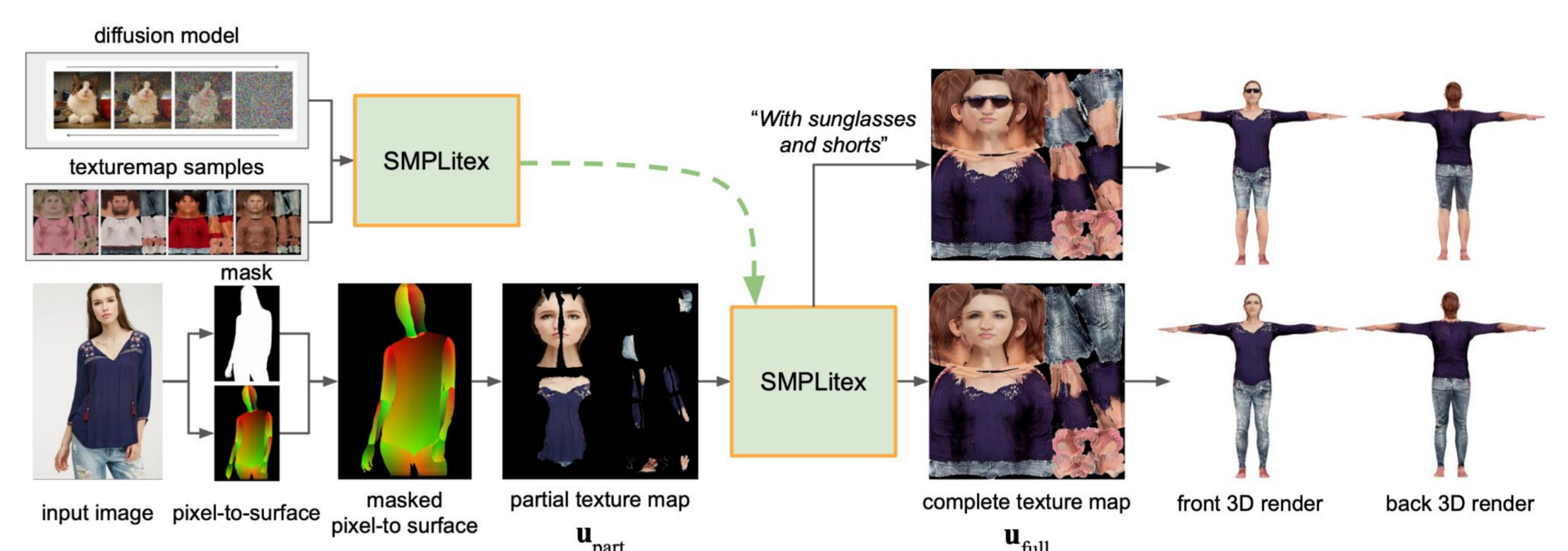
Key insights

- Project visible pixels into partial texturemap through pixel-to-surface correspondences.
- Fine-tune StableDiffusion on SMPL texture maps.
- Use inpainting capabilities of diffusion models to populate not-visible pixels in the input image directly on the texturemap.
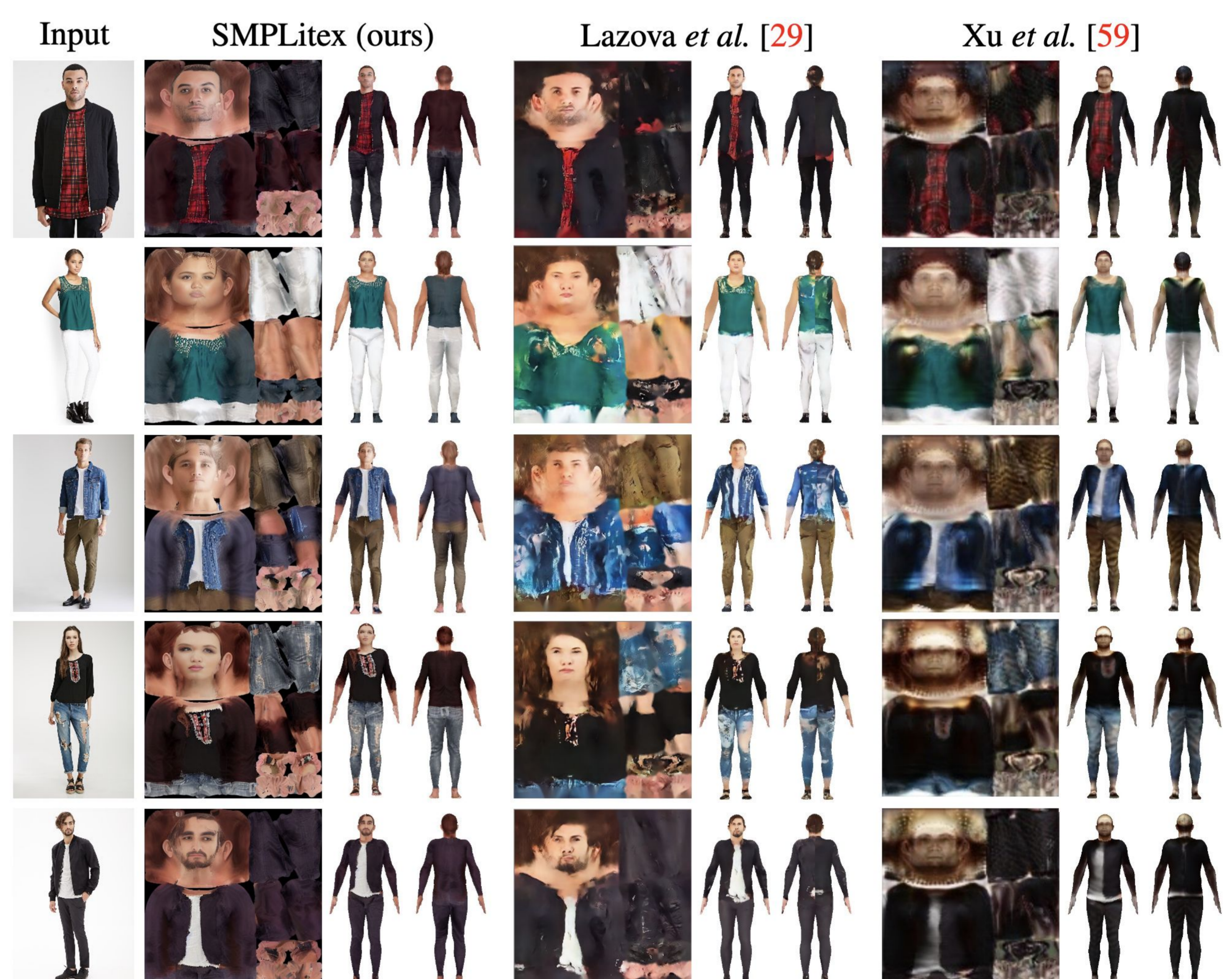
Results

"Military soldier costume"   "Race car driver costume"   "Buzz Lightyear"

"Business outfit"   "Superhero costume"   "Futuristic astronaut"

Pipeline

Comparisons to state-of-the-art

DeepFashion Dataset

Input | SMPLitex (ours) | Lazova et al. [29] | Xu et al. [59]

Market-1501 Dataset

Input | [59] | Ours | Input | [59] | Ours | Input | [59] | Ours | Input | [59] | Ours

THUman2.0 Dataset

Input image | Ours | [59] | Ground truth | Ours | [59] | Ground truth | Ours | [59]